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INTERNATIONAL RESEARCH CONFERENCE

13TH INTERNATIONAL RESEARCH CONFERENCE

HOLISTIC APPROACH TO NATIONAL GROWTH AND SECURITY

15TH - 16TH OCTOBER 2020

Allied Health Sciences

PROCEEDINGS

General Sir John Kotelawala Defence University

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General Sir John Kotelawala Defence University

Ratmalana, Sri Lanka

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Welcome Address

Major General Milinda Peiris RWP RSP USP ndc psc

Vice Chancellor, General Sir John Kotelawala Defence University

Honurable Minister of Education, Professor G L Peiris, the Chief Guest , Keynote Speaker, Secretary to the Ministry of Education, Professor Kpila Perera, Secretary to the Ministry of Foreign Affairs, Admiral Prof. Jayanath Colombage, Deputy Vice Chancellor (Def & Admin) Brig. Nanda Hathurusinghe, Deputy Vice Chancellor (Academic) Prof. Jayantha Ariyarathne, Deans of the respective Faculties, Directors of Centres, Academics, Senior Military Officers, Administrative Staff, Students and all distinguished guests who are connected with us in the cyber space.

First and foremost, let me very warmly welcome our chief guest, Hon Professor GL Peiris, Minister of Education for very kindly accepting our invitation and for gracing this occasion as the chief guest of this inaugural session of our international research conference 2020.

Sir, we consider your presence here this morning, as one of the most renowned scholars the country has ever produced in the field of Law, as a great honour to KDU. Let me also warmly welcome our keynote speaker, Prof Kapila Perera, Secretary to the Ministry of Education, who is having a very close affinity with KDU as an illustrious member of our alumni association.

Then I also welcome Admiral Professor Jayanath Colombage, Secretary to the Ministry of Foreign Affairs, and other distinguished guests and invitees participating on line as well. KDU, from its inception, was instrumental in handing down the core values of security to the development paradigm in Sri Lanka.

This year's theme 'Holistic Approach to National Growth and Security" highlights the importance of maintaining a harmonious blend in security and development in all national projects. As you are aware, this year's conference is taking place amidst very challenging circumstances, so much so that, it becomes a landmark event of KDU in terms of its resolution to ensure the continuity of events at KDU even under the most trying circumstances. And this conference is also significant because the year 2020 marks 40 years of existence of KDU since its inception in 1980.

KDU, initially established as a tri-service academy known then as KDA or Kotelawala Defence Academy, marked a significant diversion in 2008 with its renaming as General Sir John Kotelawala Defence University. Since then, with the guidance and vision of His Excellency the President Gotabaya Rajapakse, as the then Secretary to the Ministry of Defence and the Chairman of our Board of Management, KDU kept a giant leap forward to become a fully-fledged university with nine academic faculties and a University Hospital with state-of-the-art facilities. With this phenomenal change, KDU began expanding its horizon to provide its high-quality higher educational opportunities to civilian students, thereby reducing the burden on other state universities of the country in supplying for the higher educational demand in the country. Today, the University is ready to march forward steadfastly contributing to the national needs combining the national security domain with higher educational needs of the country.

Ladies and gentlemen, KDU international research conference has been attracting local and foreign presenters, participants and more importantly renowned scholars and professionals of the highest caliber both locally and internationally. However, in this year, the global pandemic situation has restricted having them physically present at KDU. But many of our invitees will join us on line to enrich the deliberations through this novel experience of having the conference on a virtual platform.

I reckon that this is a blessing in disguise for us to travel on untrodden paths for new discoveries. KDU IRC has been instrumental in establishing and strengthening the much needed research culture not only at KDU but also in the whole country.

We have been attracting papers from almost all universities, from many research institutions and other organizations representing even Batticaloa and Jaffna, which I reckon is a very encouraging sign. And the impact of the growing research culture was evident during the first breakout of Covid 19 earlier this year, where our staff and students were researching day and night for creating various products and inventions of our own to help the fight against Corona. So, it is heartening to note that in this year's conference, there are many research papers reaching the conference secretariat, which involve the student community of our nine faculties.

Therefore, we are proud that we have created a platform for emerging researchers and scientists for showcasing their research outcomes at KDU research conference. And it is our fervent belief that inculcating and fostering the research culture and enhancing the quality and quantity of research in various disciplines in the country can raise the resilience levels of society and the nation as a whole.

This year's conference has attracted six hundred and fifty plus paper submissions, which I believe is a very clear indication of the right enthusiasm growing in the country towards research, particularly in development and security domains. So we are proud as a university to be able to stand up resolutely to fulfill the needs of the nation, especially at a time when such efforts are very much needed. I believe the efforts of security-based education aiming at strengthening national development should be more cooperative in the future and KDU has always facilitated any research efforts that strengthens the national security of our nation. We urge the academic community of Sri Lanka to join hands with us in all our future endeavours to support the nation especially through productive research in diverse disciplines.

The organizers of the KDU international research conference intend to set the tone to initiate more collaborative research at national and global levels. This research conference is an ideal platform to make connections. I hope that authors of KDU and various other local and international universities will take the opportunity to interact and develop friendly relationships, establish networks and to explore win-win situations.

I wish all the very best for the presenters and hope you will enjoy every moment of this academic fusion taking place on two whole days.

Finally, let me once again welcome our chief guest and the keynote speaker on behalf of all KDU staff. I wish that presenters and participants would have all the courage to continue their pursuits with determination to link up with the international community and work towards national growth and development through their research.

Thank you.

Chief Guest Speech

Prof. GL Peiris

Honourable Minister of Education, Government of Sri Lanka

Major General Milinda Peiris, Vice Chanceller of the Sir John Kotelawala Defence University of Sri Lanka, Admiral Professor Jayanath Colombage, Secretary to the Ministry of Foreign Affairs, Professor Kapila Perera, Secretary to the Ministry of Education, Deputy Vice Chancellors, Deans of Faculties, Heads of Department, members of the staff and students of this university, friends well wishers, ladies and gentlemen. I am delighted to be present with you on this occasion for the 13th International Research Conference. I am no stranger to these surroundings. I have been consistently associated with your work during the progress of your university until you have reached the stature that we all are proud of at this time. There is no doubt that with the nine fully-fledged faculties that you already have and your plans further to expand this university particularly bearing in mind the priorities of this country at this moment. I am particularly happy about your plans for the establishment of a Faculty of Criminal Justice. I think that is certainly an area that is worthy of focus and attention. So you have always assessed, evaluated very accurately the needs and priorities of our country in the field of Higher Education. And you have been very quick to respond to those needs. That innovative approach is much to be admired. And these are among the reasons why I have particular pleasure in joining you in these deliberations. There is one another matter that I would like to mention. It is this that you are having this conference for the 13th consecutive time. It is our experience in this country that many good things are planned and inaugurated. It is much more difficult to follow through. So the fact that you have been able to do this without interruptions for 13 years adding to your expertise as you go alone improving and expanding towards what you are attempting. It is greatly to be admired the sense of perseverance and determination that is greatly required in this country at this moment and your performance is an inspiring example of what we all need to carry the country forward to even greater heights.

Now the theme that you have chosen for this 13th International Conference is extremely appropriate from many points of view. You have heard representation from many countries as Major General Milinda Peiris, Vice Chancellor explained a moment ago. You are holding this conference in exceedingly challenging circumstances. Again you have been to adapt to difficult circumstances.You are resorting to modern technology to include and involve foreign participants in these deliberations even though they are unable to present with us physically on this occasion. The topic that you have chosen is the holistic approach to national growth and security. I think that is extremely relevant to present day needs in Sri Lanka today.

The first point I would like to make is that there is an intimate connection between national growth and security. It is fanciful to talk of any kind of national growth without the assurance of security. Security is a necessary and indispensable foundation. Without security it is impossible to achieve growth in any sector of the economy. The celebrated Political Scientist the late Professor Harold Laski of the London School of Economics said that the basic duty of a state is to provide security for its people. That is the ultimate reason for the existence of the nation state. The theory of the Social

Contract which has been developed by writers like Lock and Rousseau emphasizes the fact that the public have given the authority to state principally for the reason to create conditions in which life can go on in an orderly and frank manner so that the citizens of that state can realize their fullest potential as human beings, develop themselves and develop the community in which they live. In order to do this the essential condition is security. Without it nothing at all can be accomplished. Now we have seen empirical evidence of this in the recent past of our country through the 30-year conflict with the Liberation Tigers of Tamil Eelam. It was impossible to attract substantial investment into this country. Every facet of Sri Lanka's economy suffered grievously during that period. How can you attract investors into a country which has been thrown asunder by a ferocious war? Investment, international trade all this was affected by the ongoing conflict. I would also like to make a reference to the concept of reconciliation which became very relevant and important after the end of the war in 2009. There was then naturally the feeling that we have to leave the pain and anguish of the war behind us. We have to emphasize unity and the solidarity and bring together all the people of our cherished land irrespective of caste, creed, ethnic or religious identity to emphasize the oneness of the nation. That was the pith and substance of the concept of reconciliation. But it all went wrong during the *Yahapalana* administration of 2015 to 2019. And it is worth examining in an objective spirit the reasons why that endeavour failed so miserably. I think the basic reason is that the authorities at that time forgot the sentiments, the feelings and aspirations of the majority community. Reconciliation of course bases emphasis on minority aspirations to make them comfortable, to convey to them in definite terms the impression, the conviction that they are very much part of the country. They belong, the sense of belonging so that confidence should be imparted to minorities, and at the same time, it is absolutely necessary to carry the majority community with you. If you lead them behind if you engender in the lines of the majority community that they are not important, they can be sidelined, they do not matter, such an exercise in reconciliation is doomed to failure as empirical experience in those 4 years convincingly demonstrated. What happened during that period? I think the most alarming spectacle that we are seeing in this country today is evidence that is transpiring in daily basis before the Presidential Commission that is going into the catastrophic phenomenon of the Easter Sunday Attack. Evidence has been given by one witness after another, the Inspector General of Police, the Secretary to President, the Secretary of Defence, all these people. Their evidence emphasizes the total breakdown of this security apparatus in the country. It is not mere debilitation or weakening of security apparatus it was total collapse of it. There was no security apparatus functioning in this country at all in any realistic sense. So it led to the loss of 265 valuable lives of this country and crippling of many other citizens of our land. Why did this happen?

When the present President, His Excellency Gotabaya Rajapaksa was Secretary to the Ministry of Defense, there was a very close collaboration between the intelligence arm and immigration. Whenever an application was made by a foreign preacher somebody who wants to come and teach in this country, when visa was requested a very thorough background check was done. As Admiral Professor Jayanath Colombage would bear witness the antecedent of the person applying for the visa was thoroughly examined. And if there was anything unsavory in the past of that person, if he has been involved in any activity which led to

disharmony among communities, then the immigration authority in close consultation with the intelligence arm would turn down such a request for visa in this country. That whole apparatus was consciously and deliberately dismantled. It did not happen unwittingly or inadvertently. It was deliberate government policy. So intelligence personnel were made to feel that they were in embarrassment. The less that heard from them, the less they were seen the better. That was the environment which prevailed at that time.

Surely, if you are talking of national growth and security, the first thing to ensure is that funds that are coming from abroad had to be brought into the country through proper channels. We have in this country such an established conduit. The conduit is the External Resources Department of the Central Bank of Sri Lanka. Of course resources are welcome. But they must come through the External Resources Department. We must know the source, the origin of these fundsand where are these funds coming from? We must know the purpose for which these resources are going to be applied, who is going to manage these resources? There must be an auditor accounts. All of these were dispensed. You had a situation where a university was built. What is the purpose for a university to come up in Kattankudy. The facilities, the buildings that are constructed, they are better than the buildings that you have here at the Kotelawala Defence University. They are superior to the quality of the infrastructure in the universities of Colombo and Peradeniya. If you go to Kattankudy blindfolded if the blindfold is taken off when you get there, you will feel that you were in the Middle East. The Palmyra trees, the architecture the overall environment. The sums of money involved are colossal. There is no exposure, visibility or accountability. It is that brought about a situation that culminated in the total collapse of this security establishment. Madrasas can be all over the country. There are no Sunday Schools. They are providing many of them on daily basis. Nobody examines the curricula. There is no regulatory mechanism at all. So the seeds of racial hatred are sown by those institutions. Of course there must be freedom with regard to imparting instruction. But clearly there must be some supervision, some control, some regulation. That was totally lacking. So the country then paid the supreme price for the neglect of security in pursuit of narrow and particent and political objectives to placate aggressive minorities, not law abiding members of minority communities, but people who were intent on the destruction of the very social fabric of the country. So that was our sad experience.

This is true not only within the country, but also in the conduct of our foreign relations. What happened there? Sri Lanka is unique among the nations of this world in committing to a resolution in 2015 in the UN Human Rights Council. Sri Lanka became a co-sponsor of a resolution in condemning its own armed forces accusing its armed forces of the gravest crimes under international law and under the international humanitarian law because the preamble to resolution 13/1 of the 1st of September 2015 acknowledged with appreciation the report of the High Commissioner for Human Rights. And the High Commissioner's report makes the most damaging allegations against the armed forces of this country. And the government of Sri Lanka endorsed all of them and called for a thorough investigation at the international level. The resolution gave responsibility to the Human Rights Council and to the Commissioner for Human Rights to keep Sri Lanka under constant review. So here was a government which consciously, voluntarily, deliberately submitted the country to adjudication and assessment in respect of its armed forces to international tribunals

where justice considered the inanity of what happened. There were pledges given. In resolution 13/1 and 34/1 which are clearly contrary to the highest law of this country, the constitution of Sri Lanka operating para 6 of the first resolution 13/1 recommended that foreign judges of Commonwealth and other foreign judges should be entrusted with the task of judging our armed forces and of course, members of the civilian population. This is not possible under Sri Lanka's constitution because foreigners cannot exercise judicial power in respect of our citizens. And then the High Commissioner for Human Rights, Prince Hussein publicly conceded that in respect no other country has a Human Rights Council based in Geneva adopted so intrusive approach – so intrusive, interfering directly with domestic policy in that country. To what extent did this go? The resolutions involved matters which are clearly within the domain of the Sri Lanka's parliament not the business of foreigners. It called for constitutional reform. It called for devolution of greater powers to provincial councils. It called for thorough overhaul of Sri Lanka's armed forces and the police. It called for the repeal of the prevention of terrorism Act and its replacement by alternative legislation. Members of the Sri Lankan armed forces and the Sri Lankan police force were to be subjected to special criteria when they applied to join UN Peacekeeping forces abroad and even to enroll for programmes of training. So this is the extent to which national dignity and pride was compromised in order to placate foreign interests whose aims and objectives were incompatible with the well-being of this nation.

So this attitude which destroyed the very foundations of our national security manifested itself both in respect to domestic policy and the conduct of country's foreign relations during that period 2015 to 2019. In such a situation you cannot possibly have national growth. You cannot have economic advancement because security has broken down entirely.

Just one another point I want to make before I conclude, and that is the reference to militarization in the current political discourse. Non-governmental organizations and elements of the opposition as well as some prejudiced and biased foreign commentators are finding fault with the role of the military in the conduct of national affairs in Sri Lanka at this time. But no objective observer of the Sri Lankan scene can doubt the fact. When it came to the control of COVID-19, this country could not possibly have achieved what it did without the vigorous involvement and cooperation of the armed forces, particularly the intelligence arm. We were able to control the pandemic because the armed forces were able to identify those who have been infected, first the immediate circle and then the outer periphery. That is still being done, yesterday today it is being done. And the role of the armed forces is indispensable. Without them the situation would be far worse than it is. Why is there this kind of hostile attitude towards armed forces? I think people who subscribe to that point of view failed to distinguish between the culture of east and west in this regard. Cultural attitudes, assumptions and values are in critical significance in this area. The attitude in this country, the attitude of the public, of ordinary people, to the armed forces is not what prevails in some western countries. The armed forces are not looked upon with fear. They are not regarded as instruments of oppression. On the contrary, after the war ended in 2009, it is in effect the armed forces, they got involved very intimately, very vigorously in uplifting the social conditions in the people affected in areas. They built houses. They made water available. They played a role in restoration of agriculture. And I know personally because I have seen in

my own eyes that armed forces of this country even helped in the constructions of latrines, of toilets in that part of the country. These are not regular functions of the armed forces. But because of the culture of our country the social morals the value system based upon empathy and compassion which is the hallmark of Sri Lanka's culture. That was the nature of the role that was performed by the Sri Lankan military. It is this fundamental fact that is not taken into account. In critiques of the present scene who find fault with the armed forces forget their involvement in national activity on broader scale.

So these are some of the remarks that I would like to make to you on this occasion. I am very happy that you are having this 13th International Research Conference. I am very happy that you have chosen a topic that is extremely appropriate. You have chosen a more relevant topic for this time. As the Minister of Education also with the responsibility for higher education in this country, I am very proud of the achievements of your institution, what you have been able to accomplish within so brief a time span. The needs of higher education in this country are very urgent when more people are clammaering for access to higher education, in our ministry, with the active system of Professor Kapila Perera who is rendering a yeoman service in that regard, we are trying to bridge the gap between education and employment opportunity. We are talking to the major Chambers of Commerce they provide the jobs in the private sector to ascertain from them the employment opportunities that will be available in their institutions during next three or four years, what are the skills which we are looking for? Because they are telling me it is not that we do not have jobs to offer. We have jobs. But when we interview people we find that they don't have the skills which we want in our institutions. So we don't want to enhance a reservoir of angry and frustrated young people. We want to ensure that there is a co-relation between the education that is imparted in our institutions and the skills for which there is an identifiable demand in the market place. So these are some of the adventures that we have embarked upon. We are also looking critically at our curricula which are obsolete and anachronistic. They have not been revisited for a very long period. There must be in line with the needs of our society methods of teaching. There is far too much emphasis on rote learning in memory that students have required to commit their notes to memory, retain in the memory and reproduce it at the examination that is antithetic of the education. Education comes from Latin words '*educate*' which is draw out not to force in vast volume of actual material into mind of the students. So purpose of the education is to develop the analytical and the critical faculty of the student to encourage him or her to think for himself or herself and apply that volume of knowledge to face the challenges of life. So in the midst of all of this, in confronting the formidable challenges, I am very confident that your institution, Sir John Kotelawala Defence University will render an invaluable service. So I congratulate to you on your achievements of the past and I wish you well for the future. I know that you will continue to do your country proud. And I thank you sincerely for the honour that you have bestowed upon me by inviting me as the Chief Guest for these deliberations.

Thank you

Keynote Speech

Prof. Kapila Perera

Secretary, Ministry of Education, Government of Sri Lanka

Ayubowan! Wanakkam! Assalamu Alaikum! The Vice Chancellor of General Sir John Kotelawala Defence University, Major General Milinda Peiris, the Chief Guest today my honorable Minister, Ministry of Education, honorable Professor G.L. Peiris, Deputy Vice Chancellors, Deans of the Faculties, Heads of the departments, the Secretary to the Ministry of Foreign Affairs, Professor Admiral Jayanath Colombage, all the foreign participants who are joining this 13th International Research Conference at KDU, all the presenters, moderators, session chairs and all the distinguished invitees. Thank you very much for inviting me to deliver the Keynote Speech under the theme 'Holistic Approach to National Growth and Security.' I am indeed honored and privileged to be here having witnessed the very first one 13 years ago, and it happened to be General Milinda Peiris who was the Vice Chancellor then as Major General and we witnessed the presence of the Chief Guest as the Ministry of Higher Education, Ministry of Research and Technology.

I would like to start with this quote from the Chief Guest, "We do not want to have a reservoir of angry uncontented people." I was one who had gone through in 1971, of course not in the country in 1988 -1989 and then in then 1983 as a university student, and many times during my academic career where there were disruptions to education, holding back the desire to fulfill or acquire knowledge with my colleagues, peers and the rest of the people due to the lack of security. I know how I felt then as a student. I think I was in grade 4 in 1971, and then in 1983 in my second year at this very same premises, the education of ours were disrupted. And the feeling of those delays due to the lack of security, and the Cheif Guest elaborated in deep sense of comprehension how security is important for the national growth. If I look at what is this traditional approach that is often based on defensive security policies as we had during my time at different ages. We had always defensive security policies. However, the persistence of strong security measures generates inecure feelings. I hope you agree with me. If there are strong security measures that generate insecure feeling as it reveals the presence of threats. So these are some of the things that people quote. Then again the democracy, well-being and freedom are some of the elements that we feel that we reduce this feeling of insecurity by reducing both threats and activities that we feel. Even if you take a house if you feel this insecureness due to lack of security this might not allow you to think, generate analytical skills. You are always worried about the security. How to provide security to your children and for yourself? And then it hinders and it slows down entire process of nurturing, acquiring knowledge. And then that it is halting the growth. so you start from the small households or individuals then if you take as a whole family, a village, a township and then provinces as a country, it basically retards the national growth. So, therefore, we need to have this thinking of holistic approach to national growth and as you and I understand there are necessary and essential conditions when we learn mathematics for certain things. The Cheif Guest emphasized repeatedly the essential elements and in our academic mathematics there are sufficient and necessary conditions or essential conditions for forming mathematical theories there are certain

things. Likewise, it is essential to have security for national growth.

When it comes to economics, always and even for decades, the GDP strongly criticizes the measure of development. Still the role of economic systems neglecting the goal of global capabilities and expansion holds this economic growth or national growth. But the concession of development based on the glorification of individual success and the pushed capital accumulation hardly allows reducing insecurity and increasing freedom. So security becomes an individual good and relies upon ineffective defensive policies that we have practiced in the past unlike in the present. So development, well-being, security and freedom are strictly interrelated. Individual capabilities imply collective capabilities. Even in free market economies often human needs such as food, housing, employment, health care, family policies, fresh water, security and safety can be put in a market under regulation or collective governance, and those things even the Chief Guest highlighted. The need for water, need for food, how the security-- food security and water security ensure the getting this national security when you combine all these types of security the national growth under war conditions. So these goods are often under political debate as they are critical for development and social cohesion. The more they are shared among the large part of the population the less we experience social conflict and political instability. Security hardly is achievable individually. It is the result of more holistic thinking. Individual security and freedom implies the security and freedom of all. As I mentioned before these are interrelated. And if you look at or if you study research and in future research all these studies can help in understanding human capabilities and pathways towards collective security and enhance development. So instances of participation in definition of security needs would make citizens able to feel at the center of development goals. So therefore, unlike in the past where we did not think holistically and the interrelations between the security and the national growth. Then we will fail. Even the theories in the literature highlights this one.

As far as Sri Lanka is concerned the contemporary security concerns that we face as an Indian Ocean country are broader and more complex, that need not be elaborated, than any state in our history. This will continue to exist. We can't say that this will stop today, tomorrow, next year or in ten years' time because the geopolitics and the race for the arms business and economic development, all these things will continue to grow, sometimes exponentialy. So therefore, national security cannot be neglected and cannot be just let it go as the Cheif Guest mentioned, even in a fraction of a second, it is very important. Otherwise there won't be any growth. As the Secretary to the Education, in the present context the role played by ensuring a secure environment for the student to go and sit the examination. They are not in a position to concentrate on answering the questions if the place is not secure. So if we are not able to hold the exams and continue to postpone, then we cannot achieve and we cannot predict national growth. So in this context the role played by the national security is to be commended as the Ministry of Education. I know personally the quick response to ensure secure examination centers for all of us for the future of Sri Lanka. Under these conditions even the identification of COVID origin in the recent past, you have to have peace of mind to concentrate on everything. That is basically if you only think of one place, one center out of 2,646 examination centers, then there will be lack of security in different centers. So therefore, you have to think holistically. Only the one aspect of securing

one place will not enable for us to continue this one and therefore the results will come in future in terms of national growth. So the range that concerns arise from threats to system that allows society to control intergroup and interpersonal conflict to more recently reorganized concerns associated with threats to social and economic systems. Once these events start to influence the policy and the economy of a country with a national resilience, that country will perish. One way of addressing this emerging situation is by promoting more and more research and development.

KDU, boasting with diverse nine faculties and through two new faculties to come, the Faculty of Criminal Law and the Faculty of Technology, is going to expand and provide opportunities and platforms for you to think, ponder in a military environment and inviting day-scholars giving the signal that is very important for you to mix each other understand the role of the military or security for the civilians, 22 million people in this country, how important the national security and the training in a military set up to achieve the common goal of national growth. So the KDU is at the forefront of researching the development and security related problems holistically. A holistic approach is needed to understand contemporary complex situations and circumstances. University education could inculcate co-values of security and development such as human dignity, integrity, democratic participation, sustainable development, economic equity, mutual understanding and respect and equality of opportunity. The three flags that are behind bring all three forces together, thanks to the KDA then, and how important this mutual understanding in the war was understood and it helped to coordinate things in a better manner. You trained officer cadets together and they understand the security roles in the air, at sea, on land. I am sure that it could have been the catalyst then. Now you bring the third aspect the day-scholars. So this is holistic thinking. Like I started at the beginning it was not there then. We had three academies that did not know each other, but how had it come during the time when the national security was at risk. So ultimately the beneficiary is national growth. The honorable Minister, the Cheif Guest mentioned how difficult it was for Sri Lanka to attract foreign direct investments. As I think Minister of Enterprise Development, Foreign Minister, Foreign Secretary. If you don't have security and thrust, nobody would come. But when you train together military and civilians with hand and hand, it would provide an ideal platform. The importance of civil-military relations and how KDU is instrumental in developing the above mentioned areas is to be commended. By promoting civil-military relations through education, a country could raise the resilience levels, like I mentioned, of communities. Honorable Minister spoke at length and elaborated that you have to have a strong commitment and the political will to ensure the security of this country. If these elements, instruments fail, the first thing that is going to effect is the education of the future generations. Even for me, the Oxford graduate, Rohdes scholar, I am a pupil. And this has provided opportunities and the responsibility to the government to ensure the security. So all spheres of activity will simultaneously grow ultimately culminating in national growth.

These are the few thoughts that I have to share with you. I would like to extend my gratitude on behalf of the Ministry of Education for having me and inviting me to deliver the Keynote address and set the platform for the next two day deliberations. And I wish all the success in the deliberations and creating more networks and have future directions for years to come in this context of national security that you have chosen today.

Whatever that you are going to do, base national security at the forefront. So divided we lose together we win. And I wish all the very best and thank you very much for all the participants and the people who have submitted papers, presenters, moderators, and session chairs. You are plying a very important role in this context of national security and the national growth.

Thank you very much!

Vote of Thanks

Dr. L Pradeep Kalansooriya

Conference Chair, 13th International Research Conference,
General Sir John Kotelawala Defence University

It is with deep appreciation and gratitude that I present this vote of thanks on behalf of the organizing committee of the 13th International Research Conference of the General Sir John Kotelawala Defence University.

First of all, I convey my heartiest thanks to Professor G.L. Peiris the Minister of Education, a distinguished academic who spared his valuable time with us on this occasion. Sir, your gracious presence amidst busy schedules is truly an encouragement and it certainly added the glamour and value to this important event.

Professor Kapila Perera, the Secretary to the ministry of Education, also a distinguishable academic and a senior military officer is a proud product from our own institute. Sir, I greatly appreciate your willingness without any hesitation to be our Keynote speaker today.

I would also like to take this opportunity to extend my appreciation and gratitude to the Vice Chancellor, Maj. General Milinda Peiris for all his guidance and assistance provided throughout the event and this event wouldn't have been a reality and a great success without your courageous leadership under the current challenging situation today.

I would be falling my duties if I don't mention the exceptional support and assistance provided by the two Deputy Vice Chancellors who were there behind the team guiding us through a difficult time. I also would like to thank the Deans of all the faculties who shared the responsibilities and guided their staff amidst their very busy schedules.

This year's conference has attracted six hundred and fifty plus paper submissions, which is a very clear indication of the right enthusiasm growing in the country towards research, particularly in development and security domains. I take this opportunity to thanks all authors share their studies on National Growth and Security in our conference. I also greatly appreciate our panel of reviewers on the valuable time spent to review this large number of papers. I'm sure that your valuable resnses would tremendeously supports to authors on enhancing their research studies.

Ladies and Gentlemen, as you witnessed, this was a new experience in the new normal, after the present pandemic, and therefore it was huge challenge to organize, coordinate and conduct research conference of this magnitude on virtual platform enabling a wider participation of both local and foreign participants. I thank all our participants attending the conference online despite numerous difficulties encountered due to the present situation.

Further, it is with great pleasure that I acknowledge the tremendous support and assistance provided by academic staff of all the faculties with all the Heads of Departments going beyond their regular duties to make this event a success. Similarly, I take this opportunity to appreciate the contribution of the administrative and non-academic staff whose commitment was essentially required in achieving the overall success.

Our sponsors, the financial support given by our Platinum Sponsors, People's Bank and

Bank of Ceylon and Co-sponsor, Abans Private Limited is highly appreciated.

Last but not least the officer cadets and day scholars who formed a very virtual component of the organizing teams in every sphere and I believe that it was a great learning experience and exposure which would help them tremendously in similar undertakings in the future.

Finally, I have no doubt that all of those attending the two days seminar will make the best use of the opportunity to enhance their horizons and establish new bonds and networking while sharing their own knowledge and experience in a friendly learning environment.

In conclusion, let me take this opportunity to profusely thank my co secretaries, who stood alongside me throughout extending unexplainable support and assistance with exceptional commitment.

Thank you so much. I wish you good luck and all the best.

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Technical Sessions

Multiple Intelligence and Academic Performance among BSc. Nursing Undergraduates in Kotelawala Defence University, Sri Lanka; A Correlational Study

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Abstract: Multiple Intelligence (MI) is a major determinant of academic performance among undergraduates. A descriptive correlational study was conducted to assess the types of MIs and to determine the correlation between MI and Academic performance among BSc. Nursing Undergraduates of four academic years in Kotelawala Defence University. The McKenzie's MI Inventory was used to assess the types of MI while the Semester Grade Point Average (SGPA) was used as the measure of academic performance. The Pearson Correlation was used to evaluate the correlation between MI and Academic Performance, and one-way ANOVA was used to assess the mean differences of MI among batches. The response rate of the participants was 69.6% (n=126), and the mean (±SD) age of the participants was 23.65 (±3.82) years. When considering the mean (±SD) values of MI, Interpersonal Intelligence scored the highest (7.94±2.24), and Verbal Intelligence scored the lowest (6.51±2.23). Naturalistic (p= 0.000), Musical (p=0.041), Existential (p=0.026) and Visual (p=0.022) intelligences had significant mean differences among the four batches. There was no significant correlation between SGPA and types of MIs among first- and second-year undergraduates. However, SGPA of third-year undergraduates had a significant positive correlation with Interpersonal intelligence (p= 0.045, r=0.422) and significant negative correlation with Intrapersonal Intelligence (p=0.018, r=-0.488). Further, SGPA of fourth-year undergraduates had a significant positive correlation with Naturalistic (p=0.041, r=0.404) and Existential (p=0.008, r=0.512) intelligences. It was recommended to make nursing undergraduates aware regarding their MIs and do necessary changes in the nursing curricula and to evaluate its effectiveness in future research.

Keywords: Multiple Intelligence, Academic Performance, Nursing Undergraduates

Introduction

In the twentieth century, the traditional education system was revolutionized with the increasing significance given to the learner-centred mechanism of teaching (Bakić-Mirić, 2010). Nurse educators try their best to create learning opportunities that are interactive and applicable to the requirements of various students (Amerson, 2006). However, it is identified that the academic performance of the students is dependent upon several determinants, including MI (Hernandez Suarez et al., 2019).

Intelligence can be defined as a general mental ability for reasoning, problem-solving, and learning and it mixes various cognitive functions, such as perception, attention, memory, and language (Colom et al.). According to Gardner (Gardner, 1983), intelligence cannot be termed as general intelligence, and it is multifactorial. As per the Multiple intelligence theory, every person possesses the capacity for all the nine dimensions of intelligence such as linguistic, mathematical, Spatial Intelligence, Bodily-Kinesthetic Intelligence, Naturalist Intelligence, Interpersonal Intelligence, Musical Intelligence and Intrapersonal Intelligence (Sternberg, 2012).

No individual is universally intelligent; hence an intelligence is the capacity of a person in multi-dimensional areas. The main aim of this study was to assess the types of MIs and to determine the correlation between MI and Academic performance among BSc. Nursing Undergraduates in Kotelawala Defence University, Sri Lanka.

Methodology

This study was conducted as a descriptive correlational study among all the BSc. Nursing Undergraduates (N=181) in General Sir John Kotelawala Defence University. The ethical approval for the study was obtained from the Ethical Review Committee, Faculty of Medicine, General Sir John Kotelawala Defence University, Sri Lanka. The institutional permission was obtained from the Vice-Chancellor-KDU, the Dean-Faculty of Allied Health Sciences (FAHS), KDU and the Head-Department of Nursing and Midwifery, FAHS, KDU. The questionnaires were hand-delivered among the participants once the purpose and the objectives are explained, and the informed written consent was taken from the participants after explaining the outcomes of the study.

A pretested, self-administered questionnaire was used to collect Socio-demographic data. McKenzie's Multiple Intelligences Inventory (McKenzie, 2005) which is a reliable, freely available tool (Hajhashemi, 2010) was used to evaluate the types of MI. McKenzie's Multiple Intelligences Inventory was cross-culturally adapted to Sri Lanka and pretested before use. The Semester Grade Point Average (SGPA) was used to assess academic performance. The Pearson Correlation was used to evaluate the correlation between MI and Academic Performance. t- test and One-way ANOVA was used to assess the mean differences among variables.

Results

The response rate of the participants was 69.6% (n=126), and the mean (±SD) age of the participants was 23.65(±3.82) years. Majority of the participants were females (79.4%, n=100). When considering the mean(±SD) values of MIs within the four batches, Interpersonal Intelligence (8.28±1.761), Naturalistic Intelligence (8.65±1.496), Existential Intelligence (7.80±1.746) and Visual Intelligence (8.78±2.433) were the dominant MIs found on first, second, third- and fourth-year Nursing undergraduates respectively. Verbal Intelligence had the lowest mean(±SD) value among first (6.28±2.523), third (6.37±2.289) and fourth (6.34±1.658) year Undergraduates while Interpersonal Intelligence (7.40±1.903) had the lowest mean(±SD) value among 3rd-year undergraduates (Table 01).

Table 1: F-test results of Multiple Intelligences in all batches of the programme

Multiple Intelligences	1st year Mean±SD	2nd year Mean±SD	3rd year Mean±SD	4th year Mean±SD	F Value	Si
Naturalistic	7.18±1.254	8.65±1.496	7.37±1.374	7.34±1.066	6.414	.0
Musical	7.31±2.079	8.25±1.372	6.74±2.241	7.13±1.314	2.840	.0
Logical	7.28±1.413	7.70±2.003	7.20±1.605	7.25±1.606	.458	.7
Existential	7.77±1.709	7.85±2.033	7.80±1.746	6.69±1.635	3.193	.0
Interpersonal	7.00±2.306	7.40±1.903	7.00±1.495	6.41±1.775	1.237	.2
Kinesthetic	7.90±1.314	8.30±1.559	7.26±2.105	7.69±2.132	1.560	.2
Verbal	6.28±2.523	7.45±2.235	6.37±2.289	6.34±1.658	1.440	.2
Intrapersonal	8.28±1.761	7.95±1.317	7.23±2.602	8.31±2.669	1.805	.1
Visual	7.69±2.273	8.60±1.729	7.03±3.139	8.78±2.433	3.311	.0
Total	66.69±12.3	72.15±11.4	64.00±13.37	65.94±10.7	1.969	.1

There was no significant correlation between SGPA and types of MIs among first- and second-year undergraduates. However, SGPA of third-year undergraduates had a significant positive correlation with Interpersonal intelligence (p= 0.045, r=0.422) and significant negative correlation with Intrapersonal Intelligence (p=0.018, r=-0.488). Further, SGPA of fourth-year undergraduates had a significant positive correlation with Naturalistic (p=0.041, r=0.404) and Existential (p=0.008, r=0.512) intelligences. Further, Naturalistic (p= 0.000), Musical (p=0.041), Existential (p=0.026) and Visual (p=0.022) intelligences had significant mean differences among the four batches. When considering the SGPA, there were no significant differences in means among the four batches (p=0.095).

Discussion

Modern context reveals that the process of assessing the students' MI and applying them in the teaching methodology as an essential technique in improving the learning (Sternberg et al., 2008). Grounded upon the above discrepancy and as a means to building upon the critical discourse, this study was conducted to test the hypotheses that there is no relationship between Nursing undergraduates' academic performance with their MI types. Further, the results of the research bring into line with the previous research (Yaghoob and Hossein, 2016) specified that every individual possesses diverse types of intelligence with different levels of each. Further, Interpersonal Intelligence had the highest mean score, and verbal intelligence had the lowest mean score when considering the MIs among all the BSc. Nursing Undergraduates. Having a dominant Interpersonal intelligence is essential since it will support the students to gain educational experience by working with the patients, staff nurses and other professionals. A similar study conducted in Iran among medical, nursing and midwifery students stated that the nursing students had a highest in the existential intelligence and scored lowest in the musical Intelligence (Poursaberi and Mohammadi, 2017).

Most of the MIs had no significant correlations with SGPA except the negative correlation found with Interpersonal Intelligence. A similar study conducted in Zambia also found that MI types showed no significant relationship with academic performance (Katowa-Mukwato et al., 2017). However, a study conducted among medical, nursing and midwifery students in Iran suggested that verbal Intelligence and existential Intelligence are associated with the students' academic performance with a statistical significance (Poursaberi and Mohammadi, 2017).

Conclusion

In this study, the relationship of academic performance with the types of MIs was evaluated and found significant results. Continuous assessment of MIs of the Nursing undergraduates should be planned, and relevant changes in the nursing curricula should be made accordingly. Further, experimental studies regarding MI should be implemented to evaluate the effectiveness of new teaching interventions.

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Quantitative Analysis of the Additional Radiation Burden due to Electronic Collimation in Digital Radiography

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Abstract: In recent years, the conventional film-screen radiography technique is replaced with the novel invention of digital radiography. This digital technology provides prompt image readout with reduced radiation exposure. The image can be post processed to adjust the spatial resolution and contrast. However, the inappropriate use of the background masking tool during post processing degrades the outcomes of the digital technology. Although this tool is intended to eliminate the ambient light around an image to improve the quality of the displayed image, contrary it is used as a substitute for insufficient pre-exposure collimation of the irradiated field resulting in unnecessary overexposure. The present study aimed at evaluating additional radiation dose due to electronic cropping in digital radiography facility for the first time in Sri Lanka. A sample of 194 X-ray images under nine different projections was evaluated and the average areas of pre and post-exposure collimation were measured. The difference of the mean areas was calculated and presented as a percentage of the area of the whole radiation field. The percentage of overexposed area due to improper collimation was found to be over 50% in cervical spine, shoulder and sinus projections (in 44.4% of study sample). The lateral projection of cervical spine showed the highest overexposed percentage (55%). Therefore, it is within the scope of practice of a radiologic technologist to use appropriate pre-exposure collimation. The electronic masking should be only utilized to eliminate the interfering brightness in the image and the technologists should be clinically competent to adopt the above concept.

Keywords: Electronic collimation, Digital Radiography, Background masking, Radiation exposure.

Introduction:

Almost after 90 years of the invention of X-rays by Roentgen, a new era of radiography began with the transition of film-screen to digital radiography in 1987. Following this enormous invention of Computed Radiography (CR) by Fuji, film-screen system became obsolete. Almost two decades after the introduction of CR, a new technology launched with the label “Digital Radiography

(DR)”. This technique facilitates the digital achieving of the radiographic image with enhanced image quality. Moreover, the radiation dose can reduced without compromising the image quality due to its digital detector system [1].

However, DR also has potential drawbacks where the operator should pay extreme attention to avoid unnecessary over exposure. Although the dynamic range provides benefits during under exposure to provide a viewable image, with over exposures the amount of radiation delivered to the patient will be ten or more times higher before the occurrence of signal saturation and loss of information. This would happen without the knowledge of the operator [2]. Moreover, the capability of electronic post processing and collimation of under collimated images are another potential pitfall. Accordingly, the electronic collimation

may restrict the area appearing on the final radiograph thereby overriding the right of the patient to receive the full information obtained during the acquisition [3]. Furthermore, proper collimation of the anatomy is always important since it influences the image quality. When the exposed volume of tissue increases, the tube voltage (kVp) should also be increased in order to produce a quality image. This would, more likely result in increased compton interactions, or scatter production and produce a negative impact on image quality [3]. Moreover, these scatter would increase the patient dose remarkably, hence proper collimation of the required anatomy would be essential [4]. However, electronic collimation could be used to mask the unexposed boarders around the collimation edges since these edges would allow excess light to enter in to the eye. This extra light would result in over sensitization of a chemical within the eye called rhodopsin that results in temporary white light blindness or veil glare [5]. Although viewer eye quickly recovers from this, the distraction caused would interfere with image evaluation by the eye. In screen-film radiography, special view boxes were sometimes used to avoid the effects of veil glare, but no technique has ever been entirely successful or convenient. Using the available post processing tools the white collimation borders can be turned in to black background and veil glare can be effectively eliminated [5]. Therefore, this tool should carefully be used to eliminate disturbances to the viewer's eye. Further, by removal of background or the white unexposed borders results in an overall reduction of pixels and reduces the amount of information needed to be stored in a digital image. However, this technique is not a replacement for proper collimation. It is an image manipulation art only and does not change the amount or angles of scatter. There is no substitute for appropriate pre-patient collimation since it surely reduces the patient dose ensuring the principle of "as low as reasonably achievable (ALARA)" [6].

Methodology:

This study was carried out in a private healthcare facility equipped with a Digital Radiography system. In that system depending on the selected protocol, Automatic Exposure Control (AEC) chambers are automatically activated (for erect and table buckey) and collimation is adjusted accordingly. This can be further adjusted using manual collimation knobs available on the collimator assembly. However, collimation of the X-ray field beyond the area of the detector is restricted. Following a successful exposure, resultant combination of kVp and tube current (mAs) are displayed on the console monitor together with the estimated Dose Area Product (DAP) in $\mu Gy.m^2$. Immediately after the exposure, through wired and wireless technology the automatically cropped image will appears on the screen according the pre-set area defined to suit different regions in the body. The image footer display the corresponding length and breadth of the initially collimated area as number of pixels in columns and rows. This pixel count changes simultaneously with the area of the electronic collimation when adjusted using the cropping tool. A sample of 194 X-ray projections were extracted for the evaluation including 18 Cervical spine-Antero posterior (AP), 17 Cervical spine-Lateral (LAT), 68 Chest -Postero anterior (PA) 15 Abdomen AP, 11 Shoulder AP and 6 Shoulder LAT and 24 Sinus PA. According to the figure 1 the actual radiation field areas and electronically collimated areas were noted for each projection. Due to the limitation of direct numerical measurement with the available software, the pixel count was considered reliable for calculating the area. The number of pixels in rows and columns of the post processed image was noted. Then using masking removal tool the image was converted back to original stage where the outline of actual radiation field was visible as a silver lining around the exposed area.

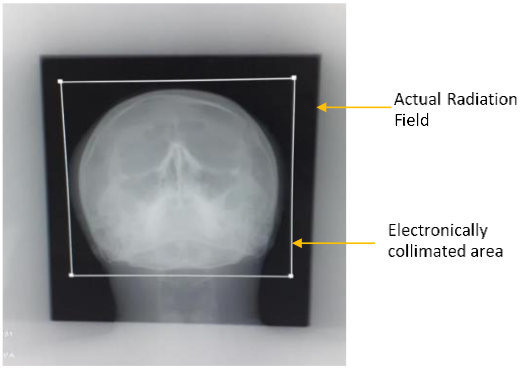

Figure 1: Illustration of electronic collimated area and radiation field in a sinus PA view. Note how the masking tool was used to eliminate the unnecessary exposed neck area in the given sinus x-ray projection

With the same cropping tool, the radiation field outline was carefully mapped and respective pixel counts in rows and columns were noted. Using the average pixel counts in rows (field width) and columns (field height) the mean areas of electronic collimated field and the radiation field were calculated separately for 9 anatomical projections. The difference of the mean area of electronic collimation and radiation field was calculated as a fraction of mean area of the radiation field and multiplied by 100 to obtain the percentage of over exposed area using the below equation.

$$\text{Percentage of over exposed area} = \frac{\text{Mean area of radiation field} - \text{Mean area of electronic collimation}}{\text{Mean area of radiation field}} X\ 100\%$$

Moreover, the percentage of over exposed areas belongs to different projections were evaluated in order to determine the practices which needs the immediate attention related to collimation.

Results, and Discussion:

The data and the results of the present study were summarized in the table 1 given below. Accordingly in 4 out of 9 anatomical projection types, the over exposed area due to improper collimation was more than 50% and cervical spine lateral showed the highest overexposed percentage of 55.1%. Also, among all projections abdomen AP showed remarkably the least percentage of over exposure of 5.9%. Moreover, the four edges of the initial pre-patient collimation were evident in the cases of alarming over exposures. However in other cases, where the four edges of pre-patient collimation was not visible, the area of the detector was considered as the area of the pre-patient collimation or the radiation field due to the inbuilt restriction of the equipment which avoids the radiation field to extended beyond the physical detector.

Table 1: The range and mean height and width of electronic collimated areas and radiation field areas for nine anatomical projections were tabulated with corresponding RF/EC ratios and the percentages of over exposure.*

Region	Projection	Sample (n)	Range (mean) width electronic collimation	Range (mean) height electronic collimation	Range (mean) width radiation field	Range (mean) height radiation field	RF* / EC*	Over exposed percentage %
Cervical spine	AP	18	826-1214 (1069.1)	13421968 (1622)	1186-2006 (1577.1)	1606-2547 (2033.1)	1.84	45.9 %
	Lateral	17	872-1352 (1218.9)	1178-2151 (1759.1)	1786-2840 (2115.4)	1840-2874 (2255.9)	2.25	55.1 %
Chest	PA	68	1464-2694 (2283.2)	12532759 (2154)	1724-2840 (2715.9)	1660-2874 (2562.2)	1.41	29.3 %
Abdomen	AP	15	2222-2598 (2410.7)	2858-3032 (3003.5)	2500-2840 (2557.3)	28743032 (3009)	1.06	5.9 %
Lumbar Spine	AP	18	1058-1344 (1205.2)	2603-3032 (2955.5)	1212-1970 (1516.3)	2643-3032 (3005.3)	1.28	21.8 %
	Lateral	17	1020-1782 (1335.5)	2802-3032 (2966.2)	1420-2516 (2109.2)	3012-3032 (3025.3)	1.6	37.9 %
Shoulder	AP	11	1200-2140 (1693.3)	1070-2008 (1753.7)	16782840 (2518)	11832874 (2396)	2.03	50.8 %
	Lateral	6	706-1646 (1343)	901-2028 (1686)	17102840 (2112)	11672874 (2280)	2.13	53.0 %
Sinus	PA	24	1108-1604 (1315.7)	1303-1761 (1460.5)	1450-2406 (1778.7)	1665-2678 (2163.1)	2.0	50.1 %

*RF- Radiation field *EC- Electronic collimated area.

According to the above results, a considerable degree of over exposure is evident in each projection and therefore it is not always possible to collimate the X-ray field exactly to the area of interest. This is agreeable up to an extent since the pre-patient collimation is based on the surface anatomical landmarks and not on the exact anatomy which is inside the human body. Therefore precise pre-patient collimation is a challenging task and in the case of incorporated patients, such as children. However, it is essential to highlight that the increasing field size would increase the dose to the patient and this increasement is considerable [7][8].

Finally, the findings were presented to the radiographers of the study setting and discussed the importance of proper pre-patient

collimation instead of post processing electronic cropping. All of them agreed with the findings and conclusions of the present study. Hence, they noticed the urgent requirement to optimize the current practice of pre patient collimation in order to reduce the radiation dose to the patient. Here after the term "over exposed "in this context is referred to as the unnecessary exposed area due to poor collimation practices.

Conclusion:

The main purpose of this study was to provide evidence to support the existence of potential over exposure in digital systems due to the electronic collimation. Therefore, special attention is required to avoid suboptimal collimation practices and pre-patient collimation should be used in maximum effort in all cases unless otherwise not possible to do so. Furthermore, shuttering should only be used as a post processing tool to mask the ambient light around an image for improving the quality of the displayed image. It should not be used as a substitute for insufficient collimation of the irradiated field. Also, it should not be used to alter the appearance of an obtained projection or to reproduce a different projection. Moreover, the appropriate determination and use of pre-exposure collimation is an important role of the radiologic technologist to comply with ALARA. Accordingly, continuous training related to collimation practice and radiation protection is essential for radiologic technologists to ensure the best collimation practices and to eliminate misconducts. Furthermore, evaluation of the collimation practices should be conducted as a part of the quality audit by the relevant authorities to ensure optimization of the radiation protection within the country. Also, in future a follow-up will be done in order to evaluate the impact of the study findings on the current collimation practices and to study its influence on the reduction of the patient dose.

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Parenting-related Stress In Mothers OF Toddlers (1-3 Years) at Piliyandala MOH Area

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Abstract: Parents of toddlers are at risk of increased parenting-related stress as toddlerhood is considered as a period with challenging behaviors due to significant physical and emotional development of the child. This descriptive cross-sectional study aims to examine the parenting-related stress levels and identify the factors affecting stress in mothers of toddlers (n=423) registered at Child Welfare Clinics of Piliyandala MOH area. The validated version of the Parental Stress Scale (PSS) was used as the data collection tool and a systematic random sampling technique was used. A Chi-square test was used to assess the associations between categorical variables. The mean age of the mothers was 30.62 (±4.77) years and 29.8% (n = 126) were employed. According to the subscales of PSS, the mean score of the Parental Stress (PS) subscale of mothers was 28.72 (Scale;15- 49) and 51.3% (n=217) were reported with a higher level of stress. The mean of Lack of Parental Satisfaction (LPS) subscale was 11.30 (Scale; 8-23) and nearly 40% (n=170) were reported with a higher LPS score which is above the mean. Further, parental stress was significantly associated when the age of the toddler is between 1-2 years (p = 0.03), having more than one child (p = 0.00), the toddler is being in the second or higher ordinal position (p = 0.02), unemployed mothers (p = 0.00) husband educated up to O/L or less (p = 0.02), temporary residence (p =0.03) and husband being alcoholic (p = 0.01). In conclusion, the majority of the mothers of toddlers showed a higher level of parental stress and a considerable percentage is having a lack of parental satisfaction.

Keywords: Parenting, stress level, mothers of toddlers

Introduction:

Parents of toddlers are at risk of increased parenting-related stress as toddlerhood is considered as a period with challenging behaviours due to significant physical and emotional development of the child. Higher parental stress is usually associated with the poor adjustment outcomes in children, including insecure attachment and behaviour problems (McQuillan and Bates, 2017). Therefore, early identification of higher parental stress is essential to enhance effective parenting practices. The objectives of the study are to assess the perceived parental stress of mothers with toddlers registered at the Piliyandala MOH area and assess the association of perceived parental stress level with sociodemographic variables.

Methodology:

A community based, descriptive cross sectional quantitative study was conducted to assess the perceived parental stress level among mothers with toddlers attending child welfare clinics in the Piliyandala MOH area. A systematic random sampling technique was used as the sampling technique, and interviewer-administered questionnaires were used for data collection. Perceived

parental stress was assessed using a validated version of the Parental Stress Scale (PSS). The parental stress scale were subdivided as Parental Stress statements (PS) and Lack of Parental Satisfaction statements (LPS) (Pontoppidan, Nielsen and Kristensen, 2018). A separate questionnaire was used to obtain socio-demographic, and other information related to the family environment. Data was analysed using SPSS version 23. Chi-square test was used to assess associations between categorical variables, and the level of significance was set as 0.05.

Results, and Discussion:

Four hundred and twenty-three mothers with toddlers participated in the study. The mean age of the mothers was 30.62 years, and 29.8% (n = 126) were employed. According to the subscales of PSS, the mean score of Parental Stress (PS) subscale of mothers was 28.72 (Scale; 15- 49) and 51.3% (n=217) were reported with higher level of stress (Figure 1). The mean of Lack of Parental Satisfaction (LPS) subscale was 11.30 (Scale; 8-23) and nearly 40% (n=170) were reported with higher LPS score which is above the mean (Figure 2).

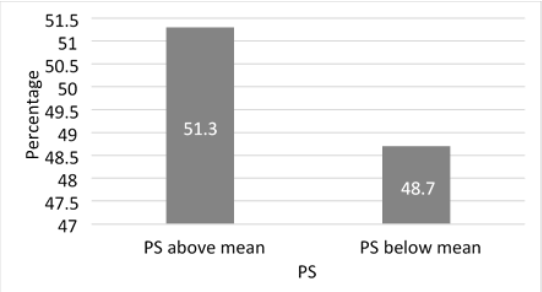

Figure 1: Percentage of Parental Stress (PS)

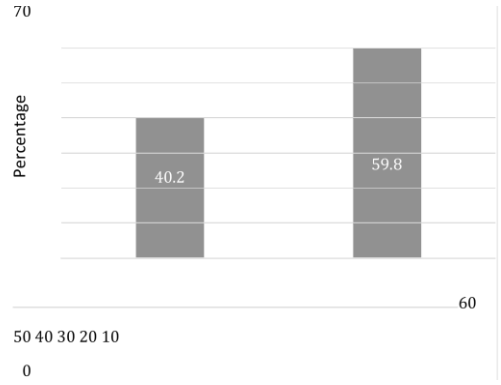

Figure 2: Percentage of Lack of Parental Satisfaction (LPS)

Further, parental stress was significantly associated when the age of the toddler is between 1-2 years (p = 0.03), having more than one child (p = 0.001), the toddler is being in the second or higher ordinal position (p = 0.02), unemployed mothers (p = 0.004) husband educated up to O/L or less (p = 0.02), temporary residence (p =0.03) and husband being alcoholic (p = 0.01) (Table 1).

Table 1: Associations between PS subscale and socio-demographic variables

	PS		
	X2	*df*	*p* value
Age of child	4.970	1	0.03
Number of living children	10.423	1	0.001
Position of child	5.651	1	0.02
Employment status of mother	8.416	1	0.004
Fathers' education	5.223	1	0.02
Type of residence	4.665	1	0.03
Alcoholic husband	6.996	1	0.01

On further analysis of Parental stress and socio-demographic association, around 55.9% of mothers who had toddlers aged 1-2 years had shown higher levels of stress. This showed that having a children between age of 1 and 2 can be the most stressful period for a mother. This was further reinforced by a study conducted in USA which mentioned that average parental stress decreases each year of the child but at the age of 2 parental stress is at its peak (Williford, Calkins and Keane, 2006).

When considering number of living children, 57.4% of mothers who had 2 or more children had shown higher levels of stress. Since having more than one child can make it difficult to give the attention required for all the children, thus leads to parents being more stressed.

Similarly in ordinal position of child, 57% of mothers who had toddlers as second born or above had higher levels of stress. Equally to number of living children, having more children increases mothers' commitment to care for all her children. Therefore mothers well spend more time and energy taking care

of them while maintaining their daily activates, which can be increasingly stressful.

For mothers' who were educated up to O/L and below, study concluded that 51.9% had shown high levels of stress. Since mothers who are poorly educated lack the knowledge to properly take care of their child, children would often suffer from neglect. Consequently the mother would have difficult time taking care of an ill child. A study was done in Scotland which stated that parental stress was higher for mothers with low educational level (Parkes, Sweeting and Wight, 2015).

On the other hand when considering father involvement, 66.7% of families with alcoholic husbands had higher levels of stress. Families with acholic fathers can be extremely damaging to relationships and bonds, mainly due to the dependence and long term effect on the psyche. Irrational behaviours and quarrels between parents, can injure the paternity role in a family and often lead to distancing. A study regarding alcoholic fathers done in India showed that 80% of spouses had suffered from psychological distress (Lingeswaran, 2016).

Lastly, the type of residency had a significant impact on mothers' stress. According to the study 60.4% of mothers with temporary residence had high levels of stress. When having to regularly change residence it can be difficult process for a family to adapt to. This leads to family being more chaotic, which has been associated with more behavioural problems of children and causes more parental stress (Mayberry et al., 2014).

Conclusion:

The parental stress was higher among mothers with toddlers, and also considerable a percentage of mothers showed lack of parental satisfaction. Further, the study was able to identify that mothers with high stress had; 1-2 years old toddlers, second-born or above ordinal position in the family, and families with more than two children. Mothers who were unemployed and educated up to O/L and below had high-stress levels. On the other hand, employed mothers who were doing both day and night duties, suffered from the highest stress. Similarly, mothers with an alcoholic husband, husbands who were educated up to O/L and below and families having a temporary residence showed higher parental stress.

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Occupational Engagement In Prisons: an evaluation of time-use in Sri Lankan correctional settings.

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Abstract: Sri Lankan prison system has shown marked overcrowding for decades. It is a common issue worldwide which contributes poor care, loss of privacy, limited resources and occupational deprivation. A lack of access to basic human occupations can lead to occupational deprivation. In penal settings, occupational deprivation has been suggested as a contributing factor in prison riots, prison suicides, recidivism, episodic disorientation and psychosis among inmates. Therefore, it is important to observe the current Sri Lankan prison system concerning the occupational deprivation among prison inmates. A cross-sectional descriptive study was carried out in Welikada prison (male section) situated in Colombo 09, aiming to explore the time-use and occupational engagement among sentenced prisoners detained and to suggest suitable actions to be taken to improve the correctional process. A Purposive sample of 30 inmates between 18 and 55 years old was selected for the study. Data collected via an informal semi-structured interview based on Occupational questionnaire (Smith, et al., 1986) and analyzed using qualitative and quantitative methods. An overall time-use in a typical day among participants were evaluated using simple statistical methods under five domains; work, daily living works, recreation, leisure and sleep. Qualitative data summarized under three main themes; occupational choice and autonomy, motivation for occupation and values of occupation. The overall findings suggest that the incarcerated environment promotes occupational imbalance, passivity and negativism, which shows an occupational deprivation among the prison population. The findings are suggestive of a need for an occupational therapy intervention to the prison institutions at large or individual and group basis.

Keywords: penal settings, occupational therapy, engagement, time use, correctional settings

Introduction:

Occupational engagement has been presented as a core construct in occupational therapy (Kennedy & Davis, 2017). Occupational engagement describes the extent to which a person has a balanced rhythm of activity and rest, a variety and range of meaningful occupations and routines, and the ability to move around in society and interact socially, implying that occupational engagement occurs over time. Moreover, occupational engagement involves interpretation and comprehension emanating from experience (Bejerholm & Eklund, 2006b).

Occupational deprivation is considered external to the individual. Whiteford (2000) defines occupational deprivation as; 'A state of preclusion from engagement in occupations of necessity and/or meaning due to factors that stand outside the immediate control of the individual'.

Incarceration itself limits occupational engagement among prison inmates as they have limited choice for occupations such as leisure and recreation. The limited occupational choices make prison inmates dependent on the detaining authorities in everyday activities (Mukiza, 2014). Helbig

(2003a) found that limited choices and autonomy often led to poor motivation and inactivity over time.

Sri Lankan prison system has shown marked overcrowding for decades. Globally, there are overcrowded prison systems that contribute to poor care, loss of privacy, limited resources and occupational deprivation. There were 8,853 of a daily average of convicted prisoners were detained in Sri Lankan prisons in the year 2016 while the authorized capacity was 6,728. It is 131.6% of the capacity (Department of Prisons, 2017).

In penal setting occupational deprivation has been suggested as a contributing factor in prison riots, prison suicides, recidivism, episodic disorientation and psychosis among inmates (Molineux & Whiteford, 1999). The Welikada prison experienced a recent riot on 09th November 2012, which left 27 people dead and 43 injured (Haviland, 2012).
Hypothesis

The inmates who are detained in Sri Lankan prisons experience occupational deprivation which limits their engagement in purposeful and balanced occupations.

Aim of the study

This study aimed to study explore the time-use and occupational engagement among convicted male prisoners between 18 and 55 years old at Welikada prison complex, Colombo 09.

Methodology:

Participants

This study was conducted in Welikada prison (male section) situated in Colombo 09. As the sample was to be selected from a limited and restricted population, the purposive sampling method was used. Thirty (30) convicted prisoners aged over 18 years, currently serving a prison sentence and have served for at least 6 months in Welikada prison at the time of recruitment to the study were selected. All the necessary means were taken to ensure selecting a heterogeneous sample of persons from various work stations. The sections where there is high security were excluded.

Data collection

Qualitative and quantitative methods of data collection were used in this study. Three data collection tools were used in this study. Two of them were standardized tools and the demographic information sheet is non-standardized. All three tools were interviewer-administered and had translated into Sinhalese.

Kessler 6 interviewer administrated questionnaire [K6]

Occupational Questionnaire [OQ]

Demographic information sheet

Ethical considerations

Ethical approval for this study was gained from the Research Ethics Committee of the Faculty of Medicine of the University of Kelaniya. The whole process of the study from participant selection to publication was designed to protect the confidentiality, autonomy and voluntary participation.

Data analysis:

Quantitative data

Data gathered from the OQ were analysed to determine the time distribution among five domains, work, daily living work, recreation, rest and sleep. Time-use was calculated by collecting each half-hour intervals under each domain of each participant. The time-use under each domain of all the participants were collated and mean time-use was calculated to achieve an overall score.

Qualitative data

The interview data recorded in data collection sheets were categorized into three themes using the principles of thematic analysis methodology. The raw data were coded and developed themes in each

conversation. Then the conversations were reviewed for common grounds and the final themes were determined.

Results:

Quantitative results

The overall time use according to the occupational domains of the OQ is shown in Fig. 1. This is a simple representation of time-use among the participants. It shows that the participants spent more time for sleep. They spend 475 minutes (32.99%) per day for sleeping. The mean engagement in work-related activities was 425 minutes (29.51%) in a typical day. They spend 291 minutes (20.21%) per day for daily living works, 87 minutes (6.04%) per day for recreation and 162 minutes (11.25%) per day for leisure. (Figure 1)

Table 2:Mean values and standard deviations of each domain of OQ

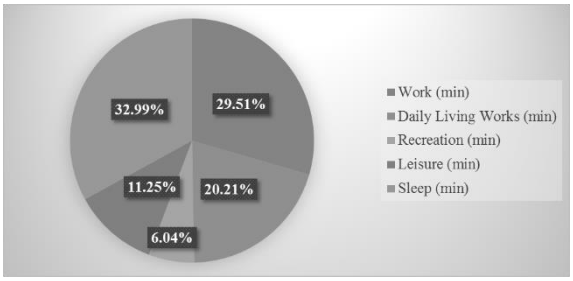

Figure 13: Distribution of time-use according to the Occupational Questionnaire (Smith et al., 1986)

Domain	Mean value (Min)	Standard Deviation (Min)
Work	425	61.57
Daily living works	291	73.54
Recreation	87	81.24
Leisure	162	101.38
Sleep	475	69.17

Qualitative results

There were three main themes developed based on the interview. They were occupational choice and autonomy, motivation for occupation and values of occupation.

Occupational choice and autonomy – Participants' choice and autonomy were believed to be diminished in their context. Majority's (76.67%) belief was the workgroups are for punishment and there is no chance for choice and autonomy.

Motivation for occupation – Almost everyone (90%) agreed with the idea that 'engagement in occupations; work, self-care, recreation and leisure, is helpful to pass time'.

'It is useful to forget the feeling about time and it is a relief to spend the imprisonment period. Less time to think about family when working.'

The value of occupation – They have different values of occupational engagement. Most of them (97%) have a negative value about what they do in workgroups. Almost everyone worries about 'how the work I do here, can help me for earning in the future'.

Discussion:

Distribution of time use

The findings of the quantitative part of this study support some findings of the limited number of studies which have carried out in similar settings. In this study sleep is predominant. The result of Farnworth et al. (2004) study on time use in Australian secure units also shows a predominant pattern of passive leisure and sleep. Findings of Stewart & Craik (2007) study conducted in the United Kingdom noted 39% of sleep time among participants as well.

Even though the time spent in workgroups is higher in Welikada prison, the quality of work should be evaluated for a better understanding. In Sri Lankan setting participants use an average time for personal care or daily living activities. It is around 20%.

The findings of this study suggest the recreation and rest time is around 17%, which is lower than average. It is not clear how the participants spent the recreation time in other study settings, but it was shown they have a limited recreational choice such as reading and listening to the radio in the Welikada prison environment.

Therefore, these findings suggest the incarcerated environment promotes occupational imbalance, passivity and negativism, which lead to an occupational deprivation among the prison population.

Occupational choice, autonomy, motivation and value

The findings of this study suggest a marked deprivation from occupational choice and autonomy among the participants. Almost everyone was allocated into workgroups without their own choice

or interest. In this study, participants' motivation is to occupy is to pass time, which doesn't show a personal meaning or value. These findings indicate features suggestive of occupational deprivation among the participants, which would have been a contributing factor for recidivism, overcrowding and recent prison riot.

Conclusion:

Summery

Despite the limitations occurred, the overall findings are 1) there is a marked occupational imbalance found in the prison population studied, 2) there are indications that are suggestive of occupational deprivation among the population studied. As supported by these findings as well as related literature, it is indicated a need for an occupational therapy intervention to the prison institutions at large or individual and group basis.

Limitations:

The OQ does not differentiate rest and sleep in data form. Stewart & Craik (2007) had incorporated sleep into the assessment based on a validated French version of OQ used by Aubin et al., (1999) (cited in Stewart & Craik, 2007). The same method used in this study as well.

There was limited literature regarding the specific research question worldwide. The participants of available studies also were diagnosed to have mental illnesses most of the time. Therefore, the researcher was unable to compare the findings with other similar studies which are an important part of the research.

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Estimation of Radiation Dose to the Eye during Radiopharmaceutical Preparation and scan procedures at a selected private hospital in Sri Lanka

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Abstract: Radiopharmaceuticals are radioactive compounds used in nuclear imaging procedures. The purpose of this study was to estimate the average equivalent dose to the eye. This study was conducted at the nuclear medicine department of Lanka hospitals PLC, Sri Lanka. A total number of 137 procedures were selected: bone, renal (DTPA - Diethylenetriamine pentaacetic acid) and whole body iodine (WBI), and dose was measured during the radiopharmaceutical preparation. Measurement of eye dose need to be done using $H_p(3)$ type dosimeter, but due to unavailability of that dosimeter, $H_p(10)$ type electronic pocket dosimeter was used for measurements. The dosimeter (Brand-POLIMASTER and model-PM1610) was placed in between the eyes during the dose measurement with the help of custom made head band. The highest estimated average equivalent eye dose of 6.93 (± 5.36) µSv was received by the technician during 1st week from newly installed radio nuclide generator. Annual estimated equivalent eye dose have received by personals involved in dose administration, and patient handling were 0.34 (± 0.24) $mSvy^{-1}$ and 0.08 (± 0.01) $mSvy^{-1}$ respectively. A strong positive correlation (r=1.0000) was found between total equivalent eye dose and eye dose received by the technician during radiolabeling. Further, the total equivalent eye dose during DTPA procedures and the dose received by eye during DTPA dose withdrawal (preparation of dose vials for each patient from total dose volume) have shown a positive correlation (r=0.9980). This study concluded that the estimated annual radiation dose to the eye of personals involves in dose administration and patient handling were far below than the ICRP recommended equivalent dose limits.

Keywords: radiopharmaceutical, eye dose, equivalent dose

Introduction

In both diagnostic and therapeutic nuclear medicine patient becomes a source of radiation which causes for own exposure and also for staff, caregivers and the general public. It remains until the radioactive material has decayed or is excreted from the body (Mattsson and Hoeschen, 2013). It was reported that the workers expose to nuclear medicine occupational exposure during the preparation of radiopharmaceuticals in hot lab and administration, higher than the exposure during imaging procedures (Delacroix et al., 2002). It is due to the staff is working closer to relatively large amounts of radioactivity while preparing radiopharmaceuticals and when administering, radiopharmaceuticals flow out of the shielding material into the patient. But during imaging workers spend only a few minutes closer to the patient (Kollaard et al., 2018).

The International Commission on Radiological Protection (ICRP) has revised that the human eye lenses have become more

radiosensitive than previously assumed. It is not only for cancer induction but also due to cataract induction in the lens of the eye. Hence a specific annual dose limit of 150 mSv has been introduced by ICRP for occupationally exposed persons and 15 mSv for the public. But during past decades, more findings caused for reduction of that dose limit from 150 mSv to 20 mSv per year averaged over 5 years but not exceeding 50 mSv in a single year. So this new dose limit is lower than previous by more than a factor 7 and it implies the further need for monitoring radiation exposure of the eye region (Bruchmann et al., 2016).

Consideration of radiation dose accumulated in the eye region is very crucial. Studies on the exposure dose on the eyes are being frequently carried out in the field of radiology involving cardiovascular and interventional procedures using x-ray fluoroscopy. But studies on eye dose assessment in the field of nuclear medicine are currently lacking (Cho, Kim and Kim, 2017). Nuclear medicine staff subjected to unavoidable radiation exposure as they need to work with unsealed radioactive materials directly. Therefore, we planned to estimate occupational radiation dose to the eye region of the staff in the nuclear medicine department. As it is important to find out whether the average eye dose limit is within the recommended dose limit and to evaluate any risk of irradiation of the eyes.

Methodology

This study was a cross sectional study which involved with dose measurement of the eye region of the nuclear medicine staff. Data were collected from three staff personnel who involve with routine work procedures in the Nuclear Medicine Unit at Lanka hospital PLC from 26th of August to 26th November 2019.

Total number of 138 procedures which were (33) preparation of radiopharmaceuticals and three nuclear medicine scan procedures (Number of 35 from each): Bone scan, DTPA scan and Whole Body Iodine scan, performed at Lanka hospital PLC, were considered in this study.The equivalent eye dose received by the nuclear medicine staff was measured for each procedure during data collection period. 3 staff members involved with this study. Distribution of workload among each personnel is mentioned in the below Table 1. Data were categorized according to each procedure and manipulated radioactivity.

Dose measurements were obtained by using real time electronic pocket dosimeter. Brand is POLIMASTER and model is PM1610. Dosimeter enables measure personal dose equivalent (DE) of continuous and pulsed x-ray and gamma radiation. Dose equivalent indication range is

0.001 μSv to 12.0 Sv. Doses were measured in μSv per procedure, because the direct equivalent dose is measured by the dosimeter. Dosimeter was placed on the forehead in between the eyes of the staff members. We used a velcro back comfortable head band for placement of the dosimeter.

Firstly, the dosimeter was resettled for the zero value. Background radiation was measured for each and every hot lab procedures. Background radiation dose in the imaging room was ignored as the value was very small and only affected when an injected patient was there. Dosimeter was attached in-between the persons' eyes using the head band before starting the procedure. Readings were taken at the end of the each procedure.

Table1: Procedure involved by the staff

Personnel	Involved procedure
Staff 01	Dose administration and dose withdrawal
Staff 02	Patient handling
Technician	Preparation of radiopharmaceuticals

Calculation of the equivalent eye dose per individual personnel: Equivalent eye doses for each personnel according to each procedure were calculated as mentioned in Table 2.

Table 2: Total Equivalent Eye Dose per procedure

Personnel	Total Equivalent Eye Dose per procedure
Staff 01	(ED1+ED3) - BKG_H + (ED2)
Staff 02	ED4+ ED5
Technician	(ED6+ ED7) - BKG_H

Equivalent Eye Dose while, DTPA dose withdrawal (ED1), DTPA dose administration (ED2), bone dose administration (ED3), bone patient handling (ED4), WBI patient handling (ED5), elution (ED6), radiolabelling (ED7), Background radiation dose in the hot lab (BKG_H)

Results

The normality test was applied for all data sets and almost all the data resulted significance value of the Shapiro-Wilk test is below 0.05, the data significantly deviate from a normal distribution. Therefore median values were used for further analysis.

Considering the total equivalent dose received by the eye region of the staff 01, staff 02 and technician during 1st week of generator and 2nd week of generator; the median values are reported as 0.75 (± 0.26) µSv, 0.15 (± 0.03) µSv, 6.93 (± 5.36) µSv, 1.97 (± 1.03) µSv respectively. 20.91 µSv, 0.47 µSv were the maximum and minimum doses received by the eye region of the technician during 1st week of generator and the sum is reported as 94.46 µSv. Maximum and minimum doses received by the staff 01 and 02 were 1.27 µSv, 0.31 µSv and 0.21 µSv, 0.10 µSv.

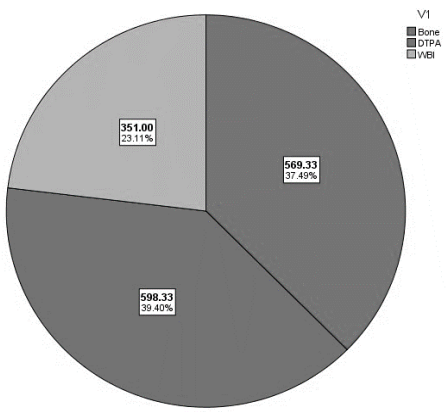

Figure 4: Average number of procedures performed per year

Table 3. Median equivalent eye doses per procedure

		Median equivalent eye dose
Technician	Generator 1st week	6.93 ± 5.36 µSv
	Generator 2nd week	1.971 ± 1.028 µSv
Staff 01	Total	0.75 ± 0.26 µSv
	Total DTPA procedure	0.27 ± 0.20 µSv
	Bone dose administration	0.32 ± 0.22 µSv
Staff 02	Total	0.15 ± 0.03 µSv
	Bone scan patient handling	0.13 ± 0.02 µSv
	WBI scan patient handling	0.13 ± 0.02 µSv

Estimated annual equivalent eye doses for staff 01 and staff 02 are 0.34 (± 0.24) $mSvy^{-1}$ and 0.08 (± 0.01) $mSvy^{-1}$.

When consider the correlations in between data sets we have observed that there was a strong positive correlation (r=1.000) and there was a significant difference ($p<0.05$) between total ED and ED7 (Radiolabeling) of the technician during both 1st and 2nd weeks. But a positive moderate correlation (r=0.460) and a moderate positive correlation (r=0.343) with no significant difference ($p>0.05$) between total ED and generator activity were observed in 1st and 2nd weeks of generator respectively. And for staff 02 Total ED (Bone + WBI procedures) derived a positive strong correlation (r=0.721) and a positive moderate correlation (r=0.460) with a significant difference ($p<0.05$), with ED4 (bone patient handling) and ED5 (WBI patient handling).

Discussion

The aim of this study was estimating the average occupational eye dose received by staff who works in the nuclear medicine department while above all selected studies.

Nuclear medicine staff maintained good radiation protection while the procedure such as lead apron, thyroid collar, lead shielding etc.

As the normality test results derived the not normal distribution of our data set, median values were utilized for further analysis. The highest estimated equivalent occupational eye dose is received by the technician who involved in radiopharmaceutical preparations, 6.93 (± 5.36) μSv and 1.971 (± 1.028) μSv for 1st and 2nd weeks of radionuclide generator. Average eye dose received by technical staff who direct contact with radiopharmaceuticals was 3.5 (± 0.3) $\mu SvGBq^{-1}$ according to Szumska, Budzanowski and Kopeć, (2014). Those values can't be compared as the investigated workloads involved by the staff members are different. As well as estimated median equivalent eye doses during assessed number of procedures for staff 01 and staff 02 were 0.75 (± 0.26) μSv, 0.15 (± 0.03) μSv respectively.

Annual median equivalent eye doses are estimated as 0.34 (± 0.24) $mSvy^{-1}$ for the personnel who involved with radiation dose administration and 0.08 (± 0.01) $mSvy^{-1}$ for the personnel who involved in patient handling. The estimated results are well below the dose limit (20 mSv) for the eye region according to the ICRP recommendations. Summers et al., (2013) have concluded that 1.85 mSv was the annual dose to the eye during ^{99m}Tc radiopharmaceuticals administration. The expected results from our study are lower than but approximately similar to value mentioned above. It should be mentioned that the investigations were conducted in selected number of procedures which expected to be provided a significant dose to the eye region of staff. The excluded procedures were which the staff didn't involve routinely making difficult to take measurements, impracticalities to wearing pocket dosimeter and used very low radiation activities. Those procedures also would be a reason for further increasing the dose received.

Estimated absorbed dose rate of eye lenses by Cho, Kim and Kim, (2017) was 1.228 μSvh^{-1}. Measurements were very sensitive as they used a phantom and $H_p(3)$ dosimeter instead of using POLIMASTER dosimeter in the present study. So the expected results may be more accurate if used a Thermo Luminescence Dosimeter (TLD) for dose measurements and increase the number of procedures investigated.

Our study results demonstrated significant association between total equivalent eye dose and the eye dose during radiolabeling by the technician ($p<0.05$), Total equivalent eye dose during DTPA procedures and eye dose during DTPA dose withdrawal ($p<0.05$) and weak correlation between generator activity and eye dose during elution of ^{99m}Tc radionuclide during 2nd week of generator and moderate during 1st week of generator. It elaborates manipulations of high activities for a considerable time increases the radiation dose received. But Dabin et al., (2016) results displayed no significant correlation with the manipulated activities reminding that associations are limited by the measurement uncertainty. We observed that total equivalent eye dose received by the staff 02 correlates strong and moderate positively with eye dose received during patient handling in bone scan and WBI procedures. We consider that noticeable time taken for patient handling in bone scan, assigns the above correlation.

Conclusion

The estimated annual equivalent eye dose received by selected nuclear medicine staff for this study conducted at nuclear medicine department Lanka hospital, Sri Lanka were 0.34 (± 0.24) $mSvy^{-1}$, 0.08 (± 0.01) $mSvy^{-1}$ for the personnel who involved in dose administration and patient handling

respectively. Average median equivalent eye doses received by the technician were the highest among average values; 6.93 (± 5.36) μSv and 1.971 (± 1.028) μSv for 1st and 2nd weeks of radionuclide generator. During the 1st week of the radionuclide generator, there was a moderate positive correlation with the generator activity and the total eye dose of the technician. The entire resulted annual occupational radiation doses to the eye region of staff in the studied place are far below than the ICRP recommended value of 20 mSv. Therefore, optimum radiation safety is maintained in this hospital.

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Prevalence of forward head posture and its' relationship with neck pain among sewing machine operators in two selected garment factories in Kaluthara district

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Abstract: Neck pain is one of the very common musculoskeletal symptoms among sewing machine operators. Sewing machine operation which is carried out in a forward inclined position over prolonged period makes them liable to develop faulty postures like Forward Head Posture (FHP) and the occurrence of neck pain. The objective of this study was to determine the prevalence of FHP among sewing machine operators in two selected garment factories in Kalutara district and to study the association of Craniovertebral angle (CVA) with neck pain intensity among sewing machine operators. A cross sectional study was carried out with a total of 167 sewing machine operators (156 females, 11 males) who worked in the sitting position. An interviewer administered questionnaire including Numerical Pain Rating Scale was used to assess the neck pain while photogrammetry was used to measure the CVA using KINOVEA app which is a motion analysis software. The mean values and the SD of age, BMI and work experience was 37.6 years ± 13.4, 23.7 kgm^{-2} ± 4.9 and 10.0 years ± 8.7 respectively. Out of the study sample, 64.67 % of sewing machine operators presented with FHP while the prevalence of FHP among sewing machine operators with neck pain were recorded as 77.45%. The test results revealed a significant weak negative correlation between CVA and neck pain intensity (p= 0.036, r= -0.208). This study concluded a high prevalence of FHP among sewing machine operators and a significant weak negative correlation between CVA and neck pain intensity.

Key Words: Forward Head Posture, Neck pain, Sewing machine operators

Introduction:

Neck pain is one of the very common musculoskeletal conditions in the general population (Fejer, Kyvik & Hartvigsen, 2006). Neck pain can vary from a small discomfort to severe disabling pain making it one of the major health problems that carries important economic costs (Mohankumar, 2018). Less severe neck pains occur due to poor posture, neck strains, occupational and sport injuries and mental state such as anxiety and depression, while mechanical and degenerative factors are more likely to develop chronic neck pain (Binder, 2007).

Forward head posture (FHP) is the most common postural deformity seen in the sagittal plane (Lee, Chung & Park, 2016). It can be defined as any alignment in which the external auditory meatus is positioned anterior to the plumb line through the shoulder joint (Kendall et al, 2005). In FHP, head moves anteriorly and the peak of the increased cervical lordotic curve is a noticeable distance away from center of gravity. FHP gradually leads to abnormal compression of zygapophyseal joint, posterior vertebral disks, narrowed intervertebral foramina and shortened posterior zygapophyseal joint capsule causing nerve root compression. Furthermore, functional changes occur in

temporomandibular joint due to these postural changes. The FHP could lead to muscle ischemia, muscle pain, fatigue, inflammation, reduced cervical range of motion and sometimes protrusion of nucleus pulpous, rotation of mandible which cause compression and irritation of retrodiscal pad (Levangie & Norkin, 2011). There are various methods to evaluate FHP but many studies have declared that Craniovertebral angle (CVA) is the best indicator to measure the FHP (Gadotti & Biasotto-Gonzalez, 2010). CVA is measured by the angle between the imaginary line which passes through C_7 and tragus and a horizontal line through C_7 (Physiopedia, 2019).

Over the years, postural evaluation has been conducted using various assessment methods such as observation, instrumental (Electronic Head Posture Instrument, Cervical Range of Motion Instrument), imaging using plain radiography and photography (Youssef, 2016). The use of photogrammetry to assess FHP has been proved to be a reliable and a sensitive method (Gadotti & Biasotto-Gonzalez, 2010) that correlates well with radiography (Grimmer-somers, Milanese & Louw, 2008). It is a non-invasive technique that requires capturing of photographs and then digitizing the photographs for further analysis with the use of a computer software (Youssef, 2016).

Work related musculoskeletal disorders are found to be high among sewing machine operators due to their long working hours with infrequent rest breaks and poor ergonomics making them liable to develop neck, back and shoulder symptoms (Lombardo et al, 2012). The sewing machine operation is executed in a static forward inclined sitting position with an uncomfortable knee and ankle angles creating a sustained load on neck muscles (Mehta, Gahlot & Singh, 2018). Previous researches have been implemented to find out the prevalence of neck pain among garment workers globally (Jehan et al, 2015; Van et al, 2015; Wang et al, 2007; Anderson et al, 1993) and also in Sri Lanka (Silva & Ponnamperuma, 2017; Lombardo et al, 2012). But a review on literature suggests that studies on prevalence of FHP and its' associations among highly risked occupations are few and far in between while many of them have been implemented to study the association of neck pain with working postures but not with habitual postures. The purpose of this study was to evaluate the prevalence of FHP and establish the relationship between the craniovetebral angle and neck pain among sewing machine operators in two garment factories in the Kaluthara district.

Methodology:

A cross sectional study was carried out in two garment factories in the Kaluthara district. A total of 167 sewing machine operators who fulfilled the inclusion and exclusion criteria participated in the study. The inclusion criteria were sewing machine operators who worked in the sitting position for at least 20 hours per week and those who had a work experience as a sewing machine operator for more than one year. They were excluded if they had been diagnosed with a medical condition that would affect the cervical spine mobility including traumatic neck injury, rheumatoid arthritis, idiopathic scoliosis, cervical spondylosis and bone cancer and sewing machine operators with congenital neck problems or if they were having radiating neck pain.

Measurement of CVA, cervical flexion and extension:

Capturing of the photographs.

Prior to capturing of the photographs in order to measure the CVA, two points of the body was marked. They were the spinous process of the7th cervical vertebrae and the tragus. The two points were marked using adhesive double sided tapes of 0.5cm x 0.5cm

and Styrofoam balls to make them visible on the photographs. In order to capture the images, the participant was asked to stand in front of a calibration board which was placed in order to make sure to align with the participant to allow referencing of horizontal and vertical axes of the photographs. The registration number given to the participant was displayed on the calibration board for identification. A foot mark was placed on the floor to ensure all the subjects stood in the same place. The position of the camera and the tripod was fixed for standardization throughout the data collection procedure. The position of the subject in front of the board and the distance between the subject and the tripod was marked by tapes using measuring tapes to avoid any changes affecting the measurements. The camera was setup on a tripod placed 100cm away from the lateral border of the footmark. The height of the camera was adjusted so that the tragus of the participant was the focus point (Youssef, 2016). The camera holder was adjusted until the bubble of the horizontal indicator and the central marking overlapped (Lau, Chiu and Lam, 2010).

In order to capture the CVA, the participant was asked to stand on the foot mark looking forward at a target on the wall. He/she was then instructed to stand with weight evenly distributed on both feet and arms resting on either sides of the body. The participant was asked to tilt their head forward and backward three times in order to make sure they assume a relaxed neutral position of the head and neck. Three photographs were taken with two minute rests in between in order to reduce bias that may occur due to tension (Yip, Chiu and Poon, 2007).

Analysis of CVA

All the photographs were transferred to computer running the Kinovea software. The CVA was measured by the angle formed between the horizontal line passing through the spinous process of 7th cervical vertebrae and the line connecting the tragus and the spinous process of 7th cervical vertebrae.

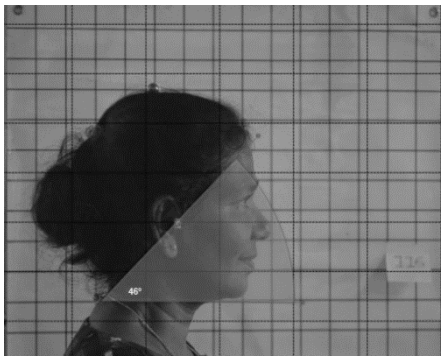

Figure 5:Measuring the CVA using Kinovea

Measurement of neck pain.

Measurement of neck pain was carried out using an interviewer administered questionnaire, which included personal details, working details, awareness on posture correction exercises and the presence and absence of neck pain. Under the presence of neck pain, the intensity was assessed using the NPRS. It was considered unlikely that the CVA measurement would affect the intensity of pain symptoms. The participants were clearly explained about the neck pain as the pain in the neck and/or the upper trapezius area which they feel while working or at the end of their shift due to working in the same position for a long period (Darivemula et al, 2016).

Results:

Table 1: Demographic characteristics of the study participants.

Variable	Minimum	Maximum	Mean	Std. Deviation
Age	16.0	65.0	37.57	13.41
Work experience	1.0	46.0	9.93	8.70
BMI	13.6	40.0	23.72	4.88
CVA	26.00	58.00	45.37	5.70

Demographic characteristics of the study participants.

A total of 167 sewing machine operators participated in the study (156 females, 11

males). The demographic characteristics of the study sample are presented in table 1.

Based on the previous literature, participants with a CVA of 50 or more were considered as having correct head posture (Kim, Kim & Kim, 2015; Diab & Moustafa, 2011). Accordingly, a percentage of 64.67% sewing machine operators presented with forward head posture while 61.08% of sewing machine operators complained of work related neck pain. From the sample of sewing machine operators who complained of having neck pain, 77.45% of them presented with FHP.

The association of CVA and the intensity of neck pain among the participants who reported of having work related neck pain is presented in Table 2.

Table 2: Correlation between neck pain intensity and CVA

		CVA	Intensity
CVA	Pearson Correlation	1	-.208*
	Sig. (2-tailed)		.036
	N	102	102
Intensity	Pearson Correlation	-.208*	1
	Sig. (2-tailed)	.036	
	N	102	102

Discussion

This study was focused on finding the prevalence of FHP and the relationship between CVA and neck pain among sewing machine operators. The study utilized photogrammetry method in order to measure CVA which has not been previously used in field of physiotherapy in Sri Lanka.

Taking a CVA of 50˚ or more as the correct head posture a total of 103 (64.67%) sewing machine operators presented with forward head posture. This high prevalence of FHP among different occupations with similar postures like office workers, visual display terminal workers, dentists and call center operators are supported by several articles (Mamania & Anap, 2019; Worikar & Shah, 2019; Nas, Bashir & Noor, 2018; Verma et al, 2018; Vakili et al, 2016 and Nejati et al, 2014). Among the sample of 167 sewing machine operators, 61.08% of them had neck pain during working hours or at the end of their shift. This high prevalence of neck pain among sewing machine operators and garment workers are consistent with the findings of previous studies by Silva and Ponnamperuma (2017), Andersen et al (1993), Kaergaard and Anderson (1993) and Van et al (2015). While studies carried by Lombardo et al (2012), Thangaraj, Kannappan and Chacko (2015) and Jehan et al (2015) revealed a low prevalence of neck pain compared to our study.

Among the sewing machine operators who complained of having work related neck pain, 77.45% participants presented with FHP. This high prevalence of FHP among participants with neck pain is consistent with previous studies by Chiu et al (2002) who reported 60.5% of FHP among academic staff with neck pain while Ruivo, Pezarat-Corriea and Carita (2014) also revealed a high prevalence of FHP among adolescents with neck pain. A negative correlation was found between the neck pain intensity and CVA among the sewing machine operators with neck pain. These findings are consistent with earlier studies carried out among different occupational groups by Subbarayalu and Ameer (2017) and Abbhasi et al (2016). Other studies by Contractor, Shah and Shah (2018), Yip, Chiu and Poon (2008) and Lau, Chiu and Lam (2010) carried out among neck pain patients revealed similar results of a weak negative correlation between neck pain intensity and CVA. A negative correlation between CVA and neck pain intensity indicates that smaller CVAs lead to higher intensities of neck pain and supports our assumption that correction of FHP could lead to better outcomes of patients with neck pain. The correlation between CVA and neck pain intensity was moderate at best

according to our results which suggests it could be one of the factors related to neck pain and the other factors needs to be addressed through further studies. As this was a cross sectional study we were unable to establish the cause and effect relationship between head posture and neck pain and self-report of inclusion and exclusion criteria may not be the most ideal. We did not exclude or screen for psychological stress, balance disorders or visual deficiencies which may affect the head posture. Furthermore, we did not analyze the characteristics of the entire spine. This needs to be addressed in future studies as the changes in lumbar and thoracic spine may affect the head posture.

Conclusion:

In conclusion, the results of our study revealed a high prevalence of FHP and neck pain among sewing machine operators and a high percentage of participants with FHP among sewing machine operators with neck pain. The study revealed a significant weak negative correlation of CVA with neck pain intensity. Our study results reinforce the importance of developing better ergonomics in the work place as well as introducing sessions of posture correction and relaxation exercises among sewing machine operators during the rest breaks. The results also support the importance of assessing the cervical posture in patients with neck pain in the clinical setup and including posture correction exercises along with conventional treatments in the clinical set up for the treatment of neck pain.

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Prevalence Of Urinary Incontinence And Its Association With Risk Factors In Three Months Postpartum Women Attending MOH Clinics Registered Under Colombo Municipal Council During September And October 2019

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Abstract: Urinary incontinence (UI) is a common symptom after pregnancy causing distress, embarrassment among women and is often under reported due to misbelieves, unawareness and shame. This study is aimed to determine the prevalence and risk factors of UI among three months postpartum women attending Maternity and Child Healthcare centres, registered under Colombo Municipal Council. A descriptive cross sectional study was carried out among three months postpartum women of age 18 - 45 who were recruited consecutively until the sample size of 420 was achieved. A questionnaire including demographic data and obstetric history was given and the "Questionnaire for Urinary Incontinence Diagnosis" (QUID) was given to diagnose the type of UI. The prevalence of UI out of the 420 participants was identified as 17.4%, stress urinary incontinence (SUI) as 6.0%, urge urinary incontinence (UUI) as 7.9% and mixed urinary incontinence (MUI) as 3.6%. The results of the Multinomial Logistic Regression test revealed that parity (p=0.002), first birth (p=0.014) and episiotomy (p=0.004) had a significant association with UI whereas head circumference (p=0.016), parity (p=0.053) and first birth (p=0.023) had a significant association with SUI. Parity (p=0.002) and the number of normal vaginal deliveries (p=0.034) had a significant association with UUI while BMI (p=0.027), first birth (p=0.016), episiotomy (p=0.047) and gestational DM (p=0.030) had a significant association with MUI. The prevalence of UI among three months postpartum women was 17.4% and UUI was the most prevalent. Parity, first birth and episiotomy were the risk factors that had a significant association with UI.

KeyWords: prevalence, urinary incontinence, risk factors

Introduction:

Urinary incontinence is a common stigmatizing condition among females which has a devastating impact on the quality of life this affecting their physical, psychological, social and economic wellbeing (Hunskar et al, 2004). A systematic review that was conducted among 33 population based studies concluded the global prevalence of UI in three months postpartum women to be 33% (Thom & Rortveit, 2010). Even though UI has social and cultural implications, limited studies have been conducted in Asian countries moreover this kind of a study has not been conducted in Sri Lanka. The aim of this study was to find out the prevalence of Urinary Incontinence and its association with risk factors for Urinary Incontinence among population.

Methodology

This research was a descriptive cross sectional study conducted among all eligible

three months' postpartum mothers who attended MOH clinics registered under the Colombo Municipal Council during September and October 2019.Three months postpartum women within the age range 18-45 years who were able to read and write were included in the study sample while three months postpartum mothers who suffered from urinary tract infections at the time of data collection and who had UI prior to pregnancy were excluded. Sample size was calculated using a standardised equation for sample size calculation as stated by Arifin (2013). Accordingly 420 three months postpartum mothers were recruited consecutively until the sample size was achieved.

Data were collected from two interviewer administered questionnaires. Initially a questionnaire inquiring demographic and clinical data was given; the validity of the questionnaire was assessed by three specialists experienced in Obstetrics and gynaecology. A Questionnaire for Urinary Incontinence Diagnosis (QUID) was used to diagnosed the type of UI, the questionnaire was validated by Bradely et al (2010) and translated by language specialists to Sinhala and Tamil and rechecked by subject professionals and was back translated. A pre-test was done for both questionnaires on ten three months postpartum women who attended the Kuppiyawatta MOH. All investigators were trained to interview the participants and one investigator was trained to measure the height and weight. Data were entered into Statistical package for Social Sciences (SPSS) version 23-computer software and analysed accordingly. Risk factors were analysed using Multi-nominal logistic regression (MLR).

Results

Descriptive details (mean, standard deviation, median, mode, minimum and maximum) of mother's age, mother's BMI, newborn's birth weight and head circumference are shown in table 1. In reference to the descriptive statistics, the sample consisted of three months postpartum mothers between ages 18 to 42 years.

Table 1: Descriptive Details

Characteristics	Mean ± SD	Median	Mode	Max	Min
Age	28.01 ±5.79	27.00	26	42	18
BMI	25.79 ±5.00	25.75	24	51.3	14.8
Birth weight	2.90 ± 0.49	2.90	2.9	4.82	1.00
Head Circumference	32.78± 1.94	32.88	33	45	24

Prevalence of UI, SUI, UUI

The prevalence of UI among the 420 three months postpartum mothers was 17.4% of which 6.0% (n= 25) was SUI, 7.9% (n=33) was UUI and 3.6% (n=15) was MUI. The prevalence of three types of urinary incontinence as a percentage of the diagnosed women was 34.2% of SUI, 45.2% of UUI and 20.5% of MUI. Multinomial logistic regression was performed on the current study to model the relationship between types of UI (SUI, UUI, MUI) and its association with risk factors.

Parity (p=0.002), First Birth (p=0.014) and Episiotomy (p=0.004) were noted as the risk factors that had a significant association with UI.

Table 2: Parameter Estimates of the significant risk factors relative to the type of urinary incontinence

Type	Risk factors	B	Sig.
SUI	Head circumference	.342	.016
	Parity:		
	Primiparous	-1.189	.050
	Multiparous	0[b]	
	First birth:		
	LSCS	-3.034	0.23
	NVD	0[b]	

UUI	Parity:		
	Primiparous	-1.790	.002
	Multiparous	0[b]	
	Number of NVD	.774	.034
MUI	BMI	.133	.027
	First birth:		
	LSCS	3.393	.016
	NVD	0[b]	
	Episiotomy :		
	Response – No	-2.023	.047
	Response – Yes	0[b]	
	Gestational DM		
	Response- No	-1.334	.030
	Response- Yes	0[b]	

Discussion

In reference to the QUID scores, 73 mothers were diagnosed with urinary incontinence. The reported stress urinary incontinence prevalence was 6%, whereas urge urinary incontinence was 7.9% and mixed urinary incontinence was 3.6%. Accordingly, in contrast to many studies , this study reported urge urinary incontinence to be the most prevalent followed by stress urinary incontinence and mixed urinary incontinence.

The urinary incontinence prevalence in the present study was almost similar to the study by Boyles et al (2009) in Oregon, USA which was 17.1%, but lower than the study by Glazener et al (2006) which was conducted in Scotland and the meta-analysis by Tom and Rotreivet (2010) which was respectively 28% and 28.7%. In comparison to the prevalence of South Asian countries, the present study showed higher prevalence in respect to the study done in Karachchi, Pakistan by Ali, Lakhani and Sarwar (2013) which had the prevalence of 10.6% and a study done by Tanawattanacharoen and Thongtawee (2014) in Thailand which was 7.8%. A higher prevalence of urinary incontinence (20.3%) than the present study was reported in Indonesia by Fakhrizal et al (2016). Studies, which were reviewed, reported a wide variability of urinary incontinence depending on the ethnicity. A literature review done to identify the association between UI in women and racial aspect reported that UI prevalence in general is higher in white and Hispanic women than among black and Asian women and that stress UI was more common in Hispanic women than the rest of the ethnicities(Leroy et al., 2012). (Sears et al, 2009) reported a significantly higher prevalence of stress incontinence among Hispanic women, followed by white, black and Asian women and a higher prevalence of urge incontinence among black women, followed by Hispanic, white and Asian women. This study conducted in Sri Lanka being a South Asian country reported higher prevalence in urge UI.

Studies conducted in Sri Lanka on urinary incontinence prevalence among general female population concluded that the most prevalent urinary incontinence type in Sri Lanka as urge urinary incontinence which was similar to the current study suggesting that ethnicity might be the reason(Pethiyagoda, Pethiyagoda & Manchanyaka, 2018; Pathiraja, Prathapan & Gunewardena, 2017).The research conducted in the Teaching Hospital , Peradeniya reported a prevalence of 4.8% for both UUI and MUI whereas stress prevalence was 1.7% (Pethiyagoda, Pethiyagoda & Manchanyaka, 2018).Another study conducted using 2354 women (18-90 years) reported 10% of SUI , 29.9% of UUI and 15.6% of MUI. The Colombo district analysis of this study reported 5.5% of SUI which is closer to the SUI prevalence in the current study (Hemachandra, Rajapaksa & Manderson, 2009).

Risk factors associated with UI

The maternal age range of the study was between 18 – 42 years with a mean age of 28.1±5.79 years. The results concluded that there was no association between the maternal age and type of UI which was similar to the study conducted by Pregazzi et al (2002) to assess the prevalence and risk

factors of three months postpartum women within the age range 19 – 44 years? Helena and Moraes (2016) concluded another study among mothers within the age range 13 – 45 (mean 25.9±7.7 years) which also reported a similar outcome. In contrast to all above studies, Zhu et al (2012) and Macarthur et al (2015) have both concluded that the increase of maternal age increased the risk of having UI.

Next, the current study identified the mean BMI of three months postpartum mothers to be 25.79±5.00 kgm-2, which had no association with the types of UI. Helena and Moraes (2016) also had reported similar results in their studies, while Macarthur et al (2015) and Eftekhar et al (2006) reported controversial results, showing an association between BMI and UI. A case control study by Helena and Moraes (2016), Boyles et al (2009) and Tanawattanacharoen and Thongtawee (2014) stated that there was no association between the birth weight of the newborn and the prevalence of UI which supported the results of the current study (mean birth weight 2.9±0.49kg), but Glazener et al (2006) concluded that the baby's birth weight had a significant association with UI which was a contentious result for the current study.

Another factor analysed in the present study was head circumference of the newborn baby which had a mean of 32.78 ± 1.94, the results revealed a significant association with SUI which was consistent with the study by Vikrupt (1992) but controversial with EPINCOT a study by Rortveit et al (2003) which showed a significant association with UUI. However,Pregazzi et al (2002) and Burgio et al (2003) interpreted a completely different outcome concluding that the head circumference had no association with UI.

Parity had been a significant risk factor that associated with UI Macarthur et al (2015), Helena and Moraes (2016) and Lin et al (2018) concluded parity as a significant determinant of SUI. This was compatible with the findings of the current study, which reported a significant association between SUI and UUI in three months postpartum women. Pregazzi et al (2002) also reported similar results. In contrast, Tanawattanacharoen and Thongtawee (2014) concluded that the parity had no relationship with UI.

The current study also found that most of the mothers suffering from UI stated NVD as the mode of delivery of their first pregnancy which revealed that NVD being the mode of delivery of the first pregnancy to have a significant association with SUI and MUI which was supported in the EPINCOT study by Rortveit et al (2001). A longitudinal cohort study by Viktrup, Rortveit and Lose (2007) concluded that mode of delivery of the first pregnancy being LSCS seemed to reduce the risk of long term while Eason et al (2004) concluded that first birth being NVD as a risk to develop SUI.

Another factor that was analysed in the study was GDM, which showed no association with SUI or UUI but showed an association with MUI. A longitudinal cohort study by Chuang et al (2012) stated that GDM was a risk factor for postpartum UI irrespective of the type compared to women who didn't have GDM, but a few studies stated that there was no association between UI and GDM (Lin et al, 2018).

A case control study by Helena and Moraes (2016) assessed the risk factors, identified that women who had undergone vaginal delivery were at higher risk of developing UI than women who were submitted to LSCS. Burgio et al (2003) concluded that experiencing a NVD, doubled the risk of developing UI in the postpartum period and studies have also proposed that LSCS prevented muscular and nerve damage to the pelvic floor reduced the risk of developing SUI compared to NVD (Snooks et al, 1990). Many more studies have reported similar

outcomes in their conclusions. The current study was also in line with these results presenting and association between the number of NVD and UUI.

Finally, the results of the present study showed a significant association between episiotomy and MUI. Zhu et al (2012) concluded that episiotomy had a significant association with UI but in contrast, the study by Helena and Moraes, (2016) concludes that there is no association between MUI and episiotomy.

Conclusion

In conclusion, the present study identified the prevalence of UI as 17.4%, SUI as 6.0%, UUI as 7.9% and MUI as 3.6% .The most prevalent type of UI was UUI. The risk factors that had a significant association with UI were identified as Parity, First Birth and Episiotomy. SUI had a significant association with head circumference, parity and first birth whereas number of vaginal deliveries and parity showed a significant association with UUI while first birth, episiotomy and gestational DM showed a significant association with MUI.

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Antimicrobial Susceptibility Patterns Of Blood Culture Isolates From Cancer Patients After Anti-Cancer Therapy.

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Abstract: Blood stream infections (BSI) have a major impact on cancer patients. Antimicrobial patterns in pathogens should be analyzed by routine surveillance since they vary among different healthcare facilities and geographical area. This study focuses on epidemiology, clinical features, and antimicrobial profiles of cancer patients with BSI after anticancer therapy. A Descriptive cross-sectional study was conducted within a period of 4 months. The causative agents and antibiotic profiles were studied according to Clinical Laboratory Standards institutes (CLSI) and VITEK automated system. Antibiotic profiles of organisms and antibiotic resistance patterns were analyzed in terms of frequency. The prevalence of BSI was 11.75%. Gram negative bacilli (GNB) were higher than gram positive cocci (GPC). Among GNB the most prevalent was *Klebsiella pneumoniae* and among GPC it was, *Staphylococcus aureus*. Prevalence of multi-drug resistance (MDR) was 78.8%. High resistance to Erythromycin was seen in patients with hematological cancers while high resistance to Benzyl penicillin was seen in patients with solid cancers. Chemotherapy had no significant impact on presence of multi-drug resistance while the association between CRP with ANC and presence of fever was not significant. Among different antibiotic resistant groups, ESBL and Carbapenem resistances were noted. According to our study high prevalence of antimicrobial resistance in Gram-negative isolates and emergence of MDR pathogens is alarming. Investigation of novel antibiotics, usage of combination therapy and usage according to the standard antimicrobial susceptibility testing may help to decrease or prevent the emergence of antibiotic resistance.

Keywords: - Cancer, Blood-stream infections, Antimicrobial resistance.

Introduction:

Blood stream infections (BSI) have a significant impact on cancer patients. It is the most common complication seen in patients with hematological malignancies such as lymphomas, leukemia, multiple myeloma and febrile neutropenia (Trecarichi *et al*., 2009) and in patients with oncological malignancies such as solid tumors. The prevalence of BSI lies between 11 to 38% while mortality reaches 40% (Montassier *et al*., 2013).

Cancer patients have a high risk of infection due to prolong neutropenic conditions, damages caused due to cytotoxic agents and altered gut flora due to antibiotic usage (Saghir *et al*.,2009). Apart from surgical operations, radiation therapy, myelo-suppressive cytotoxic chemotherapy, frequent use of invasive procedures such as central venous catheters and immunosuppression status caused by the

malignancy itself will make the patients more vulnerable to BSI.(Marin *et al*.,2014, Rolston,2017). Previous studies have mostly focused on BSI due to hematological malignancies, but patients with solid cancers that undergo surgery too possess a high potential in acquiring BSI. It could be acquired endogenously such as normal flora near operative sites or exogenously via hospital environment such as air, medical staff and equipment (Homsi *et al*.,2000, Nurain *et al*.,2015).

The development of BSI hinders the ongoing anticancer therapies such as chemotherapy and radiation therapy by delaying its administration and by reducing the dosage that can be applied. This will also lead to lengthening of hospital stay (Marin *et al*.,2014, Montassier *et al*.,2013) and increase costs related to patient care while significantly increasing morbidity and mortality (Rani *et al*.,2017).

A previous study (Chandrasiri *et al*.,2013) carried out in Sri Lanka stated that adult leukemia was the most frequent (15%) clinical condition that supported BSI while contribution of solid tumor was 9.7%. Centers for disease control and prevention (CDC) in USA has estimated that out of the patients who undergo chemotherapy about 10% are subjected to infections (Telliant *et al*.,2015).

Fever is considered as the principle indicator and sometimes the only clinical presentation of BSI. But it may also be shown as part of the flu like syndrome in cancer patients receiving chemical and biological therapy. Therefore, attention should be given for cancer patients with fever since it serves as an indicator of early diagnosis (Nejad *et al*.,2010). CRP is a statistically significant predictor for BSI in adults (Al-Mulla *et al*.,2014). Neutropenia refers to Absolute Neutrophil Count (ANC) less than 500 cells/mm3 and it also plays a significant role in BSI. It is considered as a risk factor in up to 25% of cancer patients with death rates extending to 24% in high income countries and 33% in low middle-income countries (Lubwama *et al*., 2019). All these clinical data play a significant role as indicators of BSI.

Recent studies show that gram negative bacilli (GNB) are common in BSI in cancer patients during aggressive therapy (Saghir *et al*.,2009). According to (Marin *et al*.,2014) the shift from gram positive to gram negative is dependent on the geographical area. In US Latin America gram negatives have been found to be frequent while in Europe it was gram positive. When considering gram positive bacteria Genus staphylococcus were more frequently isolated while *Klebsiella pneumoniae* , *E.coli* and *Pseudomonas aeruginosa* were isolated as gram negative bacilli (Fentie *et al*.,2018).

Antimicrobial patterns in pathogens should be analyzed by routine surveillance since they vary among different healthcare facilities and geographical area and also due to the increase of Antimicrobial resistance (AMR) in bacterial agents. BSI requires immediate antibiotic treatment. Empiric antibiotic therapy is used as the standard practice until culture results are available. This Empiric therapy is developed based on knowledge of institution specific patterns of microbial prevalence and resistances. Thus, such studies are required to assist antimicrobial therapy and control of infections at different institutions. (Lubwama *et al*.,2019). According to previous studies information on BSI in solid cancer patients is scarce and comparative studies are also limited (Marin *et al*.,2014). Therefore, this study focuses on epidemiology, associations between clinical features, causative organisms of BSI, antimicrobial resistance between two populations namely oncological and hematological malignancies of cancer patients with BSI and the association

between chemotherapy and antimicrobial resistance.

Methodology:

A descriptive Cross-sectional prospective study was conducted at National cancer institute Maharagama from August 2019 to December 2019. Ethical clearance was obtained from the Ethical review committee, Faculty of Medicine, General Sir John Kotelawala Defense University, Rathmalana and Informed consent was taken from National Cancer Institute, Maharagama. The total number of 309 positive blood cultures that met the inclusion criteria was examined.

Information on age, sex, clinical data, (White Blood Count, Absolute Neutrophil Count, C-Reactive Protein, Fever, Anticancer therapy, Antibiotics given prior to culture and blood collection site for each patient was recorded.

Samples sent to the Microbiology laboratory for routine diagnosis were used for the project. All positive blood culture samples were detected by BD BACTEC™ FX Automated blood culture analyzer. Microbial identification was performed using the biochemical tests following Laboratory Manual in Microbiology, 2011 and VITEK 2 compact automated system. Hematological reports were assorted under hospital permission. Full blood count was done using Sysmex XN - 1000 hematology analyzer and Absolute neutrophil count was obtained from full blood count report. Nine antibiotic classes named Penicillin, Aminoglycosides, Cephalosporins, Carbapenems, Fluoroquinolones, Macrolides, Lincosamides, Glycopeptides, Beta-lactam inhibitors were considered in this study.

Antibiotic susceptibility was tested using disc diffusion method following Clinical Laboratory Standard Institute (CLSI) guidelines and VITEK 2 – compact automated system. According to the CLSI recommendations, the screening of Methicillin- Resistant Staphylococcus aureus (MRSA), ESBL production, Vancomycin Resistant Enterococci (VRE) and Carbapenem Resistant Enterobacteriaceae (CRE) was conducted. In this study we considered Carbapenem resistant Enterobacteriaceae (CRE), extended spectrum beta lactamase (ESBL) regarding gram negative isolates and Methicillin Resistant Staphylococcus aureus (MRSA) and Vancomycin Resistant Enterococci/Staphylococci regarding gram positive isolates.

All data was analyzed using descriptive and inferential statistics by IBM SPSS Statistics 20 software. Antibiotic profiles of organisms and antibiotic resistance patterns were analyzed in terms of Frequency. Correlation between CRP-Fever, ANC–CRP, & MDR organisms and No. Of chemotherapy drugs were analyzed respectively by using Regression, Pearson correlation & Cochran's Mantel – Haenzel test respectively.

Results:

The prevalence of Blood stream infections (BSI) among cancer patients was 11.75%. The number of positive blood cultures examined in this study was 309. The study population consisted of patients aging from 2 months to 82 years. The majority of BSI occurred in hematological malignancies (57.9%) while BSI in patients with solid tumors were lower (42.1%).

An extended range of 41 species of causative agents were isolated. Majority of the organisms isolated were gram negative bacilli (60.1%) out of which *Klebsiella pneumoniae* (n=41, 12.5%) was dominant followed by, *Escherichia coli* (n=38, 11.6%), *Acinetobacter baumannii* (n=19, 5.8%) 37.8% gram positive cocci and 2.1% gram positive bacilli were also isolated. Predominant gram positive cocci were *Staphylococcus aureus* (n=28, 8.5%) followed by *Staphylococcus hominis* (n=18, 5.5%), Coagulase negative *Staphylococcus* (n=17,

5.2%) and *Staphylococcus hemolyticus* (n=15, 4.6%). The prevalence of poly-microbial bacteremia was 6.1% (n= 19). Some of the rare species named *Achromobater xylosoxidans*, *Bordetella hinzii*, *Burkholderia cepacia*, *Elizabethkingia meningoseptica*, *Alcologens faecalis*, *Ochrobactrum anthropic* were also isolated.

Gram negative organisms were predominant over gram positive organisms among both solid and hematological malignancies. In our study, antimicrobial resistance was high in hematological malignancies than solid tumors. Among hematological malignancy patients, GNB's such as *Enterobacter cloacae*, *Acinetobacter baumannii*, group named as LF other(Lactose fermenting),

Escherichia coli and *Klebsiella pneumoniae* and GPC's such as *Staphylococcus hemolyticus*, *Staphylococcus hominis*, *Streptococcus spp*. and Diptheroids showed high rate of resistance to most of the antibiotics. Among solid tumor patients, GNB's such as *Escherichia coli*, *Klebsiella pneumoniae* and group named as LF other and GPC's such as Coagulase Negative Staphylococcus, *Staphylococcus spp*. and *Staphylococcus hemolyticus* showed high rate of resistance to most of the antibiotics.

In this study, for gram negative organisms, Extended spectrum beta-lactamase (ESBL), Carbapenem resistant Enterobacteriaceae (CRE) and for gram positive organisms, Methicillin resistant *Staphylococcus aureus* (MRSA), Vancomycin resistant Enterococci (VRE) were considered as antimicrobial resistance patterns. Overall, 28.57% gram negative organisms were positive for ESBL. Rate of occurrence of ESBL was tested in *Klebsiella pneumoniae* (24.4%) and *Escherichia coli* (34.5%). But both were less than 50%. CRE was considered with regard to Imipenem and Meropenem. The highest resistance to Imipenem was showed by *Enterobacter spp*. (53.3%) while *Klebsiella pneumoniae* showed 73.2% against Meropenem. When considering VRE, *Enterococci spp*. showed no resistance to Vancomycin (100% sensitive) but 12.8% Vancomycin resistant *Staphylococcus spp*. were isolated. Only 4 cases (14.3%) of MRSA was observed. In our study, the total prevalence of MDR organisms was 218 (78.7%).

The total prevalence of MDR organisms was 78.7%. Majority was MDR gram negative lactose fermenting organisms (90.90%) followed by MDR gram positive organisms (73.73%) and nonlactose fermenting organisms (61.40%).

No significant association was found (p=0.562) between number of chemotherapy drugs given to the patient and the presence of MDR bacteria. Furthermore, no association was noted between absolute neutrophil count and C-reactive protein values (p=0.154). A regression model was developed to find the association between C-reactive protein value and presence of fever. The model was insignificant (p=0.376) indicating that no significant association between the two variables.

Polymyxin B is the most effective drug for gram negative organisms while most effective drugs for GPC are Fusidic acid and Teicoplanin.

Discussion:

The overall prevalence of BSI among cancer patients in this study was 11.75%. This finding is in line with many other studies which indicated a prevalence between 11-38% (Montassier *et al*., 2013, Fentie *et al*.,2018, Rani *et al*.,2017).

In this study patients ranging from 2 months to 82 years were considered. Associations between certain clinical features such as CRP, fever and ANC were assessed in this study. No significant association was observed in

the present study though literature review indicated otherwise.

When considering the bacterial profiles majority of the organisms isolated in this study were gram negative bacilli (GNB) (60.1%) while gram positive cocci and gram positive bacilli were 37.8% and 2.1% respectively. Our results were in accordance with many other studies. (Lubwama *et al*.,2019, Gudiol *et al*.,2014 and Montassier *et al*.,2013).

In a previous study, lower MDR prevalence was recorded (20) (46.5%) while 5 (11.6%) organisms were sensitive to all tested antibiotic classes and no organism was resistant to all tested antibiotic classes (Fentie, A. *et al*.,2018). Very high antibiotic resistance in our setting may be due to several reasons. The calculation of MDR prevalence changes according to the MDR definition as different research groups have followed different definitions. Patients taking antibiotics over the counter without a proper prescription and also the irrational use of antibiotics in our setting may also have played a role in high rates of MDR. A high degree of resistance to Cephalosporins among Enterobacteriaceae in the present study could be because Cephalosporins are one of the most used antibiotics for inpatients as well as for outpatients in developing countries. Papanicolas *et al*.,2017 has proposed a model stating that chemotherapy is a contributing factor for emergence of antibiotic resistant bacteria in gut. It is also mentioned that chemotherapy together with antibiotics has the potential to promote pathogen overgrowth and cause translocation into the blood stream. In our study this fact was taken into consideration and we attempted to find out any association between number of chemotherapy drugs given to a patient and the presence of multi drug resistant bacteria, however the association obtained was insignificant (p=0.562).

Conclusion:

In conclusion, this study provides information on antibiotic resistance of blood isolates which may be a useful guide for physicians initiating empirical therapy. According to our study high prevalence of antimicrobial resistance in Gram-negative isolates and emergence of MDR pathogens is alarming. This highlights the importance of investigating novel antibiotics to overcome the issue. Furthermore, evaluation of Minimum inhibitory concentration (MIC) of effective antibiotics could be performed since it depicts the extent of resistance and possibility of using the drug at a higher dosage for treatment.

Routine surveillance of baseline resistance, formulation of hospital antibiotic policy, usage of combination therapy and usage according to the standard antimicrobial susceptibility testing may help to decrease or prevent the emergence of antibiotic resistance. We also suggest that the association between chemotherapy and multi-drug resistant pathogens to be further investigated with a large sample size and a control group with similar characteristics such as age, gender etc. for better understanding.

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Learning style preferences and academic performance of undergraduate physiotherapy students

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Abstract: University level education of physiotherapy is fairly new in Sri Lanka. Hence students' satisfaction of the curriculum and learning environment has not been thoroughly studied. Different learning preferences have been reported among various undergraduate populations. understanding of various learning preferences can be used to enhance their learning experiences. Cross sectional study was conducted among physiotherapy undergraduates from the Department of Physiotherapy, Faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka .This study aimed to; i. Identify the different learning preference among physiotherapy undergraduates, ii. Assess the variations of learning preferences according to the gender and academic year, iii. Find out whether there is any relationship between learning preferences and academic performances. Learning preferences were assessed by Honey and Mumford's learning style questionnaire (LSQ). Academic performances were measured by semester cumulative grade point average (CGPA). Chi-square test was used to assess the association between categorical variables. Relationship between learning preferences and academic performances was measured using Pearson correlation coefficient. Eighty six undergraduates successfully responded to the questionnaire. Majority (51.2%) of the physiotherapy undergraduates preferred activist learning style. Chi-square value for the associations of learning preferences with gender (χ=5.961) and academic year (χ=14.399) were insignificant. Undergraduates who reported multiple preferred learning styles had relatively high CGPA. However, there was no significant different of mean CGPA among undergraduates with different preferred learning styles. Pragmatist learning preference strength was significantly and negatively correlated with the CGPA (r = 0.381). Encouraging pragmatists to improve their preferences to other styles and including more learning activities related to pragmatists may improve their academic performance. Teaching and learning activities with wide variety may improve the overall academic performances of undergraduates.

Keywords: Learning Preferences, Academic Performances, Physiotherapy Undergraduates

Introduction:

Learning styles of individuals are different according to the learners' cognitive processing [Marcy, 2001]. According to some educational researchers, disparity between learning content and mode of delivery of instruction may result in the learners' frustration with curriculum [Bertolami, 2001]. Educational researchers assume that improved learning outcomes may be obtained though addressing individual learning preferences [Silberman &Auerbach, 2006]. Educators have introduced various theories describing the learning preferences which aimed to understand the learning process better [Arthurs, 2007]. David A. Kolb introduced Kolb's experiential learning theory in 1984 which was widely discussed

among educational researches. Kolb's experiential learning theory works on two levels which are called perception and processing continuum and can be present in a four staged cycle of learning and four types of learning preferences [Kolb, 1984].

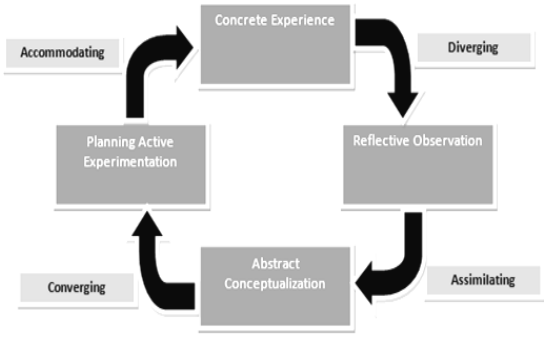

Figure 6:Kolb's experiential learning cycle [Kolb, 1984]

Many theorists were inspired by Kolb's learning theory. Honey and Mumford produced their own Learning Styles Questionnaire (LSQ) based on Kolb's learning theory as they found that Kolb's LSI had low face validity with managers. Hence rather than asking people directly how they learn, as Kolb's LSI does, Honey and Mumford gave them a questionnaire that probes general behavioral tendencies. Their reasoning for this was that the most people never consciously considered how they really learn [Knight, 2007].

Their questionnaire was directly derived from the Kolb's model of learning. However they made two modifications. First, they substitute the terms "reflector" for divergers (reflective observation), "theorist" for assimilators (abstract conceptualization), "pragmatist" for convergers (concrete experience), and "activist" for accommodators (active experimentation). In addition, the new labels have slightly different meanings. They hypothesized that individuals have different learning preferences based on the situation and level of experience, thus a learner would have multiple modes of learning preferences rather locked mode of preferences.

Reflector – these individuals prefers to learn from watching the activities. They prefer to view these activities in various perspectives, think about what happened and takes time to get to a conclusion. They prefer brainstorming. Lectures with an expert explanations and analysis will be helped for them.

Theorist – Inclined towards a step by step approach. They use models concepts and facts to understand the theories behind actions. Talking with experts is usually less useful to them.

Pragmatist – They attracted to real world applications of their new learning's to see how works. They are experimenters; want to try out new ideas. Prefer learn with field works, laboratory works and observations. They like to have feedbacks and to have clear links between hands on activity.

Activist – Attracted to face new challenges. They learn by doing and involved themselves in new challenges. Open minded and prefer to solve new problems and to work as small groups [Honey & Mumford, 2006].

Physiotherapy graduate level education in Sri Lanka was initiated and evolved within last two decades. Published research data regarding learning preferences of Sri Lankan physiotherapy undergraduates are limited. Authors could not find any published data of Sri Lankan physiotherapy undergraduates obtained through Honey and Mumford's LSQ. Some previous studies suggest that learning preferences should be examined with various tools [Mountford et al, 2006]. Class room instructions tailored according to the learners may be effective in improving learning experiences of medical undergraduates [Liew et al, 2015] .Further information regarding learning preferences of Sri Lankan physiotherapy undergraduates may be used to tailor more appropriate class room instructions and enhance the teaching learning experience.

Methodology:

Study design, setting and participants

A cross-sectional survey design was employed. This study was conducted among physiotherapy undergraduates of the Department of Physiotherapy, Faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka. All undergraduates who have registered in academic year 2019/20 physiotherapy department from four academic batches were invited to the study. One hundred twelve undergraduates were eligible to include in the study.

Study instrument

Data collection was done by a questionnaire which consisted of two sections. First section was used to enquire age, gender, academic year, and examination index number of participants while second part was the Honey and Mumford's learning Styles Questionnaire (LSQ) [Honey & Mumford, 2006]. Honey and Mumford's LSQ was used to examine learning styles preferences among physiotherapy students. This study instrument has shown good construct validity and internal consistency among South Asian populations [Haque & Afrin, 2018; Khan, 2009]. LSQ consists of 40 dichotomous statements that illustrate four learning styles identified by Honey and Mumford (Activist, Reflector, Theorist and pragmatist). Ten statements corresponds to each four styles are randomly organized. Respond to a statement can be made according to the degree of agreement/disagreement on statement. They were instructed to tick when they agree more than they disagree on a statement and to cross when they disagree more on a statement. LSQ enable the examiner to identify multiple learning preferences of the respondent. Strength of the preference for an each learning style can be further classified as very strong, strong, moderate, low or very low according to the general norms given with the study instrument. Scoring was done according to the sum of positive responses for each scale. End semester cumulative grade point average (CGPA) was collected from examination department as the indicator of academic performance.

Data collection

Institutional permission was obtained from the dean of the faculty prior to any data collection procedures. Data collections were done inside lecture halls at the beginning of a lecture during academic hours with the permission of the head of the department. Questionnaires were distributed among voluntary participants those who provided the informed written consent. Index numbers provided by participants were used with the permission of the dean of the faculty to obtain the examination results of relevant undergraduates from the examination department of the faculty.

Ethical considerations

Ethical clearance for the study was obtained from the ethical review committee of faculty of Allied Health Sciences, university of Peradeniya. Undergraduates were informed that the voluntary participation is expected. Informed written consent from every participant was obtained at the beginning of the data collection. Participants were informed the necessity of their index number for the study. All the data were handled by the investigators of the study and only for the research purpose.

Data analysis

SPSS v.21 was used to perform statistical analyzes the data. Descriptive statistics were used to characterize the sample (i.e., gender and academic year). Frequency tables of preferred learning styles were generated. Chi-square test was used to assess the association between categorical variables. Independent t-test and one way ANOVA test were used to assess the differences between

mean values of variables between groups. Relationship between learning preferences and academic performances was measured using Pearson correlation coefficient. $p<0.05$ was used as the level of significance for statistical tests.

Results and Discussion:

In this study, 76.7% response rate was reported. From the sample, 29 (33.7%) of the participants were male and 57 (66.3%) were female. This study showed comparatively low response rate (76.7%), compared to similar studies conducted in Sri Lanka (Kotelawela Defence University, 87% of undergraduates -87% and postgraduates 89.2%) [Abewardhana et al, 2018]. Comparatively less response rate may be resulted from the poor attendance of undergraduates during the time period of the data collection. Respondents were aged between 20-25 years. Twenty undergraduates from 1st academic year, 27 undergraduates from 2nd academic year, 21 undergraduates from 3rd academic year, and 18 years undergraduates from 4th academic year responded to the study.

Preferred learning style of the majority of respondents (51.2%) was "Activist" style. As contrary to these findings, previous study has shown that most physiotherapy undergraduates in Australia (26%) preferred reflector learning style [Mountford et al, 2006]. Furthermore, according to previous studies, most of other Asian students preferred passive and reflective type of learning [Charlesworth, 2008; Wong, 2004]. From the sample, 18.6% preferred "Theorist" learning style while 15.1% preferred "Reflector learning styles. Least preferred learning style was "Pragmatist" style (2.3%). Rest of the 12.6% respondents had multiple preferred learning styles. They were classified as "Mixed" style. According to a study conducted among undergraduates from various fields of study in the southern university of Chile, Medical undergraduates had a balanced preference for all styles while engineering undergraduates preferred "Pragmatist" and "Activist" learning styles [Von Chrismar, 2015]. As demonstrated by the results of above mentioned studies, field of the study and region of the undergraduates may affect the learning preferences.

Table 3: Respondents according to preferred learning style.

Preferred learning style	Frequency	Percentage %
Activist	44	51.2%
Reflector	13	15.1%
Theorist	16	18.6%
Pragmatist	2	2.3%
Mixed	11	12.8%

Majority of both male and female respondents' preferred learning style was "Activist" style. Figure: 02, shows the gender wise distribution of the preferred learning styles. Chi square test value for the association of gender with learning preference was insignificant (Pearson chi square value = 5.961). Previous study conducted among pharmacy undergraduates of Brazil report similar results [Czepula, 2016]. A study conducted to examine learning preferences of secondary school students using Neil Fleming's Vark model reported that there was no significant association between gender and learning preferences [Singh et al, 2015]. Learning preferences may be independent from gender of the learner at least when examining with Honey and Mumford's LSQ.

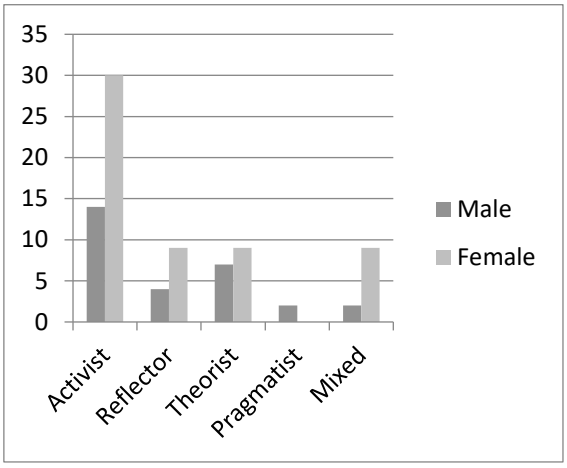

Figure 7: Learning preference according to gender

Chi square test value for the association between academic year and preferred learning style was insignificant (Pearson chi square value = 14.399). Pragmatists were reported only among 2nd year participants. Learning preferences of the undergraduates has not changed significantly from 1st to 4th academic years. A study conducted among Pakistan dental undergraduates and dentists has reported findings partially agreed with the findings of this study. According to the study most preferred learning style (reflector) remained constant from 2nd to 4th academic years and even among demonstrators [Butt et al, 2018].

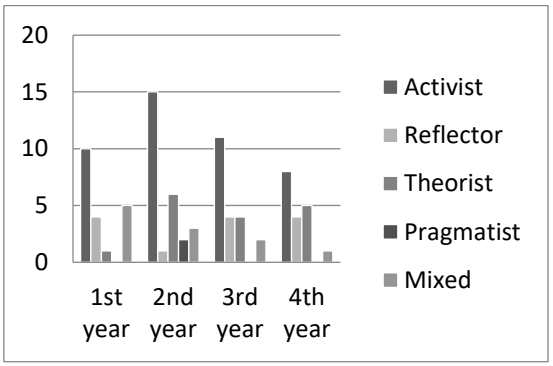

Figure 8: Learning preference according to academic year

Mean CGPA of undergraduates is 2.69. Mean CGPA of male respondents was less compared to female participants. Mean CGPA difference among academic years were insignificant. As shown in the table 2, highest mean CGPA is reported from "Mixed" group. However, No significant difference of mean CGPA between any two groups were found.

Table 4: CGPA according to preferred learning style.

Preferred learning style	Min. CGPA	Max. CGPA	Mean CGPA
Activist	1.28	3.63	2.55
Reflector	1.47	3.62	2.55
Theorist	2.05	3.44	2.67
Pragmatist	2.24	3.21	2.72
Mixed	1.51	3.81	2.76

There is a significant negative weak correlation between pragmatist preference strength and CGPA. Previous study which has conducted among pharmacy undergraduates in United Kingdom reported significant weak positive correlation between Theorist, Reflector scores and first year examinations marks. Study also has found a significant weak correlation between Activist scores and first year examinations marks [Sharif et al, 2010].

Table 5: Correlation between preferred learning style and academic performance

Learning style preference	Pearson correlation coefficient
Activist	-0.141
Reflector	-0.126
Theorist	0.158
Pragmatist	-0.381*

Conclusion:

There was a wide variety of learning preferences and strength of the preference among undergraduate physiotherapy students. Majority of the students preferred "Activist" style learning. Gender and academic year were not significant determinants of the learning preferences when examined with Honey and Mumford's LSQ. Current study demonstrates that

multiple preferences may beneficial towards academic performance. Although Pragmatists had relatively higher mean CGPA, strength of the preference to the "pragmatist" style in general has influenced negatively on academic performance.

Recommendations:

Teaching and learning activities with wide range of activities based on undergraduates' preferences may enhance the learning experience and improve academic performances.

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Effect of CT Bore size on Radiation Dose during Head CT Acquisition.

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Abstract: With the development of technology, the use of CT extended beyond the diagnostic purposes and made a room for complex radiotherapy treatment planning. As the traditional diagnostic CT scanners have small bore-size (typically 65–70 cm) and curved patient couch which is not suitable for virtual simulation with immobilised devices. Therefore wide-bore CT scanners with increased bore size (80-100 cm) were introduced for radiotherapy treatment planning. These virtual simulation CT scanners are further equipped with an external patient positioning laser system, flat patient couch and specialized visualization software. Due to the unavailability of traditional CT scanner, theses wide (or large)-bore CT simulators are used for routine diagnostic procedures. The main purpose of this study was to compare the patient doses delivered by a wide (LB) and a small-bore (AQ1) CT scanners to ensure the safe use of wide-bore simulator for diagnostic purpose. A standard head CT phantom (16 cm diameter and 15 cm length) made out of Polymethyl methacrylate (PMMA) was positioned at the iso-centre and 100 cm pencil ionizing chamber was positioned at the centre and periphery of the phantom. The phantom was scanned under different combinations of tube voltages (80, 100, 120, 135 kVp) and tube currents (100,150, 200, 300, 400 mA) and the Dose Length Product (DLP) in cGy were measured for each location of the ion chamber using an electrometer. The pitch and scan lengths (0.813, 15 cm) were kept constant for each measurement. Our study confirmed that the wide-bore is delivering considerably more dose than observed in AQ1 for head CT with the same exposure parameters. This increasement is more pronounced in exposures above 200 mA and 120 kVp. Therefore, the use of wide-bore simulator for routine diagnostic CT examinations is safer for lower kVp and mA but not encouraged for all the routine diagnostic purpose without further study.

Keywords: Computed Tomography, Wide bore CT, CT dose, CT simulator, Gantry size.

Introduction:

The gantry or the ring-shaped part of the computed tomography (CT) scanner houses major components necessary to generate the CT image. It is considered as the most important part of the scanner and vary in total size as well as in the diameter of the opening, or aperture. The range of aperture size is typically 70 to 90 cm [3]. Traditional diagnostic CT units provide a maximum scan field-of-view (SFOV) diameter of 50 cm and a limited bore size of approximately 70 cm, which cannot accommodate a larger patients or an extended simulation setup in radiation therapy (RT) [1]. Therefore until the late 1990s, imaging prior to radiotherapy treatment planning was satisfied with an acquisition of a routine CT study [4]. However, to meet the needs of radiotherapy wide-bore CT scanners with increased bore size were developed. Moreover, these

dedicated units should provide high-quality images to be used for target delineation in the treatment planning process. It is believed that high quality images should not trade off for increased radiation dose. However, based on a comparison study done in USA it was found that the head and body doses for the large bore scanner was slightly higher (1–2 cGy) compared to those for the 70-cm-type units [2]. This was the first and only study found in literature related to the above concept and however it is with several limitations. These limitations were carefully addressed in the present study and near perfect comparison of radiation dose was done among two CT units with different bore sizes for head CT.

Methodology:

Dosimetric measurements were made on a 90 cm wide bore CT simulator (LB) and a standard 78 cm diagnostic CT (AQ1) for routine head CT protocol. The pitch (0.18) and scan length (15 cm) were fixed for both occasions. However, Exposures were made at five mA stations (100,150, 200, 300, 400 mA) and for each tube current (mA) station given combination of tube voltage (kVp) were used (80, 100, 120, 135 kVp). The actual dose measurements were done using standard polymethylmethacrylate (PMMA) dosimetric phantom. With the aid of pencil shape ionizing chamber the CTDI values were recorded at the centre and periphery of the PMMA phantom. The 1/3 of the CTDI at centre and 2/3 of the CTDI at periphery were summed and multiplied by the 1/pitch to obtain the $CTDI_{vol}$ values as given in the below equation.

$$\mathbf{CTDI_w} = 2/3\ CTDI_{100}\ (\text{periphery}) + 1/3\ CTDI_{100}\ (\text{center})$$

$$\mathbf{CTDI_{vol}} = CTDI_w / \text{pitch}$$

Where, the pitch is defined as the ratio of the table feed (in mm) per 360^0 gantry rotation (Bed Index-BI) to the nominal collimated beam width (Slice width-SW)

$$\mathbf{Pitch} = BI/SW$$

To determine the dose for a single scan, the DLP is used. It is the product of dose per slice ($CTDI_{vol}$) and total scan length and is given in the below equation.

$$\mathbf{DLP}\ (mGy*cm) = CTDI_{vol} \times \text{scan length}$$

Finally, the measured DLP values were compared for LB and AQ1 at different kVp and mA combinations.

Results and Discussion:

The obtained DLP values measured in mGy.cm were tabulated for AQ1 and LB against different combinations of mA and kVp as given in the table 1. Moreover, the plot of data on above variables demonstrates a noticeable variation of measured DLP between AQ1 and LB. According to the figure 1, there is a considerable increment in the dose generated by the LB beyond 200 mA. This elevation is more pronounced in the 200 mA and 120 kVp combinations.

Table 1: Measured DLP (mGy.cm) for LB and AQ1 for different tube current (mA) and tube voltage (kVp) combinations.

	CT equipment	DLP (mGy.cm)				
		100 mA	150 mA	200 mA	300 mA	400 mA
80 kVp	LB	57.19	117.90	159.23	248.56	296.22
	AQ1	56.86	113.78	135.30	205.97	278.38
100 kVp	LB	123.50	217.88	265.54	448.56	503.91
	AQ1	122.0	207.88	245.71	399.66	433.49
120 kVp	LB	206.14	284.16	437.97	607.00	853.00
	AQ1	194.98	290.37	334.27	551.34	825.23
135 kVp	LB	273.73	404.87	499.05	789.89	1060.50
	AQ1	258.54	374.02	483.68	747.39	1044.38

LB - 90 cm wide-bore CT simulator

AQ1- 78 cm standard diagnostic CTequipment

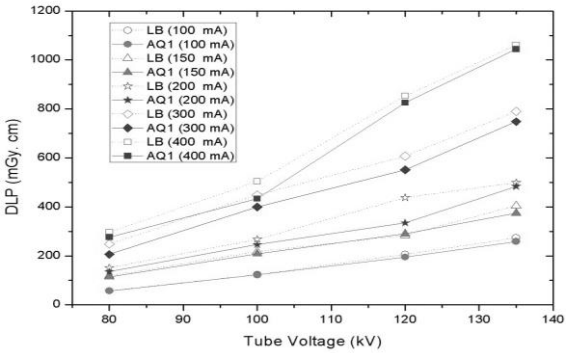

Figure 1: Plot of DLP (mGy.cm) against tube voltage (kVp) at different tube currents (mA) for LB and AQ1.

According to the best knowledge of authors this is the first study done in Sri Lanka related to the above concept and the present study provides a perfect comparison between two units were achieved the dose increment with the simulator CT may be due to but not limited to its inbuilt design to suit the oncology localization requirements. The fixed SFOV of 600 mm used in the simulator CT may be a reason for comparatively higher dose since most of the diagnostic CT equipment has lesser SFOV than the above. Further studies would require to evaluate the other contributing factors for higher doses in LB and its use in the diagnostic setting should be validated using the evidences from similar studies.

Conclusion:

Wide bore simulator is design to address the oncology requirements, such as obtain higher quality images with adequate position freedom. Therefore, it may deliver higher doses than standard diagnostic CT equipment if scanned using same parameters. According to the present study results it is evident that some combinations of kVp and mA generates higher doses in LB than that of AQ1. Though the use of wide bore simulator for routine diagnostic CT examinations is safe for lower kVP and mA, utilization of simulator CT for diagnostic purposes are not encouraged and further studies are required to confirm it.

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Gastroprotective Activity Of Vishnukarnthi Chewable Granular Dosage Form Formulated Using *Evolvulus Alsinoides* And Its Accelerated Stability Studies

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Abstract: This study investigates the in vitro gastroprotective activity of Vishnukranthi chewable granules formulated using dry plant powder of Evolvulus alsinoides by evaluating neutralizing capacity in artificial gastric juice and the titration method using Fordtran's model. Accelerated stability studies were conducted upto three months to access the stability of granules. Each parameter was accessed at day 1, 1 month and after three months.Particle size distribution, moisture content and pH were measured as physical stability parameters. Microbial stability accessed by total viable bacteria and total viable fungi counts. Stability of the gastroprotective activity was evaluated using neutralizing capacity in artificial gastric juice and the titration method using Fordtran's model. Chewable granules has demonstrated a significant ($p<0.01$) neutralizing capacity on artificial gastric acid (mean pH 1.71±0.01) when compared with negative control. The titration conducted using Fordtran's model consumed 0.1493±0.0036 of H+ ($p<0.001$). There was a significant difference between fine percentage, percentage of weight loss, total viable count of granules at day 1 and after 1 month and 3 months ($p<0.05$). There were no significant differences between pH values, Rf values and the gastroprotective activity of granules at day 1 and after 1 month and 3 months. Granules were chemically stable but physically and microbiologically less stable. In conclusion, granules has demonstrated significant gastroprotective activity in both models. Further studies are recommended to improve the physical and microbial stability of the dosage form by adding a suitable binding agent and an appropriate preservative. Further, it is important to evaluate the efficacy of Vishnukranthi chewable granules clinically because this product has a good potential to commercialize as a herbal remedy for gastritis.

Keywords: Evolvulus alsinoides, gastroprotective activity, Fordtran's model, Accelerated stability studies, Vishnukranthi

Introduction:

Gastritis is an inflammation of gastric mucosa. It is due to excessive secretion of acid from stomach parietal cells. It may induce due to alcohol, irritant drugs e.g. non-steroidal anti-inflammatory drugs (NSAIDS), *Helicobacter pylori* infection and severe physiological stress (Waugh, A. and Grant, A. (n.d.). Ross & Wilson anatomy and physiology in health and illness.,2014). The most commonly used drugs for the treatment of peptic ulcer disease (PUD) are H2-receptor antagonists (Cimetidine), chelates

and complexes (Sucralfate), prostaglandin analogs and prostamides, proton pump inhibitors. (Omeprazole) and antacids (Sodium alginate with calcium carbonate and sodium bicarbonate) (BNF 76th edition,2018-2019).

Evolvulus alsinoides is locally known as Nil Vishnukranthi. *E. alsinoides* is an annual or perennial plant which belongs to family Convolvulaceae (Indhumol et al., 2013). The plant is used in Ayurveda and Yunani as nootropic or brain-tonic (Yadav et al., 2016).

Different formulations of *E. alsinoides* have evaluated for gastroprotective activity. Lekshmi and Reddy, 2011 has revealed *E. alsinoides* has strong dose dependent gastroprotectant activity in rats. Vishnukranthi kalka is a paste which is recommended in Ayurveda for treatment of peptic ulcers. A study has demonstrated a significant gastroprotective activity of the said powder (Hewageegana, Ariyawansa and Ratnasooriya, 2006). Our research group has formulated a chewable granular dosage form using *E. alsinoides* (Welipitiya et al., 2018).

The aim of this study was to evaluate the *in vitro* gastro protective activity of the formulation.

Furthermore, stability of Vishnukranthi chewable granules using accelerated stability testing was accessed.

Methodology:

Plant Collection and Authentication

E. alsinoides were authenticated and the voucher specimens deposited at National Herbarium, National Botanic Gardens, Peradeniya.

Formulation of Vishnukranthi chewable granular dosage form

Chewable granules were made using dried plant powder, maize starch as diluent, mannitol as the sweetening agent, starch solution as binding agent, approved chocolate flavour and chocolate colouring agents. 15 g portions of granules were packed in airtight polythene sachet and labeled properly.

***In vitro* gastroprotective activity of Vishnukranthi chewable granules**

Neutralizing effects of Vishnukranthi chewable granules on artificial gastric acid

A sachet of Vishnukranthi chewable granules (15g) was dissolved in distilled water. The solution was shaken for 2 hours. Eno (GlaxoSmithKline) and Belcid suspension (Biolab Co. Ltd) were used as positive controls whereas distilled water was taken as negative control. Initial pH of each sample (9 ml) was measured. 10 ml of freshly prepared artificial gastric juice was added to each sample and shaken for 5 minutes. pH of each solution was measured. Each solution was kept on the shaker and measure the pH at 10 minutes time intervals until reaches a constant value of pH (Thabrew and Arawwawala, 2016).

Neutralizing capacity of Vishnukranthi chewable granules using a titration method of Fordtran's model

Test sample of chewable granules, Eno, Belcid suspension and distilled water were heated and stirred to 37 ^{o}C and 30 r.p.m. respectively. Test solutions were titrated with artificial gastric juice until the pH of the solution became pH 3.00 which considered as the end point. Titrations were triplicated. The consumed volume (v) of the artificial gastric juice was measured and total consumed H+ (mmol) was calculated (Thabrew and Arawwawala, 2016).

If consumed volume for titration = V (ml),

Total Consumed H+ moles = 0.063096 (mmol/ml) x V (ml)

Accelerated stability testing of chewable granular dosage form

Accelerated stability testing was done for a period of 3 months. Specified accelerated conditions are temperature at 40 ± 2 °C and relative humidity at 75 ± 5% (USP32–NF27). Each parameter of the initial sample on the day of manufacture(day 1) and the samples kept in accelerated conditions after 1 month and after 3 months were determined..

Physical stability tests of Vishnukranthi chewable granules

Particle size distribution, moisture content and pH were measured as physical stability parameters.

The retaining percentage of weight of particles between standard pharmacopeial fine range was assessed. Moisture content was determined by loss of weight on drying. Percentage of loss on drying (LOD) was calculated (British pharmacopeia 2007).

Microbial stability tests of Vishnukranthi chewable granules

Microbial bioburdens were tested using total viable aerobic count (TVC). Number of colony forming units per gram of sample was evaluated for fungi and bacteria separately and then total viable count was calculated.

The total viable aerobic count = sum of the bacterial count (CFU) + the fungal count (CFU).

The growth mediums were Soboroud dextrose agar (SDA) for fungi and casein digest agar was for bacteria. Triplicate plates were grown for each sample (British pharmacopeia 2007).

Thin Layer Chromatography (TLC) for Vishnukranthi chewable granule samples

TLC fingerprint was used to test the chemical stability. Toluene – ethyl acetate – formic acid at a ratio of 7.5: 1.5: 1.1 (v/v/v) was used as the solvent system. The plate was visualized under UV 254 nm and UV 366 nm. Rf values were obtained (Irshad et al., 2016).

Stability of gastroprotective activity of Vishnukranthi chewable granules

Neutralizing effects of Vishnukranthi chewable granules on artificial gastric acid

Neutralizing effects of samples of Vishnukranthi chewable granules at accelerated conditions were accessed according to the methodology stated in 2.3.1.

Neutralizing capacity of Vishnukranthi chewable granules using a titration method of Fordtran's model

Neutralizing capacity of samples of Vishnukranthi chewable granules at accelerated conditions were accessed according to the methodology stated in 2.3.2.

Results and Discussion

***In vitro* gastroprotective activity of Vishnukranthi chewable granules**

Neutralizing effects of Vishnukranthi chewable granules on artificial gastric acid

Table 1: Neutralizing capacity of Vishnukranthi chewable granules on artificial gastric acid

Sample	Mean value of end pH
ENO	5.55±0.01 ***
Belcid suspension	4.22±0.02***
Distilled water	1.52±0.01
Vishnukranthi chewable granules	1.71±0.01 **

Table 6 shows the initial and end pH values of distilled water, Eno, Belcid, and vishnukranthi chewable granules. $^{*}p < 0.05$, $^{**}p < 0.01$ and $^{***}p < 0.001$ compared to Control.

Mean values of end pH of Eno, Belcid, and chewable granules were statistically significant with respective negative control groups ($p<0.05$). Hence the ENO, Belcid and chewable granules are shown neutralizing capacity on artificial gastric acid.

Table 2: Fordtran's model analysis of Vishnukranthi chewable granules

Sample	Mean value of consumed H^+ (mmol)
Vishnukranthi chewable granules	0.1493±0.0036 ***
Distilled water	0.0069±0.0021
ENO	2.0695±0.0063***
Belcid suspension	3.9477±0.0036***

Table 2 shows the mean value of consumed H^+ of distilled water, Eno, Belcid, and vishnukranthi chewable granules. $^{*}p < 0.05$, $^{**}p < 0.01$ and $^{***}p < 0.001$ compared to Control.

Mean values of consumed H^+ of Eno, Belcid, and chewable granules were statistically significant with respective negative control ($p<0.05$). Hence the ENO, Belcid and chewable granules are shown neutralizing capacity on titration method of Fordtran's model.

Accelerated stability testing of chewable granular dosage form

Physical stability tests of Vishnukranthi chewable granules

The fine percentage of day 1, 1 month and 3 months samples were 0.56±0.17, 1.28±0.18 and 1.47±0.02 respectively. There is a significant difference between fine percentages of day 1 and 1 month, 3 months accelerated samples ($p<0.05$). Particles has shifted towards more fine ranges within accelerated conditions.

Percentages of weight loss in drying in day 1, 1 month and 3 months were 9.3±0.30 %, 8.67±0.23 % and 7.73±0.23 %. The result shows significantly higher percentage of weight loss in drying in day 1 sample compared to 1 month and 3 months samples($p<0.05$).

pH of day 1,1 month and 3 months accelerated samples were 5.36±0.01, 5.36±0.00 and 5.35±0.06. There is no significant difference between the pH of day 1, 1 month and 3 months accelerated samples ($p>0.05$). Hence the pH of the accelerated sample at 1 month and 3 months has not changed significantly.

Microbial stability tests of Vishnukranthi chewable granules

Number CFU in Casein Soybean Digest Agar medium per gram of sample in day 1 and 3 months were 80000 CFU/g and 20500 CFU/g respectively. Results indicate there is a significant difference between total viable bacteria counts between two samples ($p<0.05$).

Number of CFU in Sobaroud Dextrose Agar Medium per gram of sample in day 1 and 3 months samples were 30 CFU/g and 250 CFU/g respectively. Results indicate there is a significant difference between total viable fungi counts between two samples($p<0.05$). Total viable count (TVC) of day 1 sample and 3 months sample were 8030 CFU/g and 20750 CFU/g respectively.

Thin Layer Chromatography (TLC) for Vishnukranthi chewable granule samples

There were three identical separate spots on day 1, 1 month and 3 months samples.

Table 3: Rf values of TLC fingerprint analysis of day 1 sample and 3 month sample

	Spot 1	Spot 2	Spot 3
Day 1 sample	0.046	0.165	0.224
1 month sample	0.047	0.165	0.224
3 months sample	0.047	0.165	0.224

Results indicate there was no significant difference between Rf values of day 1, 1 month and 3 months samples.

Stability of gastroprotective activity of Vishnukranthi chewable granules

Table 4 : Neutralizing capacity of samples of Vishnukranthi chewable granules on accelerated conditions

Sample	Mean value of end pH
Day 1	1.71±0.01
1 months after accelerated conditions	1.75±0.01
3 months after accelerated conditions	1.74±0.01

There is no significant difference of mean values of end pH of samples of Vishnukranthi chewable granules on day 1, 1 month and 3 months samples.

Neutralizing capacity of Vishnukranthi chewable granules using a titration method of Fordtran's model

Table 7 : Fordtran's model analysis of samples of Vishnukranthi chewable granules on accelerated conditions

Sample	**Mean value of consumed H^+ (mmol)**
Day 1	0.1493±0.0036
1 months after accelerated conditions	0.1598±0.0036
3 months after accelerated conditions	0.1683±0.0036

There is no significant difference of mean values of consumed H^+ of samples of Vishnukranthi chewable granules on day 1, 1 month and 3 months samples.

Conclusion:

Vishnukranthi chewable granules has demonstrated significant gastroprotective activity in both models. The granules were chemically stable under accelerated stability conditions but physical and microbiological stability need to be improved further. Granules were shifted towards to more fine range. Therefore proper binding agent should be used to reduce the degranulation during storage. Since Chewable granule dosage form was prepared using raw plant materials it was more prone to microbial contamination. Therefore, appropriate preservative should be used. Also day 1 samples were contained significantly higher amount of moisture. So granules should be dried more than recommended time.

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Comparative Study Of Range Of Motion After Conventional Physiotherapy In Adhesive Capsulitis Of Shoulder Joint Among Diabetic And Non-Diabetic Patients At Teaching Hospital Batticaloa.

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Abstract: Adhesive capsulitis (AC) of shoulder is one of the commonest condition among musculoskeletal disorders. It affects both male and female gender and some medical conditions associated with AC especially diabetes. Physiotherapy is the most advocated treatment option to manage this condition conservatively. The objectives were to compare the range of motion (ROM) of shoulder joint in percentage among the patients with AC associated with diabetic and nondiabetic patients received follow-up at the Teaching Hospital Batticaloa after conventional physiotherapy and to determine the associated risk factors that delaying the recovery. The methodology was Observational, prospective institutional based study was conducted at the Department of Physiotherapy, Teaching Hospital Batticaloa, Sri Lanka for the period of 12 weeks. 32 patients with primary AC were recruited to this study, 15 with diabetic and 17 without diabetic. An interviewer administered questionnaire was given to the participants prior to the commencement of physiotherapy sessions and goniometry measurement was obtained in mean percentage in AC shoulder and contralateral side before and after the conventional physiotherapy with a standard 12-inch plastic goniometer. Data was analyzed in SPSS. The results shown that the conventional physiotherapy would have an impact in improving ROM of AC shoulder both in DM and non-DM population and this trend was statistically significant at a confidence level of 95% ($p<0.05$). However, there was no statistically significant ($p>0.005$) observation identified when compare the recovery of the ROM among DM and non-DM patients with conventional physiotherapy. There was no impact on the recovery of ROM in AC patients associated with DM when compared to non-DM population. Even though the present study is a preliminary in nature, the results indicated that there is no significant improvement among patients with non-DM with compared to DM patients. Therefore, it may not advisable to do over treatment to DM patients with the intention of gaining a higher productivity in the range of motion.

Keywords: Adhesive capsulitis, Frozen shoulder, Range of Motion, Diabetes, Physiotherapy.

Introduction

Peripheral joint disorders are common among the orthopaedic conditions. Of which Adhesive Capsulitis (AC) of shoulder also known as Frozen Shoulder (FS) is one of the commonest peripheral joint disorder primarily referred to physiotherapy for managing conservatively. The AC involve at the glenohumeral joint resulted by synovial thickening of the joint capsule and contracture of the surrounding soft tissues. Movements of the glenohumeral joint are restricted in all directions and the symptoms of pain and Range of Motion (ROM) of shoulder are getting worse gradually (Yanlei, Keong, & Tijauw Tjoen, 2019). Some studies revealed that about 40 % of patients felt stiffness and pain persistently for more than

3 years and 7 % to 15 % patients experienced permanent loss of function in shoulder joint. Definite cause for idiopathic or primary AC is unknown, though there are some risk factors influencing in to this condition such as diabetic, hyperthyroidism and female gender however, diabetic shows strong closest association with AC (Yanlei *et al.,* 2019). FS is common among diabetic patients with a reported incidence ranges from 10.0% to 36.0% and prevalence ranges between 10.3% to 22.4% (Vastamäki *et al.,* 2016). Another there study revealed that incidence range in diabetic is 28% to 40 % where as 2 % to 5 % in general population (Yanlei *et al.,* 2019). Adhesive capsulitis is one of the common condition among the musculoskeletal system. According the past records from May 2018 to May 2019 period, there are about 8-9% of the incidence among the reported cases to the Physiotherapy Department of Teaching Hospital Batticaloa as outpatients were recorded as adhesive capsulitis. However, some of them require in ward admission in order to undergo other intervention such as Manipulation Under the Anesthesia (MUA) or intra articular injection. AC patients with diabetic complained of poor improvements in Range of Motion (ROM) followed by physiotherapy sessions. Therefore, a focus should be drawn to compare the improvement of ROM in AC patients associated with diabetic and non-diabetic condition in order to assess the improvement and recovery rate. In addition, the present study aims at determining the responsible factors affecting a delay in recovery. The objective of this study was to compare the range of motion (ROM) of shoulder joint in percentage among the patients with adhesive capsulitis associated with diabetes and nondiabetic patients received follow-up at the Teaching Hospital Batticaloa after conventional physiotherapy.

Methodology:

This was a 12 weeks cross sectional prospective institutional based study was conducted at the Department of Physiotherapy, Teaching Hospital Batticaloa, Sri Lanka. 32 patients were recruited for this study. Patients over 18 years with diabetic lasting more than 3 years and patients without having diabetic have been diagnosed to have unilateral primary AC in the period between 3 to 9 months after the onset of the condition were included. And the patients who reject to participate for the study, patients undergoing other alternative medicine parallel with physiotherapy, non-consenting patients and past history of shoulder surgery or with comorbidities of life-threatening disease were excluded. Data was collected through an interviewer administered questionnaire prior to the commencement of physiotherapy session and goniometry measurement was obtained in mean percentage of shoulder ROM (flexion, abduction, external rotation, internal rotation and extension) of AC shoulder and contralateral shoulder before and after the conventional physiotherapy with a standard 12-inch plastic goniometer based as gold standard measurement. Data was analysed in SPSS version 19. Also, the ethical clearance was obtained from the Ethics Review Committee (ERC) of the Faculty of Medicine, University of Kelaniya Sri Lanka.

Results:

Among the 32 studied patient population, the gender ratio remained 1:1 (n=16 for males and females), while majority of respondents (81.3 %) were belonging to the age group of > 55 years old (Table 4.1). Around 96.9 % patients were married. The O/L qualification was the most common education level (34.4 %) among the patients, while majority were unemployed (53.1 %), with a monthly income of < 10000 LKR (56.2 %). Interestingly, majority of the patients (65.6 %) were not familiar with the issues in ROM.

The percentage of diabetic, hyperlipidemia and hypertension positive patients were 46.9%, 50 % and 34.4 % among the entire patient population as indicated in Table 4.1.

Table 1: Socio-demographic characteristics of the studied patient population

Variable	Category	Number	Percentage (%)
Gender	Male	16	50.0
	Female	16	50.0
Age (Years)	<25	0	0.0
	26-35	0	0.0
	36-45	6	18.8
	46-55	6	18.8
	>55	26	81.3
Marital status	Married	31	96.9
	Unmarried	1	3.1
Educational Level	No school	2	6.3
	Grade 1-4	5	15.6
	Grade 5	6	18.8
	O/L	11	34.4
	A/L	6	18.8
	Higher education	2	6.3
Employment	Unemployed	17	53.2
	Employed	3	9.4
	Retired	12	37.5
Income amount per month (LKR)	<10000	18	56.3
	10000-15000	2	6.3
	16000-20000	1	3.1
	21000-25000	4	12.5
	26000-30000	4	12.5
	31000-35000	2	6.3
	>35000	1	3.1
Diabetic status	Diabetes	15	46.9
	Non-Diabetes	17	53.1
Hyperlipidemia	Positive	16	50.0
	Negative	16	50.0
Hypertension	Positive	11	34.4
	Negative	21	65.6
Have you heard about the condition	Yes	11	34.4
	No	21	65.6

Effect of physiotherapy on the recovery in both DM and non-DM were described the mean extension percentage for Abduction, External Rotation (ER) and Internal Rotation (IR) of ROM in the studied population remained as 60.1±2.8 %, 53.2±2.8 % and 62.2±2.9 %, respectively, before the physiotherapy sessions. The percentage of all parameters corresponding to both active and passive ROM increased after the treatment with respect to both active and passive ranges (Figure 4.1). The results of the paired t test suggested that this trend was statistically significant at a confidence level of 95% ($p<0.05$).

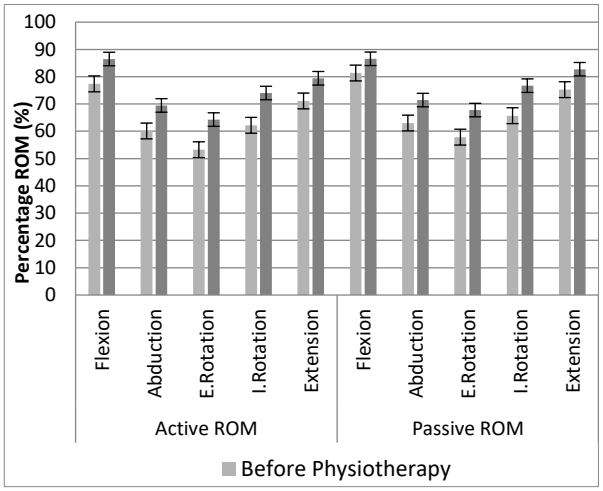

Figure 1: The ROM features before and after physiotherapy

Effect of diabetic status on the percentage recovery (comparison) revealed both

diabetic and non-diabetic populations denoted positive recovery rates. The recovery percentages of non-diabetic patients were relatively higher, except for abduction, ER (active ROM), flexion (passive ROM) and IR (passive ROM) as indicated in Figure 4.7. According to the statistics of the independent sample t test, the effect of diabetic status on the recovery levels of ROM remained statistically insignificant ($p>0.005$).

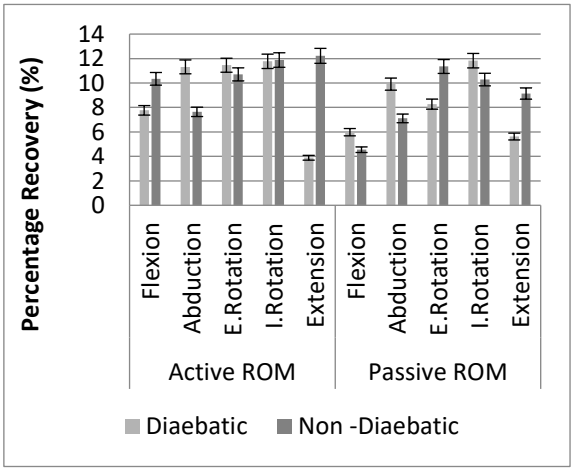

Figure 2: The variation of percentage recovery of studied ROM features with the diabetic status

The results of the present study shown, that the conventional physiotherapy would have an impact in improving ROM of AC shoulder both in DM and non-DM population and this trend was statistically significant at a confidence level of 95% ($p<0.05$). But there was statistically insignificant ($p>0.005$) when compare the recovery of ROM among DM and non-DM patients with conventional physiotherapy. Though recovery percentage of non-diabetic patients were relatively higher, except for abduction, ER (active ROM), flexion (passive ROM) and IR (passive ROM).

Conclusion

This present study stands as the first documented research work as there was no published study available in Sri Lanka on comparison of ROM of shoulder in AC patients associated with DM and non-DM. This present study revealed that there was no impact on the recovery of range of motion in AC patients associated with diabetes when compared to non-DM population. However, it emphasizes that conventional physiotherapy is an effective treatment option for AC patients. The limitations of this study were duration of this study was not sufficient to follow-up more treatment sessions, low number of sample size did not represent a sufficient number of patients with diabetes and this study was limited to one institute. Therefore, it is recommended to expand the study with more sample size including different institutes.

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A Study On The Assessment Of Perceived Stress, Self-Efficacy And Associated Socio-Demographic Factors Among Undergraduates In A Higher Educational Institution In Sri Lanka

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Abstract: Nearly 80% of students in higher education worldwide experience psychological stress during their university life due to imbalances in social, emotional, and physical conditions. Stress can lead to poor academic performance and underachievement among students. The present study assessed the levels of perceived stress, general self-efficacy and their association with socio-demographic factors among a selected group of undergraduates at a higher educational institute. A descriptive cross-sectional study was performed using stratified random sampling among 393 undergraduates. The data were collected through the Perceived Stress Scale (PSS-10), the General Self-Efficacy Scale (GSES) and a questionnaire to collect the socio-demographic data. The data were analyzed using SPSS version 23. The mean age of the sample (n=393) was 22.36±2.33 years. The results showed a mean perceived stress score of 20.72±4.96 (moderate perceived stress). The majority of the participants (79.4%) had moderate perceived stress, followed by high stress (12.7%) and low stress (7.4%). There was no significant difference between the stress levels of male and female students (p=0.766). No significant association was observed between perceived stress and socio-demographic factors assessed (age, gender, residence status, financial status, the program of study, employment prospects) using the chi-squared test. Spearman correlation showed a significant negative association between perceived stress levels and general self-efficacy (p<0.001). Intervention strategies to develop and improve self-efficacy among undergraduates should be implemented as it affects their perceived stress levels and academic achievements which will impact their life goals. Further studies are needed to understand the stressors contributing to stress among undergraduate students.

Keywords: Perceived stress, General self-efficacy, Higher education

Introduction:

Hans Hugo Bruno Selye, "Father of stress," defined stress as "the non-specific response of the body to any demand for change" (Fink, 2016). World Health Organization introduced the stress as the "Health Epidemic of the 21st century" since stress has become a part of routine life. The most common health complications of stress include; depression, hypertension, headaches, back pain, skin disorders, irritable bowel syndrome, ulcers, panic disorder, general adaptation syndrome, phobia, and post-traumatic stress disorder (PTSD) (Badur-un-Nisa, Kashif and Khan, 2016). Mood disorders and suicides are other critical stages of severe stress among various populations (Ang and Huan, 2006).

Worldwide, deaths due to suicide account for nearly 800,000 people every year. Suicide is considered the second leading cause of death among 15-29-year-olds globally (WHO, 2019). Sri Lanka is the 29th country on the suicide list, with 14.6 suicides per 100 000 in 2020 (World Population Review, 2020). A recent study revealed 20 – 30 years as the second leading age group that has become the prey for suicides (Senavirathna and Sanjeewani, 2019). At this particular age, most of the young population engage in higher education. Worldwide, around 80% of students following higher education

experience stress during their life (Scott, 2009), and in Sri Lanka, psychological distress is more significant among university students than the general population (Kuruppuarachchi et al., 2002). Research evidence reports that learning efficiency is affected due to social, emotional, and physical conditions. The studies done previously summarizes the critical reasons for high-stress levels as socio-demographic factors, gender, financial constraints, marital status, and accommodation (Rathnayake and Ekanayaka, 2016).

In Sri Lanka, most of the universities have counseling systems to support students emotionally and motivate them. However, due to the negative aura among the community, most of the students suppress their problems. Since university students endure a critical transitory period in which they advance from adolescence to adulthood, it can be stressful in their lives. Therefore, the present study assessed the levels of perceived stress (PS), general self-efficacy, and their association with

socio-demographic factors among a selected group of undergraduates. This study will eventually contribute towards increasing the quality of life among undergraduate students and to seal the gaps in knowledge that will support the society to discover and understand the factors and outcomes associated with undergraduate stress levels.

Methodology

A descriptive cross-sectional study was conducted at KIU, Sri Lanka, among a selected group of undergraduates following various study programmes. The samples were randomly stratified according to the program of study. The sample size was obtained using the following equation; $n = N/ 1+N*e^2$ (Yamane, 1967). A total of 393 undergraduates of KIU (301 females and 92 males) in the age group of 19 – 40 years were randomly recruited into the sample, and participants with previously diagnosed psychiatric disorders, chronic illness, and pregnancy were excluded. Data were collected using a pre-tested self-administered questionnaire of socio-demographic details, standard questionnaires of perceived stress scale (PSS-10)) (Cohen, 1994) and general self-efficacy scale (GSES) (Schwarzer and Jerusalem, 1995).Statistical analysis SPSS version 23 software was used for all data processing and analysis. Data were assessed by the chi-square test and Spearman correlation analysis. The level of significance was set at two-tailed with $p>0.05$.

Results and Discussion:

A total of 393 undergraduates were included in the analysis. Among them, 301 (76.6%) were females, and 92 (23.4%) were males. The undergraduates were in the age group of 19 – 40 years. Table 1 summarizes the socio-demographic profile of the participants including the association of PS and socio-demographic factors.

Note. Significant at p-value of <0.05.

The mean perceived stress (PS) score of the sample population in the present study was 20.72, with a standard deviation (SD) of 4.96. It was higher than the value reported in a similar study done in the University of Colombo by Ranasinghe et al., where a mean score of 19.9 ± 5.1 was reported among 2nd-year medical students (Ranasinghe et al., 2017). On the contrary, the finding of the present study the PS score was lower than a research done in India, which showed a mean score of 25.53 ± 5.55. Several studies done around the world reported different PS scores. An approximate score of 18 among a group of students in North of England (Shaw, Peart and Fairhead, 2017), 16 from a group of undergraduates of business students in the US (Smith, Rosenberg and Haight, 2014) and 19 from a group of students in a Turkish University (Örücü and Demir, 2009) are some of the findings around the world.

Table 1- Socio-demographic profile and association of Perceived stress level between socio-demographic data among participants (n=393)

Socio-demographic factors		Participants frequency	Mean Perceived stress level	Chi-square value
Age	18 – 20 years	34 (8.7%)	20.00 ± 6.23	0.072
	>21 years	359 (91.3%)	20.79 ± 4.82	
Gender	Female	301 (76.6%)	20.86 ± 4.97	0.409
	Male	92 (23.4%)	20.27 ± 4.92	
Civil status	Unmarried	383 (97.5%)	20.75 ± 4.96	0.741
	Currently married	10 (2.5%)	19.70 ± 4.83	
Residence	Living with parents	227 (57.8%)	20.92 ± 5.06	0.927
	Boarding place	130 (33.1%)	20.43 ± 4.99	
	University hostel	18 (4.6%)	20.72 ± 4.59	
	Nursing Quarters	9 (2.3%)	20.22 ± 3.19	
	Other	8 (2.0%)	20.38 ± 4.75	
Study program	Biomedical Science	174 (44.3%)	20.45 ± 5.16	0.150
	Management	117 (29.8%)	21.26 ± 4.37	
	Psychology	71 (18.1%)	20.58 ± 5.65	
	Nursing	16 (4.1%)	19.94 ± 2.44	
	Acupuncture	12 (3.1%)	22.75 ± 4.79	
	Kaatsu	3 (0.8%)	14.67 ± 2.52	
Current year of study	First	179 (45.5%)	19.96 ± 4.95	0.888
	Second	178 (45.3%)	21.36 ± 4.95	
	Third	34 (8.7%)	21.26 ± 4.73	
	Fourth	1 (0.3%)	23.00	
Financial method for studies	Parents' support	106 (27%)	22.51 ± 5.18	0.389
	Student Loan	260 (66.2%)	20.10 ± 4.81	
	Occupation during semester	21 (5.3%)	19.38 ± 3.68	
	Occupation during breaks	4 (1%)	18.50 ± 1.00	
	Scholarships	1 (0.3%)	25.00	
	Other	1 (0.3%)	26.00	
Employment status	Full time	49 (12.5%)	21.10 ± 4.19	0.527
	Part-time	41 (10.4%)	21.24 ± 5.91	
	Contract based	2 (0.5%)	22.50 ± 4.95	
	Training/Internship	9 (2.3%)	24.11 ± 4.01	
	Unemployed	282 (71.8%)	20.46 ± 4.99	
	Other	3 (0.8%)	22.33 ± 5.13	

However, when comparing our results to those of the other studies, it must be pointed out that the current study had a collection of students following multiple study programs, and the mean age group of the sample in the present study was different from the other studies. This suggests that the changes in the PS score might be due to the differences in age, educational background, culture, and social status. Our results demonstrated that all the undergraduates had a certain level of stress; the perceived stress scale showed that 312 students had moderate perceived stress among the study group (236 females and 76 males). Of the sample, 50 students had high perceived stress (42 females and 8 males), while 31 students had low perceived stress levels (23 females and 8 males), as shown in Figure 1.

Overall the findings of the present study are more or less comparable to the results reported by Ranasinghe. P et al., who conducted his study among medical undergraduates in the 2nd year, 4th year, and 5th year have an average perceived stress score level (Ranasinghe et al., 2017). These results are in line with other studies where they reported having a higher number of students in the moderate stress category (Sabih, Siddiqui and Baber, 2013; Kashif et al., 2016).

Previous studies have concluded that higher stress levels observed among undergraduates were mainly due to factors such as financial issues, relationship issues, academic pressure, and family problems (Sherina, Rampal and Kaneson, 2004; Yakushko, Watson and Thompson, 2008; Scott, 2009). There was no significant difference between mean PS score of male and female students as determined by Independent T-test (p=0.766). Contrary to the findings of previous studies, we didn't find any association between perceived stress and socio-demographic factors like age, gender, civil status, residence status, financial status, the program of study, year of education, and employment status. The commonest reasons for higher stress identified in other studies were the

increasing load of academic work, career development, and family problems (Acharya, 2003; Pau et al., 2007; Raushanova et al., 2015).

In the present study, 203 undergraduates out of 393 had high self-efficacy (51.7%) according to the findings, while 190 students had low self-efficacy (48.3%). Since the higher number of students is in high general self-efficacy, it sheds light on the reason for the low count for high perceived stress. The results also showed that general self-efficacy of the students was significantly associated with civil status (p=0.014) and residence (p=0.036).

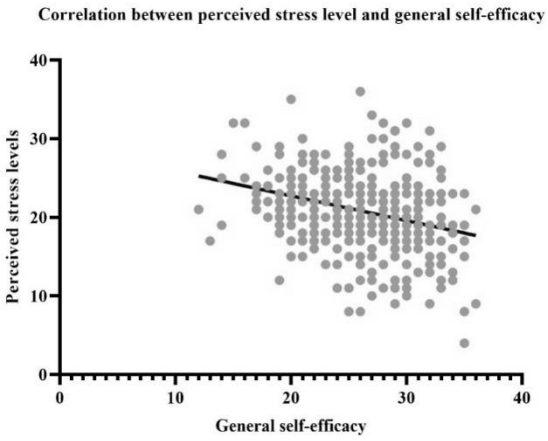

Figure 1: Prevalence of perceived stress among the participants

One of the critical findings of the present study was that it showed a significant association between perceived stress level and general self-efficacy (p=0.003) among the participants of the study. The Shapiro Wilk test showed that the data were not normally distributed (p<0.05).

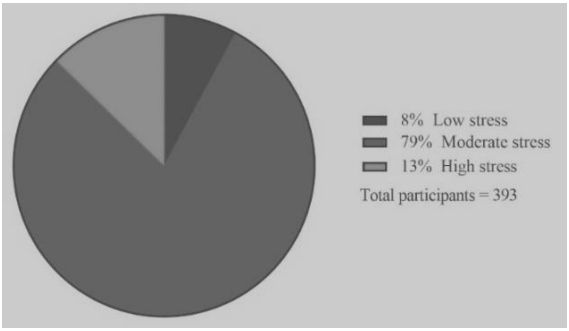

Figure 2: Correlation between perceived stress level and general self-efficacy among participants. P<0.001, r= -0.293

Through the Spearman correlation test, the results showed a statistically weak negative correlation between perceived stress levels and general self-efficacy (p<0.001, r=-0.293) (See Figure 2). These results are in line with the study done by Kumar et al. where the lower general self-efficacy was found to be significantly associated with psychological distress (Kumar, Talwar and Raut, 2014).

An apparent limitation of the study includes the under-reporting and over-reporting of their perception of stress and self-efficacy, as they may have felt expressing their thoughts and feelings in a university background might be unsettling and the stress handled by students differ from each other. However, the difference in these perceptions can be ruled out since there was a large sample size of more than 300. Although the effects of these factors are negligible, future studies need to focus on the statistical power of calculating the samples.

Conclusion

Perceived stress has been distressing undergraduate students across the globe, in all genders, and among all cultures, and the present study bought into light that stress is a part of all students in varying amounts. The moderate stress level encountered was prevalent among the majority of undergraduates irrespective of their gender and other socio-demographic data. The students possessed a lower general self-efficacy with higher perceived stress. Moderate stress can escalate into a higher stress level if not adequate measures are not taken. Higher education providers should have stress assessing methods and intervention strategies to reduce perceived stress and increase self-efficacy of the students, where the quality of their lives will be enhanced. Further studies are needed to determine the contributing factors to stress among undergraduate students.

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Investigation Of *In-Vitro* Antiurolithiatic Activity Of *Passiflora Foetida* And *Stachytarpheta Indica* On Experimentally Prepared Calcium Oxalate Crystals.

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Abstract:-Urolithiasis or the formation of urinary stones is a major non communicable disease that affects the urinary system. Among the different types of renal stones CaC_2O_4 are the overwhelming. Antiurolithiatic activity is the inhibition of formation of urinary stones. There is a high demand for herbal medicines to treat urolithiasis due to unavailability of a successful drug devoid of complications. *Passiflora foetida* (Udahalu) & *Stachytarpheta indica* (Balunakuta) plants are used in the treatment of kidney stones in traditional medicine. This study was aimed to investigate *in-vitro* antiurolithiatic activity of these plants on experimentally prepared CaC_2O_4 crystals. The crude plant extracts were prepared by boiling the dried plant material in water followed by evaporation of the solvents via rotary evaporation. A concentration series of aqueous extract of the plants were prepared with negative and positive (cystone tablets) controls. Antiurolithiatic activity was evaluated using the UV/visible spectrophotometry by measuring optical density of each samples having different concentrations of the plant extracts at 620 nm. The mean absorbance of *P.foetida* extract at 0.125 mg/mL, 0.25 mg/mL, 0.5 mg/mL, 1 mg/mL, 2 mg/mL, 4 mg/mL concentrations were 0.045, 0.062, 0.105, 0.216, 0.1393, 0.623 respectively. The mean absorbance of *S. indica* extract at 0.125 mg/mL, 0.25 mg/mL, 0.5 mg/mL, 1 mg/mL, 2 mg/mL, 4 mg/mL concentrations were 0.180, 0.260, 0.201, 0.959, 0.862, 0.492 respectively. There is a concentration dependent increase in the mean absorbance for the samples. The results reveal that both extracts exhibit antiurolithiatic activity and the highest activity is exhibited by *S. indica*.

Keywords: Urolithiasis, calcium oxalate, *Passiflora foetida, Stachytarpheta indica*, antiurolithiatic activity

Introduction:

Urolithiasis is one of the major diseases in the world. Urolithiasis means the formation of stones in the urinary system i e. in the kidney, ureter, and urinary bladder or in the urethra. 'Urolithiasis' = ouron (urine) and lithos (stone). Globally, the prevalence and recurrence rates of urolithiasis disease are increasing. This affects about 12% of the world population at some stage in their lifetime. There are mainly five types of kidney stones, based on the mineral composition and the pathogenesis as

Calcium stones, Struvite or Magnesium Ammonium Phosphate stones, Uric acid stones or Urate, Cystine stones and drug-induced stones

There are two types of calcium stones namely calcium oxalate and calcium phosphate. Calcium stones are overwhelming renal stones containing about 80% of every urinary stones. Calcium oxalate is found in most of kidney stones and exists as CaOx monohydrate (COM, termed as mineral names: whewellite, $CaC_2O_4 \bullet H_2O$), and CaOx dihydrate (COD, weddellite, $CaC_2O_4 \bullet 2H_2O$), or as a combination of both which accounts for greater than 60%. COM is the most thermodynamically stable form of stone and more frequently observed than COD in clinical stones. Stone development begins with the arrangement of crystals in supersaturated urine which at that point stick to the urothelium, subsequently making the nidus ensuing stone development. Crystals in urine stick together to arrange a small hard mass of

stone called crystal growth. This crystal growth occurs through aggregation of secondary nucleation of crystal on the matrix – coated surface. This crystal formation is a very slow process and it takes a long time to obstruct the renal tubules.

Antiurolithiatic means preventing the formation of urine stones. To prevent the formation of urine stones, anti urolithiatic drugs have been discovered. Most of the synthetic anti urolithiatic drugs are having adverse effects. The traditional herbal medication is the basis of the modern complementary medical therapy. Nowadays, antiurolithiatic drugs are not generally used by physicians. Instead they just treat for the pain until the stone passes out by itself. Standard drugs are not using due to its side effects and less effectiveness. Commonly using drugs are Allopurinol, Citrate, Cystone and thiazide diuretics

In this study, two plant species which are used as herbal remedies to treat urolithiatic patients in Sri Lanka have been investigated for antiurolithiatic activity.

The main objectives of this study are to investigate in-vitro antiurolithiatic activity of the plants Passiflora foetida and Stachytarpheta indica on experimentally prepared calcium oxalate crystals.

Methodology

The study was carried out to evaluate in-vitro antiurolithiatic activity of selected medicinal plants; Passiflora foetida and Stachytarpheta indica on experimentally designed calcium oxalate crystals as a laboratory based experimental study in natural urine medium. The study was carried out in the laboratories of the Faculty of Allied Health Sciences, General Sir John Kotelawala Defence University Ratmalana.

The Passiflora foetida and Stachtarpheta indica plants including its flowers and fruits were collected at daytime from the local areas of Ratnapura (6.70560N, 80.38470E) and Galle (6.05350N, 80.22100E) districts.

The specimens were identified by the National herbarium, Royal botanical garden, Peradeniya, Sri Lanka. The collected plants were washed with running water and air dried for seven days to remove the moisture and grinded as a coarse powder. Then they were labelled and stored in air tight bottles.

Phytochemical screening was carried out for both plants to detect the presence of particular compounds using standard procedures

The crude plant extracts were prepared by using standard methods with minor modifications. From the stored plant powder, 50 g were taken from each, soaked in 750 mL of distilled water and boiled for 2 hours separately. The two solution mixtures were filtered through a filter paper. The filtrates were subjected to rotary evaporation to remove the water and solid crystals of the crude extract were obtained. The crystals were kept in separate air tight bottles and stored under 2-4^{0}C.

A concentration series of plant extract was prepared using the doubling method. First, 40mg of plant extract was taken and dissolved in 10.0 mL of distilled water (10 mL). This process was repeated to make a successive dilution series as 4 mg/mL, 2 mg/mL, 1 mg/mL, 5 mg/mL, 0.25 mg/mL, 0.125 mg/mL.

A volume of 1.0 mL of the plant extracts having different concentrations were added to six test tubes each containing 2 mL of healthy urine. Into those test tubes, 50 µL of $Na_2C_2O_4$ solution having a concentration of 0.0005 mg/dm^{-3} and 50 µL of $CaCl_2$ solution having a concentration of 0.003 mg/dm^{-3} were added. For this mixture, Tris buffer with the concentration of 0.05 mol/L was added drop wise until the pH is adjusted to 6.5 and 10 µL of dil. Sulphuric was added to facilitate the formation of crystals.

For the positive control, two Himalaya Cystone tablets were crushed and 40 mg was taken and dissolved in 10.0 mL of distilled water. A volume of 1.0 mL of this solution was added to test tubes containing 2.0 mL of healthy urine along with the 0.05 mol/L of Tris buffer solution to

maintain the pH 6.5. For this mixture, 50 µL of $Na_2C_2O_4$ with a concentration of 0.0005 mg/dm-3 and 50 µL of $CaCl_2$ with a concentration of 0.003 mg/dm-3 were added. Into the final mixture, 10 µL of dil. Sulphuric acid was added to facilitate the formation of crystals.

For the negative control, 1.0 mL of distilled water was added instead of plant extract and the rest of the chemicals and conditions were not changed.

The samples were incubated at 37°C for 2 hours. And OD of the formed crystals were measured using a UV-Visible spectrophotometer at 620 nm wavelength.

Results and discussion

A graph was plotted for the absorbance values obtained for different concentrations of the aqueous extracts of *P.foetida* , *S. indica* and positive control as a comparison among each other (Figure 1).

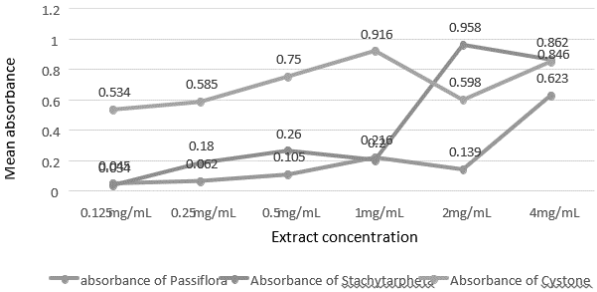

Figure 1 - Graph of comparison of mean absorbance of P.foetida, S.indica and positive control

As shown in the graph, the mean absorbances of the two plant extracts and the positive control have shown an increasing pattern with the increase of concentrations from the lower concentration towards the higher concentrations with slight fluctuations (figure 1)

The graph depicts that there is a concentration dependent increase in the mean absorbance for both the *P foetida* and *S indica* extracts except for slight fluctuations at the concentrations 2mg/mL and 1 mg/mL respectively.

According to the graphical representation, aqueous extract of *S.indica* has shown higher absorbance values with compared to *P.foetida* aqueous extract. The highest absorbance value for *S.indica* has shown at its 2mg/mL concentration which is 0.958 while the highest absorbance value for *P.foetida* is 0.623 which has been shown at its 4mg/mL concentration. The highest absorbance value of *S.indica* is higher than that of the positive control cystone which is 0.916 shown at its 1mg/mL concentration.

Crystal formation and presence of those free particles in the urine do not necessarily lead to stone formation, but crystal retention is essential for the formation of stones so that interference with crystal growth and aggregation can be applied as a therapeutic strategy for the prevention of recurrent stone formation. Therefore, the main focus of the study was to investigate the inhibitory activity of the two plants *Passiflora foetida* and *Stachytarpheta indica* on crystal aggregation.

Optical density of a solution is affected by many characteristics such as its particle number, particle size and shape. Particle number and particle size are the main factors which affect the OD. The particles in a suspension will scatter light. (Thus preventing it from reaching the light detector) Therefore, the turbidity changes and OD readings can be taken as evidences for the changes in the number of particles of a solution.

If there is an effect of the plant extracts to inhibit the formation of calcium oxalate stones, aggregation of crystal particles in the test samples should be prevented. This principle has been used to determine the effect of the plant extracts on the inhibition of kidney stone formation by the spectrophotometric method. According to the theory, if the particles are aggregated, the turbidity of the solution should be reduced.

In other words, in the spectrophotometric analysis, the increase in the absorbance at 620 nm with increasing concentrations of the extracts depicts an increase in the number of

crystals in the samples preventing the crystal growth and aggregation. Inhibition of crystal growth and aggregation can inhibit the stone formation. Because the dispersed crystals can be eliminated easily through urinary tract.

In this study, the antiurolithiatic property was investigated *in-vitro* with the mean absorbance results obtained by the spectrophotometer. They show a concentration dependent increase in the mean absorbance values with slight fluctuations which can be taken as a proof to demonstrate the inhibition of particle aggregation with the increase in the concentration of the plant extracts in natural urine. In *P.foetida,* the extract in the concentration 4 mg/mL has shown a mean absorbance value of 0.623 which is higher than that of the negative control which is 0.492 and plant *S.indica* has shown its highest mean absorbance value of 0.861 at 4 mg/mL concentration.

Conclusion

The present study reveals that aqueous extracts of *Passiflora foetida* and *Stachytarpheta indica* exhibit antiurolithiatic activity on experimentally prepared calcium oxalate stones in natural urine medium. They may be beneficial in the treatment of urolithiasis due to calcium oxalate kidney stones. Aqueous extract of *Stachytarpheta indica* exhibits the highest antiurolithiatic activity following the standard drug cystone (Himalaya drug company, India) and aqueous extract of *Passiflora foetida*.

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In Vitro Evaluation Of Sun Screen Activity And Phytochemical Screening Of Methanolic Leaf Extract Of *Magnolia Figo*

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Abstract: *Magnolia figo* (Local name: *"Madana-kama"*) is a native Chinese plant, which belongs to Family Magnoliaceae. Although, different parts of the plant have been used as a treatment for several types of disease conditions such as malaria, cardiovascular diseases and as a strengthening agent for sexual virility in traditional medicine. The aims of the present study were to evaluate the sunscreen activity and to qualitatively analyze the phytochemicals present in methanolic leaf extract of *Magnolia figo.* Collected leaves were air-dried, powdered and macerated in methanol. The filtrate was evaporated to dryness and subjected to freeze-drying process. The SPF values of methanolic extract of *Magnolia figo* and the reference agent; Dermatone® were analyzed *in vitro* by using spectrophotometric method. The results exhibited that 2.00 mg/mL methanolic extract of *Magnolia figo* has high sun protection activity (29.94). The dose response relationship of *Magnolia figo* and Dermatone® was analyzed according to concentration series of each, respectively. In the current study EC 50 was calculated to methanolic leaf extract of *Magnolia figo* (0.9135) which is lower than Dermatone® (1.7820) suggesting that the potency of methanolic leaf extract of *Magnolia figo* is higher than the reference agent. According to the phytochemical screening, methanolic leaf extract of *Magnolia figo* was rich in alkaloids, phenols, tannins, terpenoids, flavonoids, steroidal glycosides and saponins. The results concluded that leaf extract of *Magnolia figo* possesses marked sunscreen activity which exhibits its potential use for development of sunscreen formulations.

Keywords: *Magnolia figo*, sun screen activity, phytochemical screening

Introduction:

In the present day, most practical and popular strategy to protect from the UV radiation is the application of topical broad-spectrum sunscreen formulations on the skin, because they have the ability to reduce the penetration of UV-A and UV-B radiation through the skin. Sun screen formulations act by either absorbing or reflecting the sun's ultraviolet radiation (Napagoda *et al.*, 2016). The Sun Protection factor (SPF), which is expressed as numeric measurement on sunscreen products is the recognized universal indicator for the photo protective performance of the product (M.S. Latha, 2013**).** SPF is defined as the UV energy required to produce a minimal erythema dose (MED) on protected skin, divided by the UV energy required to produce a MED on unprotected skin (Saraf and Kaur, 2010). The SPF values of a sunscreen product can be determined using *in-vitro* methods. (Mansur J.S., 1986, Sayre *et al*., 1979). There are many factors that should be considered when formulating a new sun screen to the public because it has to be safe, chemically inert, non-irritating, non-toxic and photo-stable and should provide complete protection to the skin (Mbanga *et al.*, 2014). Synthetic products are known to cause photo

allergic reactions and potential to develop skin melanoma due to complete absorption of UV-B radiation allowing transmission of large quantities of UV-A in to the deeper layers of the skin, exacerbation of acne and rosacea because they contain zinc oxide and titanium dioxide which can block skin pores (Latha *et al*., 2013). Due to associated adverse effects synthetic sunscreen products are rapidly being replaced by the herbal sunscreen products because most of the materials which are used in sunscreen products have not been established as safe for long term human use (Korać and Khambholja, 2011). There is strong evidence that UV light induces the accumulation of UV light absorbing flavonoids and other phenols in dermal tissues of plant body. This is a protective mechanism in plants (Bissonnette, Nigen and Bolduc, 2012). Naturally occurring phytochemicals such as phenolic acids, flavonoids and high molecular weight poly phenols are very useful for prevention of harmful effects generated by UV radiation (Saraf and Kaur, 2010).In order to fulfill this great demand of novel plant based clinical herbal sunscreens, many pharmaceutical companies try to invest lots of money for their research & development to get a product outcome which can compete with other products, with higher efficacy, relatively cheap and user friendly. Species of genus *Magnolia* have many traditional uses. In Ayurvedic medicine, diseases such as fever, colic, leprosy, eye disorder, gonorrhea, and gout can be treated with *Magnolia champaca. Magnolia alba* is used to treat bronchitis, prostatitis, and leucorrhoea. *Magnolia hypoleuca* and *Magnolia officinalis* have been used to treat carcinomatous sores in leukemia. Flowers of *Magnolia figo* are used as a cardiac tonic and roots and bark are used as antidote for fish poison (Kumar, 2012). There is no scientific evidence available about *Magnolia figo* leaves that correspond to *in vitro* evaluation of sunscreen activity. Phytochemical analysis studies proved that the leaves of *Magnolia figo* have several phyto constituents such as polyphenols, flavonoids, alkaloids, aporphines and sesquiterpene lactones which possess exquisite biological activities (Kumar *et al.*, 2012). The presence of magnolamine, magnoline and tetrandrine in the leaves also has been reported (Jayaweera and Senaratna, 2006). Accordingly, the current study was conducted to evaluate the sun screen activity and carry out a qualitative analysis of the phytochemicals present in methanolic leaf extract of *Magnolia figo.*

Methodology:

Matured leaves of plant *Magnolia figo* ("*Madana-kama*") were collected,air-dried, powdered and macerated in methanol. The filtrate was evaporated to dryness and subjected to freeze-drying process. The freeze-dried sample from the plant extract (2 mg) was weighed using an analytical balance and put into 1.5 mL eppendorf tube. Eppendorf with extract was filled with 1000 µl ethanol and it was properly mixed using vortex mixer. In addition, the reference agent; Dermatone® was dissolved in ethanol to obtain a solution of 2.0 mg/mL and absorbance of UV radiation by the methanolic plant extract and Dermatone® were determined in triplicate using SPECTRA max PLUS 384 microplate spectrophotometer from 290 to 320

$$SPF_{in\ vitro} = CF \times \sum_{320}^{290} EE \times (\lambda) \times I(\lambda) \times abs(\lambda)$$

nm, at 5 nm intervals taking ethanol as the blank and data were recorded using the software-Softmax Pro. SPF values were then determined using the Mansur equation (Mansur, *et al*., 1986).

EE = erythemal effect spectrum

I = solar intensity spectrum

abs = absorbance of sunscreen product;

CF = correction factor (= 10)

λ = wavelength

For Determination of the dose – response relationship, the freeze-dried sample which obtained from *Magnolia figo* was redissolved to obtain 2.0 mg/mL, 1.0 mg/mL, 0.5 mg/mL, 0.25

mg/mL, 0.125 mg/mL, 0.0625 mg/mL, 0.03125 mg/mL samples. In addition, Dermatone® was dissolved in ethanol to obtain a solution of 2.0 mg/mL, 1.0 mg/mL, 0.80 mg/mL, 0.40 mg/mL, 0.20 mg/mL, 0.10 mg/mL, 0.05 mg/mL. The Absorbance of UV radiation from samples prepared were measured in micro plates, in triplicate using SPECTRA max. PLUS384"

Microplate spectrophotometer from 290 to 320 nm at 5 nm intervals using methanol as the blank. The SPF values were calculated using Mansur equation. Two graphs were plotted to determine the EC_{50} values separately. Statistical analysis was performed using GraphPad Prism 8.0.1 (244) software. The significance level was set at $p < 0.05$.

UV Absorbance values of 2.0 mg/mL methanolic leaf extract of *Magnolia figo* was measured within the 190 nm-690 nm wavelength range using a microplate spectrophotometer to show the spectral analysis of methanolic leaf extract**.**

Qualitative analysis of methanolic extract of *Magnolia figo* for alkaloids, saponins, flavonoids, tannins, phenols, sterols, glycosides was done using standard procedures as described in Evans (2000) and Harbone (1998).

Results and Discussion

Table 1 - Comparison of SPF values of plant extract and the Dermatone® sample at 2.0 mg/mL concentration

Tested Sample	SPF
Magnolia figo	29.94
Dermatone®	33.77

In SPF rating, the values 2-12, 12-30 and ≥30 are considered as having respectively minimum, moderate and high sun protective activity respectively. The results showed that 2.00mg/mL methanolic extract of *Magnolia figo* exhibited high sun protection activity (29.94) which is a novel finding of this study. Further, SPF value of 29.94 suggests that this plant extract can protect the skin against 97% of harmful UV-B rays and the 1.00mg/mL extract showed moderate sun protective activity which is 8.19% lower than the SPF of highest concentration. Positive control, Dermatone® showed SPF value of 33.77 in 2.00mg/mL concentration. The sun protective activity of methanolic extract of *Magnolia figo* is 3.83% lower than the reference agent. According to the guidelines of international regulatory agencies, only SPF value equal or greater than 6 is preferred in cosmetic products (Costa *et al*.,

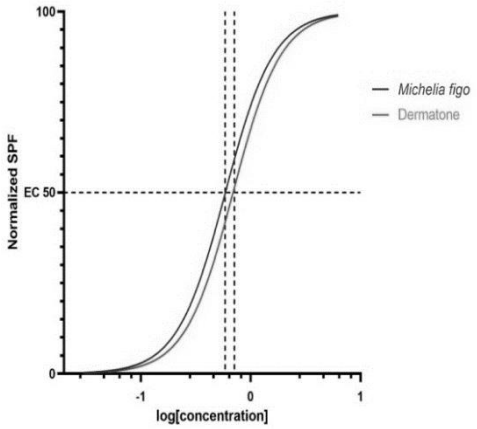

Figure 1 - Comparison of sun protection factor of methanolic leaf extract of Magnolia figo with the Dermatone® sample using normalized SPF Vs Log[concentration] graph.

2015). Hence the results suggested that *Magnolia figo* extract can be considered as a promising active ingredient for sunscreen formulation.

Potency refers to the concentration or dose of a drug required to produce the drugs maximum effect. The lower the dose of the drug required for a given response the more potent the drug and usually describe as half maximal effective concentration (is the dose at which 50% of the maximum effect is produced or the concentration of drug at which the drug is half maximally effective) known as EC_{50}. Smaller the EC_{50} the more potent the drug (Lambert, 2004) as shown in the dose response relationship. In the current study EC_{50} was calculated to methanolic leaf extract of *Magnolia figo* (0.9135) which is lower than the reference agent Dermatone® (1.7820) suggesting that the potency of methanolic leaf extract of *Magnolia*

figo is higher than the reference agent. The potency difference is illustrated clearly shown in Figure 1.

If higher SPF value is desired, it can be achieved by reducing the dilution factor when preparing the extract because SPF is found to be concentration dependent (Costa *et al*., 2015).

It is clearly depicted by the strong positive statistically significant correlation between concentration of the methanolic extract of *Magnolia figo* and the *in vitro* SPF value as shown in (Table 2) ($r = 0.9745$, $p < 0.05$). Furthermore, UV absorption spectrum of methanolic extract of *Magnolia figo*, the highest absorbance peak (~3.9) was observed in UV-C region (150 nm - 270 nm) and another high absorbance peak (~3.5) was observed in UV-B region (270 nm - 350 nm) which exhibit effective sun protection activity against harmful UV-B and UV-C rays.

Test	Result
Alkaloids	
Mayer's Test	+++
Wagner's Test	++
Phenols & Tannins	
Ferric Chloride Test	+++
Terpenoids	
Salkowski's Test	++
Flavonoids	
Zn/HCl Reduction Test	+++
Steroidal Glycosides	
Libermann Burchards Test	+
Saponin	
Foam Test	+

Table 2 - Correlation between concentration of the methanolic leaf extract and in vitro SPF

	Pearson Correlation Coefficient (r)	p	r^2
Concentration Vs SPF	0.9745	0.0002	0.9497

Table 3.

Table 3- Results of phytochemical screening for Magnolia figo

The phytochemical analysis for leaf extract *Magnolia figo* revealed the presence of alkaloids, tannins, terpenoids, phenols, flavonoids,

steroidal glycosides and saponins. The results are exhibited as the presence of bioactive compound (+) and the results are shown in

[Mild presence: (+), Moderate presence: (++), High presence: (+++)]

Conclusion

The methanolic extract of *Magnolia figo* exhibits promising sun protection activity (SPF = 29.94) and there is correlation between concentration and the sun protection factor, display a huge potential to be developed as a safe, cheap and effective topical sunscreen formulation. From the results obtained in the present study, it is concluded that methanolic leaf extract of *Magnolia figo* contains alkaloids, phenolics, flavonoids, terpenoids, steroidal glycosides and saponin. Final results clearly indicate that potential use of *Magnolia figo* leaves for development of cosmetic formulations.

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Association Between Perceived Stress And Obesity Among Female Undergraduate Students In The University Of Peradeniya

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Abstract:-Obesity has been widely recognized as a major health hazard due to the increased risk of heart disease, diabetes mellitus, and cancers. BMI is the most popular method of measuring obesity. However, waist circumference is a commonly used measure to evaluate the abdominal fat distribution. In Sri Lanka, female sex is recognized to be associate with overweight and obesity. Out of many well-known etiological factors, ever-increasing stress in life remains a poorly understood cause of obesity. University students are particularly subjected to stressors and possibly have a higher incidence of becoming obese and to have high abdominal obesity. This study explores the prevalence of overweight and obesity by Body Mass Index, abdominal obesity by Waist Circumference, and explores the association between the degree of perceived stress measured by perceived stress scale with BMI and waist circumference among female students at the University of Peradeniya. A total of 450, 3rd-year female students were selected randomly to represent all the faculties of theUniversity of Peradeniya. The Perceived stress scale; a

self-reporting questionnaire was administered. Anthropometric measurements were measured by using standardized equipment. Visceral fat was measured by the Bio Impedance analysis machine. Data were analysed using SPSS 20 software. Prevalence of overweight, obesity, and abdominal obesity were 19.9%, 4.1% and 10.1% respectively. There was a statistically significant association between perceived stress level and the waist circumference categories ($p<0.05$). A similar trend was seen with BMI even though it

is not significant ($p>0.05$). This study demonstrates a low prevalence of obesity among university students compared to the previously reported 7.3% of prevalence among the female population, Sri Lanka. The impact of high perceived stress; a manageable risk factor of obesity was recognized.

Keywords: Obesity, Perceived stress, University students

Introduction:

Obesity also is known as adiposity, chubbiness, corpulence, and fatness has gained considerable attention as a major health hazard. Obesity is defined as abnormal or excessive accumulation of fat that may impair health. It is defined as body mass index greater than or equal to 30 kg/m2 according to the international classification of obesity and overweight is defined as BMI above 25 kg /m^2 (World Health Organization, 2017). Worldwide obesity has increased by more than double between 1980 and 2014. It causes at least 2.8 million people to die each year and contributed to an estimated 35.8 million (2.3%) global disability-adjusted life years. In low and middle-income countries, the prevalence of obesity is twice higher among women than men (World Health Organization, 2017). In Sri Lankan adults, the percentage of overweight, obese and centrally obese categories were 25.2%, 9.2%, and 26.2%. Female sex, urban living, higher

education, higher income and being in the middle age were shown to be associated with overweight and obesity in Sri Lanka (Katulanda *et al*., 2010).

Genetics predispose to severe obesity and early onset of obesity (Shawky and Sadik, 2012). Individual behaviors and environmental factors can contribute to excess calorie intake and inadequate physical activity leads to obesity (Duffey and Popkin, 2011). Certain medical conditions such as polycystic ovary syndrome (Sam, 2007) and prescription drugs such as steroids, and antidepressants (Kulkarni and Kaur, 2001) can cause weight gain. Inadequate sleep, prenatal and post-natal influences (Gunderson, 2009), chemical exposure (Wang *et al.*, 2012) and stress (Richardson *et al.*, 2015) may affect energy balance and obesity risk. However, out of many well-known etiological factors, ever-increasing stress in life, remains a poorly understood cause of obesity.

Obese people tend to die prematurely (Global BMI Mortality Collaboration, 2016). Overweight and obesity predispose to vascular diseases (Lawlor, Lean and Sattar, 2006), diabetes mellitus (Al-Goblan, Al-Alfi and Khan, 2014), renal diseases (Eknoyan, 2011), gallbladder diseases (Amaral and Thompson, 1985) and impairs respiratory function (Lin *et al.*, 2006). They often suffer from anxiety, sleep apnea, psychosocial problems, depression and low self-esteem (Araghi *et al.*, 2013). Consequently, morbidity and mortality rates are higher among the obese people (Abdelaal, le Roux and Docherty, 2017).

In the evaluation of obesity, various methods have been used. Body mass index is the most widely used method in epidemiological studies (Nuttall, 2015). Furthermore, skinfold thickness (SFT) measurement has been used from ancient times (Gray *et al.*, 1990). Also, waist to hip ratio (WHR) and waist circumference have been done to evaluate abdominal obesity (Ahmad *et al*., 2016). Measuring waist circumference is considered as an effective method of assessment of health risks (Siren *et al.*, 2012). Also, the place of distribution of fat is an important risk factor, because fat cells have different metabolic activities depending on their locations (Jensen, 2008). In recent years, development of Bio Impedance Analysis (BIA) method, which involves assessment of the resistance of body tissues by passing an electric current of low intensity, with a fixed frequency, contributes to measuring the percentage of the different compartment of body fat (Sampei and Sigulem, 2009).

Abdominal obesity is often referring to belly fat also known as central obesity or intra-abdominal fat. It includes both subcutaneous fat that sits just under the skin and the visceral fat that sits deep in the abdominal cavity around internal organs (Hellen, 2009). Visceral adipose tissue, more metabolically active, more sensitive to lipolysis and more insulin resistant than subcutaneous adipose tissue thereby carries a greater risk of morbidity and mortality (Ibrahim, 2010).

Abdominal obesity is associated with serious adverse metabolic and cardiovascular outcomes, including type 2 diabetes, atherosclerotic heart disease (Pischon *et al*., 2008) and severe impairment of lung function (Leone *et al*., 2009). Cytokines released by adipocytes may cause inflammation which can lead to certain cancers in tissues such as in colon, endometrium and breast (American Cancer Society, 2016). Risk of diabetes is increased when the waist circumference is more than 31.5 inches (80 cm) in women and more than 35.5 inches (90 cm) in men (The International Diabetes Federation, 2010).

Stress is a state of threatened homeostasis caused by intrinsic or extrinsic adverse forces (stressors) (Tsigos *et al*., 2000). Intrinsic

stressors were defined as stressful components that are triggered by the cognitive challenges (Sandi and Pinelo-Nava, 2007) such as dealing with uncertainty, novel and urgent tasks (Pottier *et al.*, 2015). Extrinsic stressors were defined as stressful components that are induced by conditions that are completely unrelated to the cognitive tasks (Sandi and Pinelo-Nava, 2007) such as noise, pain, sleep deprivation and crowding (Pottier *et al.*, 2015). Stress is counteracted by complex physiological responses including increased heart rate, increased sweating, dilation of the pupil and behavioral responses including changing eating and sleeping patterns, feeling angry or depressed (Henry, 1997).

Central and peripheral stress systems contribute to maintain and re-establish the body equilibrium (Tsigos *et al*., 2000). Within the CNS, they produce lasting changes relevant to depression and anxiety-like behavior by activating the hypothalamic-pituitary-adrenal axis. Peripheral systems release immature, pro-inflammatory monocytes and neutrophils into the peripheral circulation that precipitate a series of immune events (Pfau and Russo, 2015). Each one's stress is determined by a multiplicity of genetic, environmental and developmental factors (Tsigos et al., 2000).

Methods to assess the stressors include self-report and biofeedback methods. In a self-report questionnaire an individual's answer questions about the mental or physical state (Morgan, Umberson and Hertzog, 2014). Perceived Stress Scale (PSS) is a validated self-report tool thatused globally (Chiu *et al.*, 2016). For the understanding of daily stress, diary methods, ecological momentary assessment, short questionnaire and telephone interviews are used (Almeida, McGonagle and King, 2009). In the biofeedback technique, record the activity of the physiological systems of the body's stress response. Measurement of blood pressure, heart rate, respiratory rate and stress hormones (mostly cortisol) in saliva can be used (Lupien, 2013).

Stress has a multitudes impact on health. Short-term stressors boost the immune system but chronic stress suppresses the immune system and increased risk for viral illnesses (Segerstrom and Miller, 2004). Stress increased the risk of bronchoconstriction (Edith, *et al*., 2007), diabetes mellitus (Richard, 2002), gastroesophageal reflux causing peptic ulcers, stress ulcers or ulcerative colitis (Bradley *et al.*, 1993). Stress is linked to psychiatric illnesses such as schizophrenia and depression (Cheryl *et al*., 2002). As well as Stress has been associated with poor eating behaviors, diet quality, high body mass index (Richardson *et al.*, 2015) and impairs the inclination to be physically active (Stults *et al*., 2014).

Undergraduate students are subjected to high levels of stress due to academic, health-related and psychosocial stressors (Waghachavare *et al.*, 2013). Stress plays a role in the determination of body fat distribution among the female population. This is consistent with the known effects of cortisol in the redistribution of fat from the periphery to the abdominal region (Dallman, Pecoraro and la Fleur, 2005). Enzymes that control tissue cortisol concentrations is located in adipose (fat) tissues (Morris and Zemel, 2005). Thus, a higher percentage of deep fat cells surrounding the abdomen may lead to obesity due to the production of greater amounts of cortisol at the tissue level (Epel *et al.*, 2000). Therefore, evaluation of the association of the stressors and obesity may be important for the prevention of stress-related obesity among female undergraduate University students.

This study aimed to determine the prevalence of obesity among undergraduate female and to evaluate the association between perceived stress with body mass index and waist

circumference among undergraduate female students in the university of Peradeniya.

Methodology:

The study is a descriptive and exploratory study that was carried over a period of six months from December 2017 to June 2018. Third-year undergraduate female students from all nine faculties in the University of Peradeniya were included and undergraduate female students who are with disabilities were excluded from the sample. A random sampling method was used to select the sample. According to the large sample theory, the sample size was taken as 450. The names of the female third-year students were taken randomly from the registers under the permission of deans and senior registrars from each faculty.

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Height was measured using a calibrated stadiometer. Weight and visceral fat were measured using bioelectrical impedance machine (BIA). Waist at minimal waist circumferences was taken using a calibrated measuring tape. The degree of Perceived Stress level was measured using validated English, Sinhala and Tamil version of the self-report tool PSS; 10 item questionnaire. Sinhala PSS Translation courtesy of Dr. A.V.S. Rekha Aththidiye, Licensed Clinical Psychologist, University of Colombo; Sri Lanka. Tamil Translation courtesy to Mr. Santhalingam Sathees, University of Jaffna.

Ethical clearance was taken from the faculty of Allied Health Science, University of Peradeniya. Permission to conduct the study was obtained from the Deans of all nine faculties and contact the senior registrars of each faculty. Registers of names were obtained to select the random sample and get a convenient time and the venue for data collection was decided after discussing with the participant of each faculty. Research assistants and primary investigator were trained under the supervision of a clinical nutritionist, for measurement of anthropometric measurements and to operate the BIA machine. Clinical nutritionist evaluates the trainees for precise and accurate measurements. Calibrated of equipment were done along with the training. Participants were recruited by the poster. Spend one to three days per faculty to get the total number expected from one faculty. On the day of the study, it was arranged in a suitable place.

The information sheet that includes a description of the research, ethical consideration and medical boundaries of the research and the written consent forms were distributed and time was given to participants to read, understand, ask for queries and sign the document before the data collection process.

Questionnaire used to collect demographic data including age and district. Perceived stress scale questionnaire (Cohen, *et al*, 1983) that is consisted of ten items about the feelings and thoughts during the last month was used to assess perceived stressors. It was taken 10 to 15 minutes to complete the questionnaire for a single participant.

A. PSS Score

Reverse the scores for questions 4, 5, 7, and 8. On these 4 questions, change the scores like, 0 =4, 1 = 3, 2 = 2, 3 = 1, 4 = 0. Add up the scores for each item to get a total. Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress. Scores ranging from 0-13, 14-26 and 27-40 would be considered as low, moderate and high perceived stress.

B. Anthropometric measurements.

Each anthropometric measurement was taken by a single investigator. Anthropometric measurements were taken according to accepted guidelines ('WHO | Physical status: the use and interpretation of anthropometry', 2013). Measurement of height was taken by a stadiometer to the nearest 0.5 cm. Participants

were asked to remove their shoes, hair ornaments and stand with his back of the head, back, buttocks, calves and heels should be touching upright, feet together and to look straight. The headpiece of the stadiometer of the sliding part of the measuring rod was lowered so that the hair was pressed flat and height was recorded to the resolution of the height. Measurements for waist circumferences were taken using a calibrated measuring tape. Waist circumference was taken at the minimal part of the midsection. Abdominal obesity was defined based on WC ≥80 cm measured by at the minimal waist.

Measurements for weight to the nearest 0.1 kg, predicted visceral fat was derived from bioelectrical impedance by OMRON BF 511 body composition analyzer. Instructed to the participant being measure, should not contact with any other non-conducting surface with legs apart and arms away from the body (Omron Healthcare Co Ltd: Body Composition Monitor BF500 Instruction Manual, 2017).

BMI was estimated with the body weight (kg) / height2 (m2) formula. In accordance with the classification by the World Health Organization for Asian Population, they were regarded as underweight (BMI 18.5 kg/m2 below), normal weight (BMI 18.45-22.9 Kg/m2), overweight (BMI 23- 27.4 Kg/m2) and obese (BMI ≥27.5 Kg/m2) (WHO Expert Consultation, 2004).

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Statistical Package for Social Sciences (SPSS) version 20.0 for Windows was used for data entry and analysis. The results of descriptive statistical analysis were summarized as mean, standard deviations (±), frequencies (***N***) and percentages (***%***) and illustrated as tables and figures. Association between perceived stress with BMI and WC, groups were determined by employing Chi-Square test where P value less than 0.05 was considered to be statistically significant.

Results:

The mean age of the respondents was 23.30 ± 0.892. Study subjects were presented from every district from Sri Lanka. The mean ± SD values for BMI, WC and VF of the total study population were 20.83±3.86, 69.87±6.79 and 3.46±1.35 respectively. In Table 3.1, based on BMI, majority of students (49.1%) had normal weight and prevalence of overweight and obesity were 19.9% and 4.1% respectively. Prevalence of abdominal obesity (≥80 cm) was 10.6% measured by waist circumference that is
higher than general obesity. Percentage of students for high visceral fat level (VF level >10), indicated that is none of the study subjects had visceral obesity.

Table 1 - Prevalence of obesity among undergraduate female students in the University of Peradeniya

	Frequency(*N*)	**Mean ±SD***	**Percentage (%)**
BMI category			
Underweight	119	17.01 ± 1.15	26.9
Normal weight	217	20.59 ± 1.23	49.1
Overweight	88	24.97 ± 1.39	19.9
Obesity	18	28.61 ± 1.50	4.1
WC category			
<80 cm	397	68.26 ± 5.10	89.4
≥80 cm	47	83.44 ± 3.14	10.6
VF level			
<6	401	3.24 ± 1.13	92.4
6-9	33	6.18 ± 0.63	7.6
>10	0	0	0

BMI: Body mass index, WC: Waist circumference, VF: Visceral Fat. Using the WHO classification for Asian population (2004) and weekly epidemiological report released by Ministry of Health, Sri Lanka (2013); Normal BMI: 18.0-22.9 kg/m^2, Overweight: 23.0-27.4 kg/m^2, Obesity: ≥27.5 kg/m^2. Abdominal obesity: WC≥80 cm for women. Using body Composition Monitor BF500 Instruction Manual, (2017) Normal VF: 0-9, high VF: ≥10.*SD- Standard Deviation.

Table 2 - Level of stress among female undergraduate students according to stress score on 10 item perceived stress scale.

Perceived stress level (score)			
	Low Perceived Stress	Moderate Perceived Stress	High Perceived Stress
Frequency(*N*)	63	337	39
Percentages (*%*)	14.4	76.8	8.9
mean ± SD	11.02 ± 1.77	19.24 ± 3.29	29.00 ± 2.10

Using Cohen *et al* (1983); Low perceived stress: 0-13 score, moderate perceived stress: 14-26 score, high perceived stress: 27-40 score.

The mean ± SD perceived stress scale (PSS) score of the total study population was 18.92±5.22. There was a significant difference between means of perceived stress levels ($p<0.01$) according to the One-way ANOVA test. The descriptive characteristics for each PSS are as shown in Table 3.2 and majority of students (76.8%) perceived moderate stress.

Table 3 - Comparison of WC, BMI and stress score with the chi-square test, among undergraduate female Students University of Peradeniya.

	PSS score			P value, df
	low	*moderate*	*high*	
	N (%)	*N (%)*	*N (%)*	
WC categories				
<80 cm	47 (12.1)	306 (79.1)	34(8.8)	*p*=0.002*, 2
≥80 cm	14(30.4)	27(58.7)	5(10.9)	
BMI categories				
Underweight	18 (15.5)	96 (82.8)	2 (1.7)	*p*=0.067,6
Normal weight	25 (11.8)	161 (75.9)	26 (12.3)	
overweight	14 (16.5)	62 (72.9)	9 (10.6)	
obesity	3 (16.7)	13 (72.2)	29 (11.1)	

*Significant association between degree of stress based on WC categories assessed, WC: waist circumference, BMI: Body Mass Index, PSS: Perceived Stress Scale, N = frequency counts, figures in parentheses represent percentages.

There was a statistically significant association between perceived stress level and the waist circumference categories ($p<0.05$) and a similar trend with BMI even though it is not significant ($p>0.05$) (Table 3.3).

Discussion

Excess body fat is well documented as a risk factor for numerous chronic conditions, such as diabetes, hypertension, hyperlipidemia and cardiovascular diseases (Must and McKeown, 2000). In this study, BMI; a measure of general obesity and WC; a measure of abdominal obesity that are predictors of cardiovascular risks, non-insulin-dependent diabetes, and hypertension (Morris and Zemel, 2005).

Total 450 subjects represent students from every district in Sri Lanka. The mean age of the study
the population was 23.30±0.892 years. The prevalence of underweight, normal, overweight and obesity determined by BMI were 26.9%, 48.1%, 19.9%, and 4.1% respectively. This study indicates lower prevalence of obesity than the previous report of 7.3 % prevalence of obesity in the female population,Sri Lanka (World Data Atlas, 2017).

The prevalence of overweight, obesity and central obesity among university students reported from India were 26.8% and 10.7%, and 16.4% (Pengpid and Peltzer, 2014) In another study involving university students in 22 countries prevalence of underweight, normal weight, over weight and obesity were 17.6%, 62.1%, 14.1% and 5.2% respectively (Peltzer *et al.*, 2014). Both studies indicate a lower prevalence of obesity (4.1%) and a higher prevalence of underweight (26.9%) in our sample, probably indicating the socioeconomic background of our university entrants. It is important to note that none of the study subjects had visceral obesity when compared with 39% of prevalence among female students in A'shaqiyah University, Oman (Louay Labban, 2015). Obesity prevalence by BMI was 4.1% when compared to 10.6% of obesity prevalence that is

measured by WC. 6.5% of obese girls were not detected by BMI. The discrepancy of obesity prevalence measured by BMI and WC needs further evaluation.

The average perceived stress score was 18.92, which is higher than the standard score (M = 14.2; SD = 6.2), and 51.9 % of students had scored above standard, indicating a higher prevalence of stress among these participants. However, the mean perceived stress scale score (18.92) reported by Swaminathan *et al* in a Tamil Nadu university was 21.09 (Swaminathan *et al.*, 2015) and findings of Al-Dubai *et al* among medical residents in Malaysia was 20.4 (Al-Dubai *et al.*, 2014) and in a study in Pakistan among first and second-year students was 30.84 (Shah *et al.*, 2010) indicating better stress levels in our university students that is probably indicating the psychosocial relief provided by this garden university with vast facilities for leisure and recreation. Comparisons with other universities in the country would be a valuable exercise.

The focus of this study was on the association of PSS on BMI and WC, two measures used to classify obesity and the risk of fat accumulation. PSS investigation would make a unique contribution to understanding the association in a university female population. There was a statistically significant association between perceived stress level and the waist circumference categories (p<0.05) and a similar trend with BMI even though it is not significant (p>0.05).

This study provides preliminary evidence that perceived stress interacts to play a role in the determination of body fat distribution among female. This is consistent with the known effects of cortisol to redistribute fat from the periphery to the abdominal region (Dallman, Pecoraro and la Fleur, 2005)

Stress is a phenomenon occurring between an individual and the environment, and it creates a biochemical, psychosomatic condition including releasing cortisol. Particular enzymes that control tissue cortisol concentrations is located in adipose (fat) tissues (Morris and Zemel, 2005). Thus, higher levels of these enzymes in these deep fat cells surrounding the abdomen may lead to obesity due to greater amounts of cortisol being produced at the tissue level (Epel *et al.*, 2000).

It is suggested that women with visceral fat accumulation have elevated cortisol secretion due to an increased sensitivity along the hypothalamic-pituitary-adrenal axis, and that this may be causing their abnormal fat depot distribution (Marin P. *et al.*, 1992)

Conclusion

Low prevalence of obesity among study subjects was noticed when compared with reported prevalence of 7.3% among females in the general population, Sri Lanka.. Better stress levels in female students in Peradeniya University, probably indicate that the psychosocial relief provided by this garden university with vast facilities for leisure and recreation. Also, it may associate with body image perceptions of attractiveness as female students to maintain a healthy BMI to remain attractive. WC becomes a useful measure in a university setting due to its simplicity. Discrepancy of obesity prevalence measured by BMI and WC needs further evaluation.

The results of this study show statistically significant association with perceived stress with WC So, perceived stress is a risk factor of obesity for female university students, which is manageable and need attention and further clarification. The impact of high perceived stress; a manageable risk factor of obesity was recognized.

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Evaluation of Anti-inflammatory and Antibacterial activities of the extracts of leaves, roots and combination of leaves and roots of plant *Magnolia figo.*

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Abstract:-Discovery of novel drugs from medicinal plants is getting popular owing to lesser side effects and to overcome antimicrobial resistance. The methanolic extracts of both leaves and roots of *Magnolia figo* plant by cold maceration were subjected to the evaluation of anti-inflammatory and antibacterial activity. *In vitro* anti-inflammatory property was determined using heat-induced protein (egg albumin) denaturation test compared to diclofenac sodium (positive control). Concentration series of the extracts were analyzed to calculate the percentage inhibition (IC_{50}) of heat-induced protein denaturation. Antibacterial activity of the methanolic extract was determined against *Escherichia coli* (ATCC® 25922™) and *Staphylococcus aureus* (ATCC® 25923™) using the cylinder plate method using gentamycin as the positive control. The size of inhibitory zone was compared with the positive control to determine the antibacterial activity. Lower IC 50 value (1.819 (µg/mL)) was shown in the combination extract of *M. figo* plant compared to the reference drug (4.337 (µg/mL)). It reflects the synergistic effect of the plant parts. The leaves and roots combination extract exhibited dose-dependent behavior of anti-inflammatory activity and highest antibacterial activity against *E. coli* (zone diameter – 15 mm). However, none of the extracts exhibited antibacterial activity against *S. aureus*. Phytochemical investigations of extracts indicated the presence of alkaloids, flavonoids, phenols, tannins, saponins, terpenoids, glycosides and steroids. Significant results elicited by the combination of plant parts confirm that *M. figo* is a medicinal plant which can be used to develop novel anti-inflammatory agents.

Keywords: Antibacterial activity, Anti-inflammatory activity, *Magnolia figo,*

Introduction :

Use of traditional herbal and folk medicines is becoming more popular and globally accepted nowadays. Therefore, it is necessary to seek their medicinal properties and ascertain their therapeutic properties. The bioactive compounds of medicinal plants are used as antidiabetic, chemotherapeutic, anti-inflammatory, anti-arthritic agents where there is no satisfactory cure in modern medicines (Megha G. *et al*., 2013).

Inflammatory and infectious diseases are the most prevalent conditions leading to poor quality of life (Oz, 2017). The commonly used drugs for the management of inflammatory conditions are nonsteroidal anti-inflammatory drugs (NSAIDs) which have several side effects especially gastric irritation leading to the formation of gastric ulcers. Instead of side effects causing NSAIDs, the rich wealth of plant kingdom has been used to

represent a novel source of compounds with antiinflammatory activities (Chatterjee *et al*., 2012). Bacterial infections are the most common cause of inflammatory conditions and having a strong relationship that leads to find substituents that elicit both antibacterial and anti-inflammatory effects (Park *et al*., 2004). The emergence of new infectious diseases, the resurgence of several infections and the increase in bacterial resistance have created the necessity for studies directed towards the development of new antimicrobial agents (Valgas *et al*., 2007).

Magnolia figo is a plant belongs to Magnoliaceae family rich with secondary metabolites like alkaloids, polyphenols, tannins. Hence *M. figo* was selected and in *vitro* anti-inflammatory and antibacterial activity of methanolic extracts of leaves, roots and combination of both leaves and roots extracts of *M. figo* was evaluated in this study.

Methodology:

About 800 g of each matured, fully expanded leaves and roots of *M. figo* were collected in fresh condition at day time. Selected plant materials were thoroughly cleaned using running tap water and air-dried until a constant weight was obtained. The dried leaves were ground well to obtain fine powder form. Well dried and blended powder samples of each plant material were taken for the extraction procedure. The methanolic extract was obtained by cold maceration with 1000 mL of 80% methanol. Erlenmeyer flask was used to obtain a hydro alcoholic crude extract and it was stirred for 7 days at room temperature. The alcohol was distilled off and concentrated to a dry residue by evaporating the water from the filtrate using a rotary evaporator under reduced pressure.

For the anti-inflammatory study, plant samples were compared with diclofenac sodium under the same concentration. The dilution series (1000, 500, 250, 125, 62.5, 31.25, 15.625, 7.8125, 3.9, 1.95, 1, 0.5 µg/mL) of reference drug sample and the plant extracts were prepared. A similar volume of double distilled water was used as negative control. This process was carried out by using ELISA plate reader. A flat bottom ELISA plate which has 96 wells where each well consisted 300µl of reaction mixture was used for the evaluation. The mixtures were placed in an incubator at 37 °C (37±2°C) for 10 to 15 minutes. Denaturation process was induced by increasing the temperature gradually up to 57 °C in the laboratory oven. Samples were allowed to cool down to room temperature at 30 °C. After cooling down, the absorbance was measured at 660 nm using ELISA plate reader. The percentage inhibition of protein denaturation for each sample was calculated by using the absorption readings according to equation 100*[Vt/Vc-1] where Vt = absorbance of test sample and Vc = absorbance of control.

In the antibacterial studies, a serial dilution was prepared by re-dissolving crude extract in DMSO starting from 1500 µg/mL filtrate up to 250 µg/ml. Cylinder plate method was used to evaluate the antibacterial activity. DMSO was used as negative control while gentamicin was used as positive control. Mueller-Hinton agar was used as the culture media to determine antibacterial activity of *Staphylococcus aureus* (ATCC® 25923™) and *Escherichia coli* (ATCC® 25922™). The antibacterial activity was examined in triplicate for each sample and the diameter of the inhibition zone (in mm) for the extracts against the above-mentioned bacterial strains was measured and recorded.

The two extracts which were prepared by using only roots and combination of both leaves and roots were subjected to phytochemical analysis to detect the availability of the following secondary metabolites; flavonoids, carbohydrates, tannins, saponins, alkaloids, glycosides, phenols, terpenoids, amino acids and proteins and steroids.

Results and discussion Anti-inflammatory results:

Percentage inhibition of each plant extract and reference drug (diclofenac sodium) is summarized in Table 1. Data were calculated using the absorbance readings and represented as mean ± SEM. According to the results, combination extract showed the highest percentage inhibition compared to the other two extracts.

Table 1 - Percentage inhibition for extract samples of M. figo plant parts and reference drug

Concentrations (µg/mL)	Leaves	Roots	Combination	Reference Drug (Diclofenac Na)
1000	86.365 ± 12.2	61.389 ± 7.5	97.895 ± 25.3	96.128 ± 0.3
500	85.299 ± 7.3	58.977 ± 9.9	93.468 ± 8.6	95.674 ± 3.6
250	61.293 ± 1.3	56.345 ± 6.5	82.418 ± 19.8	89.002 ± 1.0
125	61.151 ± 3.5	66.910 ± 3.1	81.748 ± 15.8	90.377 ± 11.1
62.5	62.225 ± 2.3	41.983 ± 5.7	79.179 ± 12.0	76.992 ± 0.4
31.25	64.140 ± 0.76	47.908 ± 16.6	66.236 ± 10.1	70.808 ± 3.5
15.625	36.679 ± 6.62	43.465 ± 1.1	68.74 ± 16.2	68.732 ± 1.8
7.8125	20.282 ± 0.76	20.887 ± 2.1	54.684 ± 11.7	64.329 ± 0.7
3.9	9.877 ± 1.32	16.387 ± 0.1	38.86 ± 12.367	41.518 ± 11.2
1.95	6.363 ± 5.51	27.125 ± 2.8	25.239 ± 23.3	20.945 ± 0.1
1	0.324 ± 0.76	31.956 ± 1.2	21.421 ± 17.2	15.129 ± 6.1
0.5	0.216 ± 0.23	10.891 ± 3.6	18.364 ± 18.6	11.614 ± 0.2

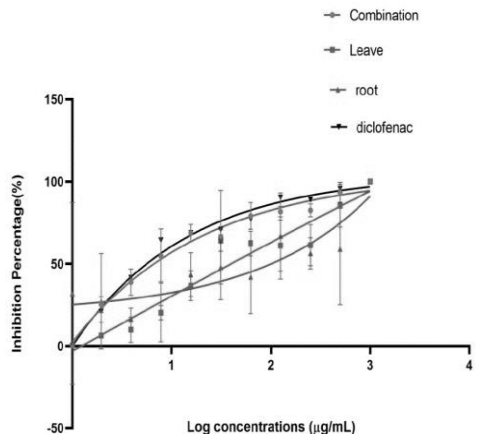

Figure 1 - Dose-response curves for anti-inflammatory properties of the M. figo plant leaves, roots and combination extracts and reference drug (diclofenac sodium) based on inhibition percentage.

Percentage inhibition data was used to calculate the dose response curve and the IC_{50} values for each extract. According to the dose-response curves, the combination extract and leaves extract showed highest potency compared to diclofenac sodium. The root extract showed lower potency compared to diclofenac sodium. Reference drug exhibited a higher IC_{50} value and a higher R^2 value than *M. figo* combination extract. The curve of the combination showed a similar pattern to that of the reference drug.

Figure 1 shows that, with the increasing log concentrations of *M. figo* leaves extract, percentage inhibitions were also increasing. A positive strong correlation (r^2=0.8307) between log concentrations and inhibition percentages of leaves extract was shown with an IC50 value of 4.132 µg/mL. Reference drug exhibited a higher IC50 value (4.337 µg/mL) and a higher R-square (r^2=0.9220) value compared to that of M. *figo* leaves extract.

With the increasing log concentrations of M. *figo* roots extract, percentage inhibitions were also increasing. A positive moderate correlation (r^2=0.4422) between log concentration and inhibition percentages were shown with 6.519 µg/mL IC50 value. Reference drug exhibited a lesser IC50 value compared to that of *M. figo* roots extract but higher R-square value than that of the roots extract.

It also showed that, with the increasing log concentrations of M. *figo* combination extract, percentage inhibitions were also increasing. A positive moderate correlation (r^2=0.5684) between log concentration and percentage inhibitions were shown with 1.819 µg/mL IC50 value. Reference drug exhibited a higher IC50 value and a higher R-square value than M. *figo* combination extract. The curve of the combination showed a similar pattern to that of the reference drug.

According to the Figure 1, combination extract and leaves extract showed higher potencies compared to diclofenac sodium. Roots extract showed lower potency compared to diclofenac sodium. (Details are given in the Table 2)

Table 2 - Details of the dose-response curves of reference drug and M. figo leaves, roots and combination (leaves, roots)

Tabular results	Leaves	Roots	Combination	Reference drug (Diclofenac Na)
IC_{50} (µg/mL)	4.132	6.519	1.819	4.337
R-square	0.8307	0.4422	0.5684	0.9220
P value	<0.0001	<0.0001	<0.0001	<0.0001

Calculation of diclofenac sodium equivalents and milligrams of leaves, roots and combination extracts of *M. figo* reveals that anti-inflammatory activity of leaves of *M. figo* was found to be 1.0496 g diclofenac equivalents / gram (g) of the extract, anti-inflammatory activity of roots of *M. figo* was found to be 0.6653 g diclofenac equivalents / gram (g) of the extract and anti-inflammatory activity of roots of *M. figo* was found to be 0.6653 g diclofenac equivalents / gram (g) of the extract.

Antibacterial study results

The results of antibacterial activity screening are summarized in Table 3 and Table 4.

Table 3 - Antibacterial effect of methanolic leaves, roots and combination extracts of M. figo against E. Coli.

I → Concentrations Zone of inhibitions of *Magnolia figo* plant parts (µg/mL)

	Leaves	Roots	Combination
1500	15.10±0.12	14.45±0.35	15.30±0.04
1000	14.14±0.34	14.11±0.13	15.31±0.18
750	13.21±0.20	12.52±0.15	14.51±0.50
500	12.20±0.25	12.63±0.15	13.47±0.17
250	10.86±0.22	11.47±0.21	12.92±0.60
Positive control	30.84±1.19	28.61±2.06	29.78±1.98
Negative control	10.18±0.05	10.21±0.34	10.33±0.30

Table 4- Antibacterial effect of methanolic leaves, roots and combination extracts of M. figo against S. aureus

II → Concentrations Zone of inhibitions of *Magnolia figo* plant parts (µg/mL)

	Leaves	Roots	Combination
1500	10.33 ± 0.3	10.66 ± 0.2	9.96 ± 0.2
1000	10.15 ± 0.3	10.61 ± 0.2	10.22 ± 0.3
750	10.28 ±0.5	10.52 ± 0.2	10.44 ± 0.4
500	10.54 ± 0.1	10.36 ± 0.3	10.34 ± 0.3
250	10.12 ± 0.1	10.51 ± 0.1	10.26 ± 0.2
Positive control	30.84 ± 1.2	30.16 ± 2.0	28.37 ± 2.1
Negative control	10.18 ± 0.1	10.22 ± 0.8	10.33 ± 0.3

Data is expressed as, mean inhibitory diameter ±SEM

Positive control - Gentamycin 50 µg/ml

Negative control - DMSO (Dimethyl Sulfoxide)

Dose-response curves of methanolic leaves, roots and combination extracts of *M. Figo* against *E. Coli* is given in Figure 2.

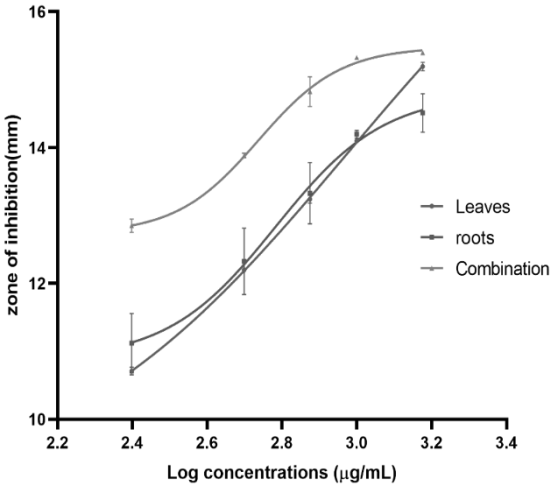

Figure 2 - Dose-response curves of methanolic leaves, roots and combination extracts of M. figo against E. coli

Results of our study show that the methanolic combination extract exhibited highest zone of inhibition (15.30 mm) against gram-negative

E. *coli.* Roots extract of *M. figo* exhibited lowest inhibition *(*14.45 mm*)* against gram negative *E. coli.* Accordingly, concentrations of the extracts have shown a positive correlation with zone of inhibition against E. *coli with* R^2 values equal to 0.99. Analysis of the data obtained from dose response study *(*figure 2*)* reveals that, the highest EC_{50} value *(*946.5 µg/mL*)* against E. *coli* is exhibited by the methanolic leaves extract whereas lowest EC_{50} value *(*536.2 µg/mL*)* against E. *coli* was obtained from methanolic combination extract. According to all these results, methanolic extracts of leaves, roots and combination of *M. figo* have shown positive antibacterial response against gram-negative bacteria *E. coli* and negative antibacterial response against gram-positive bacteria namely *S. aureus.* This indicates that leaves, roots and combination of *M. figo* extracts possess gram-negative antibacterial spectrum. It is advantageous to discover a novel antibacterial medicine to overcome the antibiotic drug resistance which is a problem at present.

The highest effect of anti-inflammatory activity was shown by the combination extract of *M. figo* followed by its leaves extract, the root extract and the highest effect of antibacterial activity was also shown by the combination extract of *M. figo* followed by its root extract and leaves extract. Variable presence of phytoconstituents in different parts of the plant such as roots and leaves might have been the reason for the above observations.

Results of phytochemical profile of methanolic extracts of roots and combination of leaves and roots of plant *M. figo* are expressed in table 5. The results are exhibited as the presence and the absence of bioactive compound (+) and (-) respectively and are given in Table 5.

Table 5- The results of the phytochemical analysis

Phytochemical	Test	Results	
		Root	Combination (leaves+roots)
Flavonoids	Alkaline Reagent test	+	++
Carbohydrates	Molisch Reagent test	+++	+++
Tannins	Braymer's test	+	+++
Saponins	Froth test	-	++
Alkaloids	Wagner's test	+	+++
Glycosides	Keller-Kiliani test	-	++
Phenols	Ellagic acid test	+	+++
Amino acids and proteins	Ninhydrin test	+++	+++
Terpenoids	Salkowski test	-	+
Steroids	Liberman Burchard test	++	+

Mild presence: (+), Moderate presence: (++), High presence: (+++)

According to the findings of phytochemical studies, the presence of higher amounts of phenols, flavonoids, tannins, saponins, terpenoids, steroidal glycosides and alkaloids in combination extract was shown compared to the other two extracts of the plants. As such, it can be assumed that the above secondary metabolites have caused the synergistic effect in the combination extract.

Conclusion

This study showed that methanolic extracts of *M. figo* plant parts (leaves, roots) have marked *in vitro* dose-dependent anti-inflammatory activity and antibacterial activity. The anti-inflammatory activity of methanolic leaves and combination extracts of plant were more potent than the reference drug. *M. figo* extracts showed marked antibacterial activity against *E. coli*, but not as effective as the reference drug (gentamicin). Synergistic effect may be due to the secondary metabolites present in *M. figo* plant. Further studies are necessary to

ascertain the mechanism and the active constituents responsible for the anti-inflammatory and antibacterial activities of the methanolic extracts of plant parts of *M. figo*.

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Determination of Gender using Measurements of the Mandible taken from Orthopantomogram and Cephalogram

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Abstract:-Determining of age is essential in forensic and medico legal practices. Most dimorphic bone of the skull is mandible. Therefore, in sex estimation, mandible plays a dominant role. Since the measurements of the mandible vary with the ethnicity, it is important to evaluate the measurements of the mandible which are important in determining gender for a Sri Lankan population. The aim of this study was to determine the gender using measurements of mandible taken from orthopantomogram and cephalogram. This prospective cross sectional study was conducted among 116 SriLankan Sinhala patients (female 93, male 23) who underwent both orthopantomography (OPG) and lateral cephalometric examination at National Dental Teaching Hospital, Colombo 07. Maximum and minimum ramus breadth, condylar height, projective height, ramus height, coronoid height, biogonial width were taken from the OPG image and gonial angle was taken from the lateral cephalometry using left mandible of the patient. According to the statistical analysis, mean values of maximum ramus breadth, minimum ramus breadth, condylar height, projective height, ramus height, coronoid height, biogonial width of males were higher than females. Mean value of gonial angle of males were lower than females. Projective height was the most significant predictor in determining gender (P=0.000). Among the sample, 67.2% predicted the gender accurately using the prediction model found in the present study. 67.7% were predicted as females and 60.9% were predicted as males accurately. In conclusion, the most reliable measurement of the mandible is projective height in determining the gender of a Sinhala population in SriLanka.

Keywords: Gender, Mandible, Orthopantomography, Cephalometry

Introduction:

Age and gender estimation of individuals plays an important role in issues related to immigration, child labour and forensic sciences. Age and gender are the information that is vital to determine the identity in cases where visual recognition is not possible. The role of aging and gender changing in forensic investigations are not limited only to identification. In addition to the identification, age and gender changes can also be utilized in the context of crime investigation, chemical and nuclear bomb explosions, natural disasters, and ethical studies (Bhagwatkar et al., 2016).

To determine the gender, physical and chemical methods are used. As chemical methods DNA test is the accurate method. As physical methods, identification of the skeletal remainders is a very significant step in medico-legal investigations.

Numerous markers on a human skeleton can be used to assessment the sex of the deceased. Sexual dimorphism as seen in the human skeleton can be resolute by using skull, dentition, pelvic and dimorphism. Among

those, skull and pelvic bone are the two most commonly used skeletal markers. Most of the time parts of the pelvis and skull are used for the sex and age determination. Presence of a dense layer of compact bones makes it strong and well unspoiled than many other bones (David et al., 2012).

When the entire adult skeleton is available for analysis, sex can be determined up to 100% accuracy, but in vast disasters or fetal incidents where the loss of the pelvic region, the skull is playing a vital role in sex determination. Skull is the most dimorphic and easily sexed portion of skeleton after pelvis providing accuracy up to 92%. But in a case where intact skull is not found mandible may play a vital role in sex determination as it is the most dimorphic, largest and strongest bone of the skull (David et al., 2012).

Moreover, the morphological changes of the mandible are raised by the occlusal status and age of the subject where longitudinal studies have proposed that remodeling of the mandibular bone occur with age. With 100% accuracy, sex and age are recognized even by the even measurements of mandible (Markande, David and Indira, 2012).

Two main methods can be used to take the measurements of the mandible called, physical method and radiographic method. For the physical method dry mandible which is clearly visualized the anatomical features (Graduate Trainee and Resident, 2017). In radiological method intra oral radiographs, lateral mandible oblique radiographs, orthopantomography (OPG) radiograph, lateral cephalometry and postero-anterior (PA) cephalometry radiographs can be used.

According to the some studies, the mandibular measurements are vary with the ethnicity (Graduate Trainee and Resident, 2017). Therefore, forensic medical professionals in Sri Lanka can't use the measurement values given by the researches in other countries in determining gender using the mandibular measurements. The objectives are to estimate the gender of a known person using the measurements of the mandible for Sri Lankan Sinhala population and to determine the most reliable measurement/s of the mandible can be used to determine the gender (Leversha et al., 2016, Radhakrishnan, Sapna Varma and Ajith, 2017).

Methodology:

This prospective cross sectional study was conducted among 116 Sri Lankan Sinhala patients (female 93, male 23) who underwent both orthopantomography (OPG) and lateral cephalometric examination at National Dental Teaching Hospital, Colombo 07. Panoramic and cephalometry images were collected using via CS 3900 trophy Digital Imaging and Communications in Medicine (DICOM) - 6.4.0.4 software. imageJ windows version software were used to take all the measurements of the mandible. The maximum ramus breadth (A), minimum ramus breadth (B), condylar height (C), height of ramus (D), coronoid height (E), projective height (G) and biogonial

width (H) were taken by orthopantomogram and gonial angle (F) was taken by lateral cephalomerty of the left mandible. Figure 1.1 and 1.2 illustrate the above mentioned measurements.

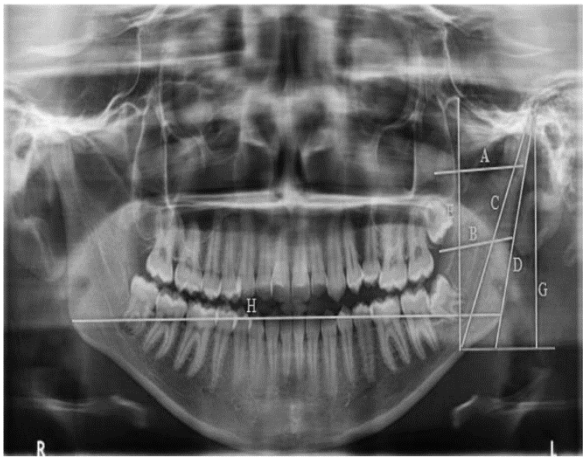

Figure 1 - Measurements taken on OPG radiograph

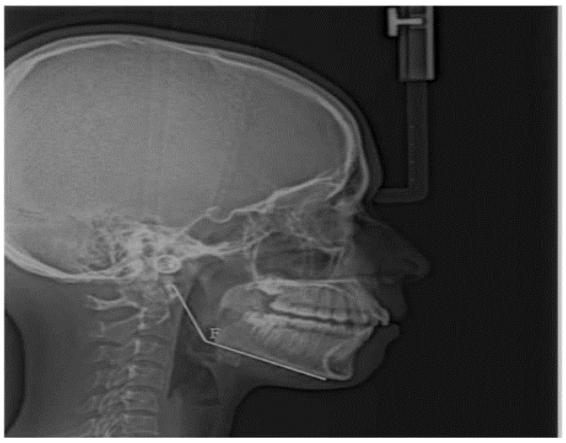

Figure 2 - Measurements taken on lateral cephalometry radiograph

Result

Descriptive statistics analyze was used to find minimum, maximum, mean, standard deviation (SD) and median values. Kolmogorov-Smirnov normality test was used to find the normality of the distribution significant p value (p> 0.05). According to the results of the KolmogorovSmirnov test, the data set follows a normal distribution.Interclass correlation coefficients were used to determine the reliability of both collectors' rates. Reliability result shows no significant difference among those both collectors', therefore only one data set used to analyze the results.Independent sample t test was performed to compare the difference of means between 2 gender groups. According to the results of Independent sample t test Minimum ramus breadth, Condylar height, Projective height, Coronoid height and Height of ramus significantly differ between males and females (P<0.05). A discriminant function analysis was performed to create a prediction model to predict the gender of a person. Significant mean differences between males and females were found for above five measurements.

According to the wilk's lambda test statistic all 5 variables which were found to be significantly different between two gender groups , were significantly contribute to the proposed prediction model also.

Table 1 - Test of equality of group means

	Wilk's lambda	F	df1	df2	Sig.
Minimum ramus breadth	.960	4.795	1	114	.031
Condylar height	.913	10.878	1	114	.001
Projective height	.888	14.393	1	114	.000
Coronoid height	.890	14.131	1	114	.000
Height of ramus	.932	8.372	1	114	.005

Moreover, table 1.2 demonstrates the relative importance of the variables to the proposed model

Table 2 - Standardized Canonical Discriminant Functions coefficient

	Function
	1
Minimum ramus breadth	.323
Condylar height	-.2.072
Projective height	1.730
Coronoid height	.725
Height of ramus	.393

Although all five measurements play a significance importance to the model, projective height had the highest importance indicated by Canonical discriminant Functions coefficient of 1.730. According to the unstandardized canonical discriminant function coefficients (table 1.3) a discriminant function equation can be derived as below.

D=-7.953+0.063X1-0.256X2+0.211X3+0.089X4+0.053X5

D= Predicted Class Intercept = (-0.793)

X1 = Minimum ramus breadth

X2 = Condylar height

X3 = Projective height X4 = Coronoid height

X5 = Height of ramus

Table 3 - Unstandardized Canonical discriminant Functions coefficient

	function
	1
Minimum ramus breadth	.063
Condylar height	-.256
Projective height	.211
Coronoid height	.089
Height of ramus	.053
(Constant)	-7.953

Discussion:

Result of the study is concerned statistically, except gonial angle measurements, all other seven measurements of the mandible(maximum Ramus breadth: male 47.72mm and female 45.51mm, minimum ramus breadth: male 34.50mm and female 31.88mm, condylar height: male 91.38mm and female 85.16mm, projective height: male 86.47mm and female 79.23mm, coronoid ramus height: male 88.32mm and female 81.18mm, height of ramus: male 73.70mm and female 68.67mm, biogonial width male 214.15mm and female 205.10mm) is higher in males than females. Only gonial angle measurement (female 134.37o and male 132.37o) is higher than males. Most reliable measurement is expressed as projective height through discriminant function analysis. According to the prediction equation, 67.2% overall accuracy can be gained. Males can be predication as 60.9% correctly. Likewise, correct prediction of females is 67.7%. Projective height is the most significant parameter for the Sri Lankan population. The sensitivity of the proposed model is 67.7 % and the specificity is 60.9%.

As respects the gonial angle, males exposed statistically significant lower mean gonial angle standards than females (132.37o and 134.37o respectively). This was in covenant with many researchers. Hence, the gonial angle values in females were higher than in males. According to the ethnicity, mandibular angle differs among various population (119o) in Indian, Chinese and Peruvian mandibles, (110°) in that of the Neanderthals, (128o) in the European population, (120o) in Xanthoderms and African Negroes and (124o).

This study Saini et al., (2011) revealed important factors on with the study regarding to the mandibular measurements taken from Northern Indian population. It consisted of 92 males and 24 females with 37.4 years mean age. In case of all males, all the metric parameters were higher than females (Coronoid height: male61.68 mm and female 54.89, projective height: male 53.89 and female 47.45, condylar height: male 60.67 and female 54.46, maximum breadth: male 42.81 and f e male 40.34 and minimum breadth: male 31.29 and female 29.65). While it purposed the 80.2% overall accuracy, significant sexual dimorphism could be seen.

Another study Indira et al., (2012) was done in Bangalore population in to this regard. In this study, all linear ramus dimensions were taken from Orthopantomographs were higher in males than females significantly. 50 males and 50 females participated within 20-50 years age group. (Coronoid height: 119.70 mm and 111.15, projective ramus 26 height: 129.05 and 120.82, condylar height: 131.30 and 123.27, maximum breadth: 74.20 and 68.98 and minimum breadth:

51.35 and 46.96 in males and females respectively). 76% of the cases were classified correctly.

Conclusion:

For determination of gender, applicable measurement of the mandible is projective height. The results of this study will contribute in the medico-legal practice in Sri Lanka for determination of gender in Sinhala population.

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Correlation between Liver Fat Indices and Ultrasonography to determine NAFLD among Diabetic patients.

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Abstract:-Non Alcoholic Fatty Liver Disease (NAFLD) and Diabetes Mellitus (mainly Type 2 Diabetes Mellitus – T2DM) strongly coexist with each other as both share common pathophysiological conditions that causes an imbalance in homeostasis. Non-invasive scores have been introduced to detect NAFLD using routine biochemical investigations and anthropometric measurements which provides simple, cost effective and patient friendly means of diagnosing fatty liver. Determination of the incidence of NAFLD patients at the Diabetic clinic, Colombo South Teaching Hospital and Association between ultrasonography based diagnosis of fatty liver with the two liver fat indices – Hepatic Steatosis index (HSI) and Fatty Liver Index (FLI) were the main objectives of this research. The study was a cross-sectional analytical study conducted involving 100 newly diagnosed diabetic patients selected using exclusion and inclusion criteria. Socio-demographic data, patient history and medical history was obtained using an interviewer based questionnaire. Anthropometric measurements were collected using standard methods. Blood was collected to conduct biochemical investigations and each participant underwent an ultrasounds scan to diagnose and stage fatty liver. The data were analyzed statistically. The incidence of NAFLD among T2DM was 82%. There was a significant correlation ($p<0.05$) between Ultrasonography results of NAFLD with HSI. The study also found a highly significant correlation ($p<0.001$) between ultrasonography results of NAFLD with FLI and also determined that it shows a significant difference between the categories; No fatty liver and grade 2 fatty liver or above which makes it a suitable marker to predict the presence or absence of fatty liver in Diabetic patients.

Keywords: Non-alcoholic Fatty Liver Disease, Diabetic Mellitus, Ultrasonography, Fatty Liver Index, Hepatic Steatosis Index

Introduction:

Non-alcoholic fatty liver disease (NAFLD) is one of the most important causes for chronic liver diseases worldwide and it is predicted to be one of the leading causes of end stage liver disease in the future as it affects the population irrespective of age; adults or children (Younossi et al., 2017) and according to the World Gastroenterology Organization, it is considered to be the hepatic presentation of metabolic syndrome – Diseases related to Type 2 Diabetes Mellitus (T2DM), insulin resistance, obesity, hyperlipidemia and hypertension. Diabetes Mellitus is a group of metabolic disorders characterized by hyperglycemia which negatively affects the insulin secretion, insulin action or both (Diagnosis and Classification of Diabetic Mellitus, 2009).

NAFLD and Diabetic Mellitus (mainly Type 2 Diabetic Mellitus – T2DM) show a strong

association with each other as they share common pathophysiological conditions – insulin resistance and level of adiposity (Obika and Noguchi, 2012). The prevalence of NAFLD in Diabetic patients has shown to be significantly high and thereby increasing the necessity of determining the affected population to prevent health deterioration (Williamson et al., 2011).

Examination for NAFLD is mainly done due to abnormal liver function tests and the gold standard for detecting NAFLD is liver biopsy which is invasive and can cause complications. The most common technique used at present is Ultrasonography along with many other radiological approaches like Computed topography (CT) and Magnetic resonance imaging (MRI) scan (Lv et al., 2018) and it could be unaffordable to screen the Sri Lankan Population in general. Therefore there is a need of developing more simple, routine biomarker panels and validate the existing liver fat indices according to the requirements of the local population to easily predict NAFLD to reduce the disease burden. Several liver fat indices – Fatty liver Index (Bedogni et al., 2006), Hepatic Steatosis Index (Lee et al., 2010) etc. have been introduced in the recent years and are being validated for the general population for each country.

Determination of the incidence of NAFLD among the diabetic patients at the Diabetic clinic in Colombo South Teaching Hospital, Kalubowila and the determination of the association between the Ultrasonography based diagnosis of Fatty Liver and the two liver fat indices used – Fatty Liver Index (FLI), Hepatic Steatosis Index (HSI) were the main objectives of the present study.

Methodolog:

The study is a cross sectional analytical study conducted on newly diagnosed diabetic patients aged between 20 – 65 years attending the Diabetic clinic at Colombo South Teaching Hospital, Kalubowila between August and December, 2019 (n=100). All the participants were selected following an inclusion and exclusion criteria considering medications, alcohol consumption, medical history, pregnancy. Ultrasounds scan performed on the participants to diagnose and stage fatty liver. Two liver fat indices namely, Hepatic Steatosis index – HSI and Fatty Liver Index – FLI were used in the study. They were calculated using necessary anthropometric measurements – weight, height, BMI, waist Circumference and biochemical investigations including Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Gamma Glutamyl transferase (GGT) and Triglyceride level. Data analysis was conducted using the statistical software SPSS version 23.0.

HSI = 8 * (ALT/AST) + BMI + 2, *if T2DM*; + 2, *if female*

$$FLI = (e^{0.953 * \log_e(\text{triglycerides}) + 0.139 * BMI + 0.718 * \log_e(GGT) + 0.053 * \text{waist circumference} - 15.745}) / (1+e^{0.953 * \log_e(\text{triglycerides}) + 0.139 * BMI + 0.718 * \log_e(GGT) + 0.053 * \text{waist circumference} - 15.745}) * 100$$

Table 1 - Categorization of continuous variables

Variables	Categories
Age (Years)	25 – 40
	41 – 55
	≥ 56
BMI (Asian Categorization)	< 18.5 (Underweight)
	18.5 – 22.9 (Normal weight)
	23 – 24.9 (Overweight)
	25 – 29.9 (Pre obese)
	≥ 30 (Obese)
HSI	< 30 (Ruled out fatty liver)
	31 – 35 (Risk for fatty liver)
	≥ 36 (Ruled in fatty liver)
FLI	< 30 (Ruled out fatty liver)
	31 – 59 (Risk for fatty liver)
	≥ 60 (Ruled in fatty liver)

Results:

The incidence of NAFLD among the one hundred type 2 diabetic patients participated in the study was 82% and the rest (18%) were diagnosed with no fatty liver according to the supportive studies (Fedchuk et al., 2014;

Ciardullo et al., 2019). The distribution of the patients related to the categorization of ultrasounds scan results with scores of the two indices each is shown in the boxplots below.

Figure 1 - Boxplot FLI of vs. USS

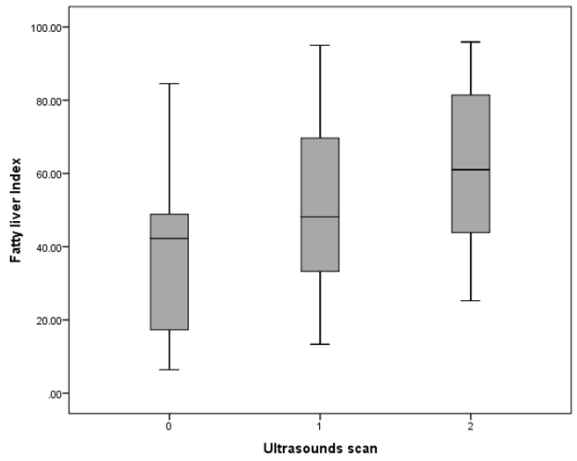
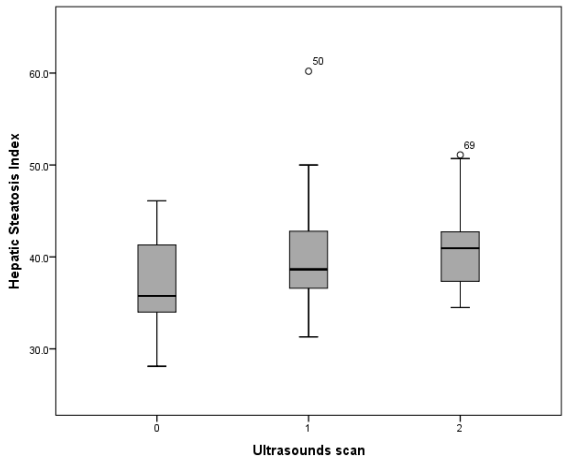


Figure 2 - Boxplot of HSI vs. USS



Mean comparisons of the liver fat indices showed higher values: FLI with a mean of 57.2 ± 21.6 and HSI with 40.3 ± 4.8 and it corroborates with similar studies (Fedchuk et al, 2014).

The correlation between the two liver fat indices and the ultrasounds scan was statistically analyzed.

Table 2 - Correlation of USS with HSI and FLI

		HSI	FLI
Ultrasounds scan	r value	0.233	0.317
	p value	0.02	0.001

In the present study, a moderately significant correlation; with a coefficient correlation of 0.233, was found between hepatic steatosis index and ultrasounds scan ultrasounds scan ($p < 0.05$). 81.7% (n = 67) of the diabetic patients with fatty liver participated in this study showed positive results which ruled in fatty liver according to the scoring system used in HSI corroborates with similar studies conducted (Singh et al., 2017) but the results of the study also showed that 50% (n = 9) of the diabetic patients without no fatty liver gives a score that predicts as presence of fatty liver through HSI.

The results obtained showed that the fatty liver index shows a highly significant correlation ($p<0.001$) which was also found in a similar study (Koehler et al., 2012). The percentage of the diabetic population with fatty liver that showed normal value in FLI (<30) was 11% (n = 9) while the rest of the population (n = 73) gave intermediate (42.7%) and positive (46.3%) results in FLI for fatty liver and align with other findings (Forlani et al., 2016)

The two indices were further analyzed against the grade of the fatty liver diagnosed through the ultrasounds scan. The fatty liver index showed a high significance as shown below.

Table 3 - Comparison of the grade of fatty liver with FLI

			Mean difference	95% CI	Significance
Ultrasounds scan	Grade 2 fatty liver or above	No fatty liver	24.45049	10.4126 – 38.4884	0.00213

There was a significant difference among the categories considered, $F(2, 97) = 9.039$, $p < 0.001$. It revealed that there is a significant difference between the categories of Grade 2 fatty liver or above (Mean ± SD = 61.746 ± 20.184) and No fatty liver (Mean ± SD = 37.2956 ± 22.89627) than the other categories. These findings indicate that fatty liver index

can be used to predict fatty liver more precisely between patients without fatty liver and patients with Grade 2 fatty liver or above.

Conclusion

The current study showed a higher incidence of NAFLD in the diabetic patients. There was a moderate significance between HSI and ultrasounds scan a highly significant correlation was observed between FLI and Ultrasounds scan results that could predict the presence or absence of fatty liver in diabetic patients (T2DM). It also provided that the association between FLI and Ultrasonography was able to predict the patients without fatty liver and patients with Grade 2 fatty liver or above more precisely according to the scores given to the index. Therefore it can be concluded that, according to the present study FLI and HSI can be used as cost-effective, non-invasive and simple markers to predict NAFLD in diabetic patients which allowing the early detection and prevention of chronic complications that would deteriorate health status of an individual.

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Correlation between Hemoglobin Concentration and Absolute Reticulocyte count of adolescent female iron deficient patients at Colombo north teaching hospital.

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Abstract:-Iron deficiency can be identified as the most common micro-nutrient disorder and cause of anemia. Most frequently occurred in children under the age of 5 years, females of childbearing age and pregnant women. Study population comprised of untreated female patients, between 15-35 years of age (n=111) with Iron deficiency due to nutritional deficiency; from Thalassemia unit, Colombo North teaching hospital. In order to generate a comparison, of the correlations in a healthy person and an Iron deficient patient, a control population (n=60) were selected according age and gender matched patient population. The Thalassemia unit was chosen, as those patients who could make a major effect on hemoglobin levels, could be eliminated. Blood from the selected patients were collected for Full blood count analysis with Reticulocyte count and Serum Ferritin analysis. The Pearson's moment correlation of coefficient (r) of patient population (n=111); between Hb and Abs.Retic is r = - 0.432, a moderate negative correlation (t-test: P=0.000 < 0.01), between Hb and S. Ferritin r = 0.570, a strong positive correlation (t-test: P=0.000 < 0.01), between Abs.Retic count and S. Ferritin r= -0.268, a weak negative correlation (t-test: P=0.000 < 0.01). There were no correlations between parameters of control population. The Hb sub-group 9- 9.9 g/dL of patient population contributed to the significant strong negative correlation (t-test: r=-0.717; P=0.000<0.05) among all the groups. The results of our study shows that the body starts to present iron deficiency (ID) features (Microcytosis, Hypochromasia) in blood picture below Hb value 11.1 g/dL level. Although, above the 11.1 g/dL of Hb the ID features in blood picture is not prominent there are symptoms of ID. At the Hb range 9 – 9.9 g/dL the Abs.Retic count increases by about 6.804 x 10^{10}/L which could be identified as an attempt of compensating the bone marrow in reduction of RBC production, in Iron deficiency anemia.

Keywords: Iron deficiency anemia, Serum Ferritin, Absolute Reticulocyte count, Correlation, ID symptoms

Introduction:

Iron deficiency can be identified as the most common micro-nutrient disorder and cause of anemia. Most frequently occurred in children under the age of 5 years, females of childbearing age and pregnant women. Nutritional iron deficiency occurs when bio availability of iron is insufficient in dietary supplies to meet the body's requirement (Lynch, 2011). Iron deficiency is the most common nutritional deficiency in the world, and it is a global health problem (Camaschella, 2015; Haas et al., 2001). It is a condition in which the mobilizable iron stores are absent which results in compromised iron supply to tissues including erythrocytes. Pallor fatigue and dyspnea are the most common symptoms of anemia (Iron deficiency anemia, 2001; Dallal et al., 2016).

Sri Lanka too is heavily burdened by the problem of anemia, mostly due to nutritional

deficiency of iron. According to a study done by the medical research institute Sri Lanka in 2001 using a sub sample of 2000 population from the District Hospital System, prevalence of anemia among children age 6 -59 months was 32.6%, prevalence of anemia among non-pregnant women age 15- 49 years was 34.1 % and prevalence of anemia among pregnant women age 15 - 49 was 39.1% (Demographic & Health Survey, 2007). According to the host factors: age, gender, physiological, pathological, socio economic and environmental conditions the prevalence of iron deficiency may vary greatly.

The purpose of this study was to find an association between Hb and Absolute reticulocyte count in patients those who are newly diagnosed of Iron deficiency caused by nutrient deficiency, and to compare the statistical correlations in patient and control populations.

Methodology:

Hundred and seventy one adolescent girls and women of childbearing age (15 to 35 years) were enrolled for the study. The participants who were attending the Thalassemia prevention program, CNTH within the time frame of our data collection were selected by their serum ferritin values, confirmed by the Consultant haematologist CNTH. Individuals with serum ferritin value <20 ng/mL were selected as the patient population (n=111) and individuals with serum ferritin values >20 ng/mL were selected as control population (n=60) based on the study population selection criteria of previous study (Thoradeniya et al, 2005). Patients with ID symptoms, and have been excluded for Thalassemia by the Thalassemia Prevention program, CNTH were identified. Written consent were obtained, ensuring the willingness to participate in the research. Blood samples were collected by the nursing staff of the selected individuals. Questions regarding dietery intake of participants, food habits, nutritional practices, knowledge about ID, ID symptoms if any shown and menstrual problems were queried and certain background knowledge about the patients were obtained.

Individuals with a normal healthy Hb concentration, which have been excluded of Thalassemia by the Thalassemia Prevention program, CNTH, were also selected and above mentioned procedures of obtaining consent and collection of blood samples were done similarly to the patient group.

All the samples from patients and controls were checked for visible hemolysis prior to performing the tests, by holding each sample against a clear white color background.

The tests were carried out within 4 hours of sample collection. The samples for Full blood count with reticulocyte count were analysed in Mindray BC6800 fully automated analyser in CDR mode. Hemoglobin estimation by Colorimetry and RBC estimation by Flowcytometry. The samples for serum ferritin were analysed in VITROS 3600 fully automated immunodiagnostic analyser by immunodiagnostic methods. A manual reticulocyte count analysis was performed for 50 randomly selected samples for confirmation of the automated values. A blood picture analysis was performed for samples with Hb < 10.00 g/dL (14 samples) and 36 more random samples to confirm the exclusion of other anemias.

All data analysis was done using IBM SPSS software version 20 and Microsoft office Excel 2010 software.The statistical analysis that was used in the study was Pearson's correlation coefficient.

Results:

Patient Hb values varied from 6.6 to 14.4 g/dL and Hb values of the control population used in the study vary from 12.1 to 15.1 g/dL Ferritin values vary from 3.81 to 19.9 ng/dL in patient population and Ferritin values of the

healthy control population vary from 20.9 to 84.5 ng/dL. Out of the 111 patients 62 patients have a higher Hb value than 11.9 g/dL (according to WHO criteria < 11.9g/dL Hb, defines as anemic.) but they have low serum ferritin values which indicates them as iron deficient but not anemic. They represent 55.85% of whole patient population that strongly indicates even patients with high Hb values can be iron deficient with symptoms. 44.15% of the patient population have IDA. Their Abs.Retic count vary from 1.5 to $11.1X10^{10}$/L in the patient population.

The Pearson's moment correlation of coefficient (r) value between Hb and Abs.Retic of the patient population (n=111) is - 0.432, which indicates a moderate negative correlation between parameters. The 2 parameters showed a significant statistical difference (t-test: P=0.000 < 0.01).

The Pearson's moment correlation of coefficient between Hb and S. Ferritin (r) value of the patient population is 0.570 which indicates a strong positive correlation between Abs.Retic count and S. Ferritin. The parameters showed a significant statistical difference (t-test: P=0.000 < 0.01).

The Pearson's moment correlation of coefficient between Abs.Retic count and S. Ferritin (r) value of the patient population is -0.268 which indicates a weak negative correlation between parameters. The parameters showed a significant statistical difference (t-test: P=0.000 < 0.01).

None of the correlations showed significant correlations (t test: p value > 0.01) in the control population (n=60). Since the Hb and Ab. Retic count parameters indicated a negative correlation the Hb levels were further grouped according to the WHO criteria for anemia. According to the WHO criteria for non-pregnant women the groups are designed as Hb > 11.9 g/dL; 11.0 < Hb > 11.9 g/dL; 8.0 < Hb > 10.9 g/dL; Hb < 8.0 g/dL. The data were re-analysed by Pearson coefficient correlation to identify which group specifically gives the negative correlation. However, there was no correlation in above groups.

The patients were sub-grouped by reducing the width of the range and 7 subgroups were prepared.

The only significant correlation was obtained in 9.0 to 9.9 g/dL Hb group and it was a strong negative correlation (r= -0.717). There were no correlations observed in any other sub-group. In our patient population we observed that the majority (56%) had normal Hb values (Hb > 11.9 g/dL – non anemic) but low iron stores (serum ferritin < 20 ng/dL) suggesting cellular iron deficiency and iron depletion as indicated in Allen et al. (2017).

Discussion:

Our most significant finding in the ID patient population, is the Pearson's moment correlation of coefficient (r) value between Hb and Abs.Retic of the Patient population (n=111) was - 0.432, which indicates a moderate negative correlation between two parameters fulfils our general objective. Since we achieved a significant correlation and also our Hb range width is comparatively large the range was further divided into groups as shown in Table 4. During the analysis we observed that Hb group 9 - 9.9 g/dL was the only group that contributed to the significant correlation (t-test: r=-0.717; P=0.000<0.05) among all the groups. Such finding has not revealed in the literature to our knowledge. The most probable reason as revealed in literature that nutrient deficiencies specially iron, which is a major necessity for RBC production, decreases RBC production hence the reticulocyte count also decreases, resulting in reticulocytopenia (Thurnham and Northrop-Clewes, 2013).

Conclusion:

But as our finding indicates one level of Hb in ID, shows an increased reticulocyte count, which indicates reticulocytosis which may be

due to the bone marrows attempt of trying to compensate the loss of RBC. In the higher Hb levels (>10 g/dL) and very low Hb levels (< 8.9 g/dL) this compensation process and reticulocytosis cannot be observed.

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Effect of Lidocaine Spray in the Enhancement of the Quality of Intra-Oral Periapical Radiograph when Imaging Lower Third Molar Teeth

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Abstract: Dental radiography is one of the best diagnostic methods used to identify dental diseases and several dental radiographic methods are practised in order to achieve quality images of the specific dental region. In the process of imaging lower third molar region using bisected angle technique (BAT), which is an intra-oral peri apical (IOPA) radiographic method, radiographers and the patients undergo a lot of difficulties. As a result of the difficulty in placing the film packet sufficiently posterior in the mouth cavity, the qualities of the radiographs are contrastively affected and patients tend to experience discomfort and pain. This study introduces an anaesthetic spray, to be sprayed around the oral mucosa of lower third molar region so that above difficulties are minimized. This applied descriptive study is carried out engaging 62 patients in two randomly selected groups as 31 in an experimental group and 31 in a controlled group. Photographs of each radiograph obtained from both the groups were analysed for quality using a quality assessment tool and each patient were given a visual analogue scale for the pain assessment. Results obtained from statistical analysis showed that there was no significant difference between the qualities of radiographs obtained from conventional method and the new method. However, there were significant differences between conventional and new method when the overall opinions of the evaluators and the pain levels were analysed. This study can be considered as a useful supplementary aid in the clinical practise.

Keywords: BAT, IOPA, anaesthetic, evaluators

Introduction:

Oral diseases are common non-communicable diseases which affect people throughout their lifetime, causing pain, discomfort, disfigurement and even death. Dental radiography plays an important role in managing oral diseases. During diagnosis and treatment procedures such as root canal treatment, caries diagnosis, diagnosis and treatment planning of orthodontic patients, dental radiography analysis is mandatory.(Wang *et al.*, 2016) In the oral cavity, lower third molar region is an important region which is vulnerable to much pathology and also creates much difficulty in radiographic imaging due to its anatomical position. Pathological cases such as impacted third molar, acute or chronic periodontitis, caries, pericoronitis and deleterious effects on second molars, may lead to the removal of the third molar.(Marciani, 2007) Therefore radiographic examination of the third molar is very important in diagnosing most of the above pathologies and treatment planning and also in estimating the age of individuals.(Jung and Cho, 2014) Among different radiographic methods, bisected angle technique which is an intra-oral peri apical radiographic method, is widely practised when imaging lower third molar region due to its high convenience. However, the main difficulty in this technique is the placement of the film packet sufficiently

posteriorly to record the entire third molar region (particularly when it is horizontally impacted) and the surrounding tissues including the inferior dental canal. This happens due to anatomical difficulties like large tongue (macroglossia), small mouth (microstomia), tight oral musculature, limited neck movement, narrow dental arches, shallow palate, obesity, and neurological difficulties such as severe gag reflex and anxiety. Hence patient may not hold the film properly. This results in the reduction of the quality of the film and possibly repeating the procedure. (Reddy *et al.*, 2012)

As an alternative, extra oral radiographic (EOR) methods or several modified techniques can be used. But those techniques have their own drawbacks. EOR increases the patient dose due to compensation of source to film distance and decreases resolution and contrast of final images, hence obscure the necessary anatomical details.(Reddy *et al.*, 2012) Newly invented techniques, such as using film placement tags in order to position the film packet inside the mouth cavity, has several disadvantages such as difficulty in mass production of the film tag and maintenance of its sterility.(Rad, 2018)

As a new approach to above problems, this study has implemented a local anaesthetic drug which was sprayed in to the oral mucosa prior to the radiographic examination. This significantly aided in the placement of the film packet sufficiently posterior, so that the entire third mandibular molar and the surrounding tissues including inferior dental nerves were included in the radiograph. This study was aimed to obtain a quality image for lower third molar region effectively using the conventional IOPA method, without replacing it to another alternative radiographic procedure and also to reduce the pain and discomfort experienced by patients during the film packet placement.

Methodology:

The study was conducted as an experimental randomized controlled study involving randomly selected 62 patients who were assigned in to two groups as 31 in a controlled group (CG) and 31 in an experimental group (EG). Patients selected for the CG were subjected to the normal routine procedure. Patients selected for the EG were subjected to the anaesthetic application. A separate written consent was obtained from the EG patients providing necessary information regarding the risks and benefits. Patients were clearly asked for the history of any known allergies for contrast media or other food and drugs.

After the procedure, IOPA radiographs obtained from each group were photographed and they were evaluated by 4 dental surgeons and one radiographer using a quality assessment tool which contains 7 selected qualities (Inclusion of the region of interest in the middle of the film, visibility of the IDN, apices cut off, crown not shown, dropped film corner, image distortions and cone cutting).

Evaluated results were statistically analysed. A three-point scale system was used to obtain the overall quality measurement of the radiograph. Data obtained from a visual analogue scale given to the study subjects, was analysed to find the degree of general discomfort experienced during the examination. Results were analysed using MINITAB 19 Software. Chi square test was used to analyse the quality assessment results obtained via quality assessment tool and two sample t test method was used to analyse the pain assessment results obtained via pain assessment visual analogue scale.

Results and discussion:

Bar graphs were obtained for each evaluator according to the qualities provided in the quality assessment tool to visualize the

difference between the conventional method and the new method

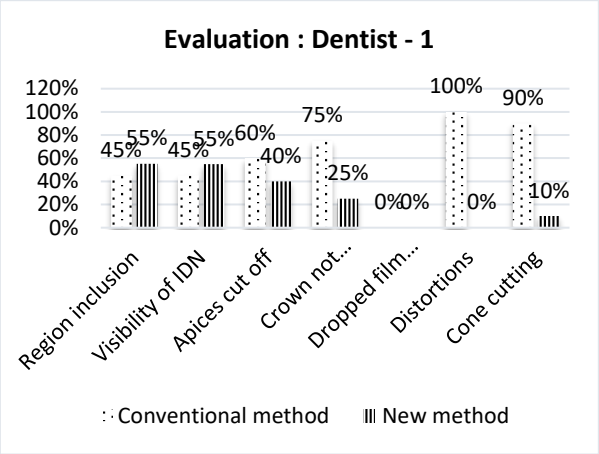

Figure 9: Evaluation 1

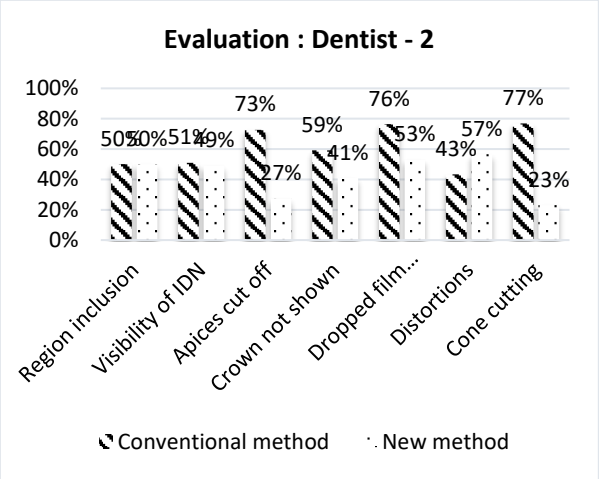

Figure 2: Evaluation 2

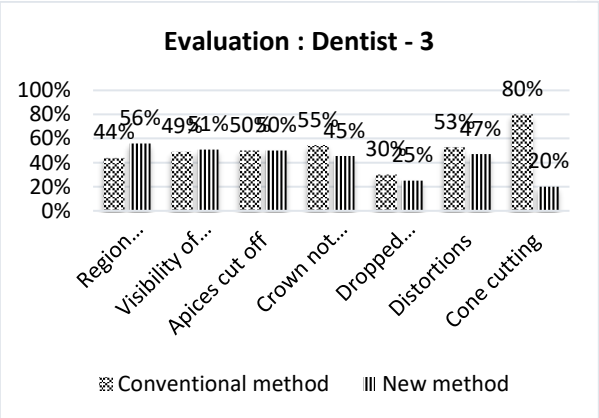

Figure3: Evaluation 3

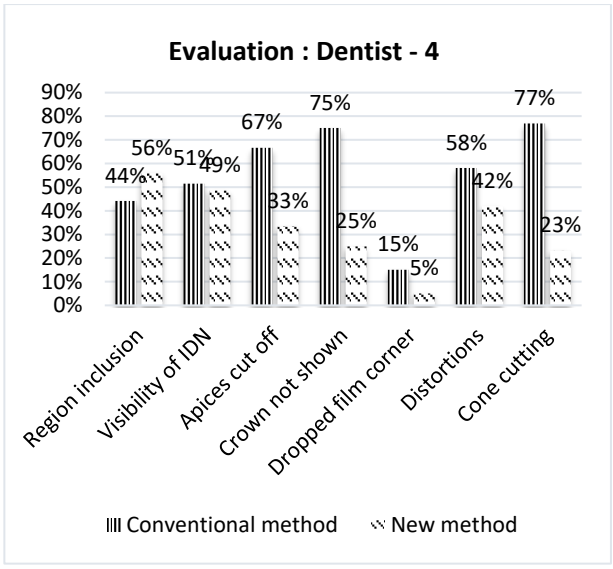

Figure4: Evaluation 4

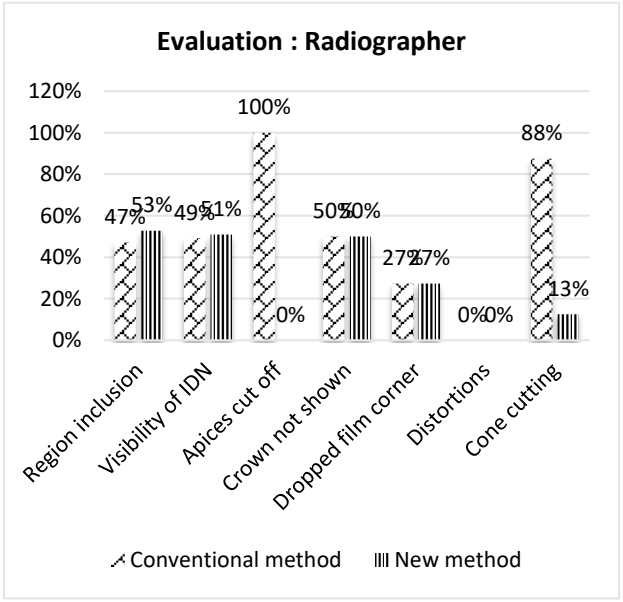

Figure 5: Evaluation 5

Overall results obtained for 'region inclusion' and 'visibility of IDN' shows less difference while overall results of other qualities 'apices cut off', 'crown not shown', 'dropped film corner', 'distortions' and 'cone cutting', show a contrastive difference between conventional and new methods. However, the statistical analysis of the qualities does not show significant difference between the two methods for the selected sample size. (p-value > 0.05)

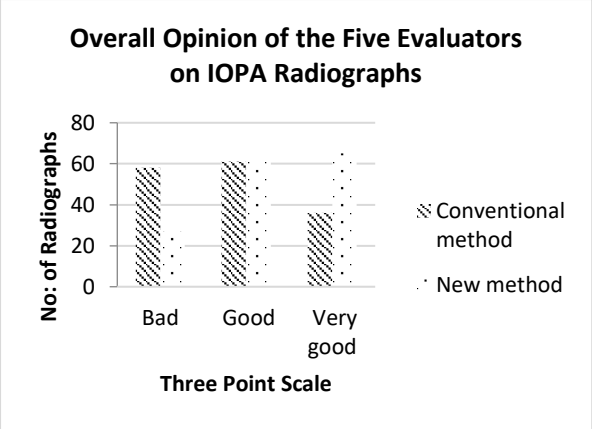

Figure 6: Overall opinion of Evaluators

Statistical analysis of the overall opinion of the evaluators indicates that the positive qualities 'good' and 'very good' show a significant difference between the conventional and new method. (p-value < 0.05) That is, the radiographs obtained using the new method show more positive qualities than radiographs obtained from the conventional method. In case of negative quality 'bad', radiographs obtained from the conventional method show more negative qualities than in new method.

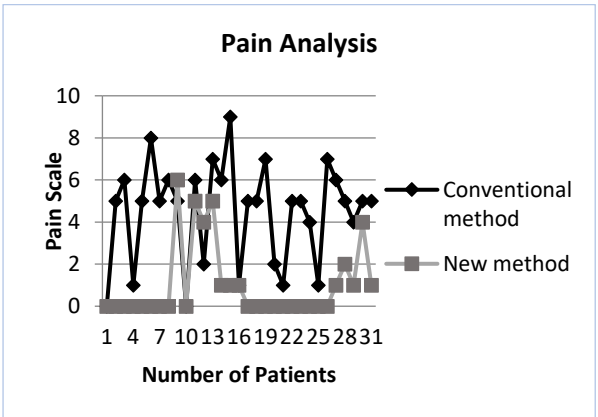

Figure7: Pain Analysis

Results obtained from the statistical analysis of the pain scale, indicated that the mean pain experienced by the patients subjected to new method had a significant difference compared to the pain experienced by the patients subjected to conventional method. (p-value < 0.05) That is, more pain and discomfort was experienced by the patients who were subjected to conventional method than new method.

The proposed method in this study is a highly practical solution. The anesthetic spray significantly aided in the placement of the film packet sufficiently posterior. This helped to include the entire third mandibular molar and the surrounding tissues including inferior dental nerves in the radiograph. Since the gag reflex was absent patient was very cooperative in placing the film packet in the correct position as instructed by the radiographer.

The pain and the general discomfort caused due to the contact of the sharp corners of the film packet in the floor of the mouth cavity were not experienced by the patients. The radiographer also found it very convenient to push the film packet sufficiently inferior so that whole tooth from crown to root is included in the film packet area. This produced a quality radiograph with excellent diagnostic value. A larger sample size would show a significant difference between each given qualities of conventional and new method. The overall opinion of the evaluators was that the radiographs obtained from the new method are better in quality than the radiographs of conventional method. According to the pain assessment obtained, patients subjected to the proposed method marked nearly 0 in the visual analog scale from 0 to 10. That is they had very less pain and discomfort during the film packet placement. Most of the patients subjected to the conventional method experienced a pain which was marked almost above 5 in the visual analog scale. Pain analysis showed statistical difference in between the two methods.

Conclusion:

This is a useful alternative technique and has proved to be effective in patients who are unable to tolerate the conventional technique. This technique might be used in the patients with exaggerate gag reflex, dental phobic patients and especially when patient feels

severe pain when placing the film packet inside the mouth. The advantage of this technique is the increased patient compliance providing images with adequate details and diagnostic quality. The unknown allergies for the anesthetic spray, the temporary altered sense of taste, and pain being highly subjective from patient to patient can be considered as limitations of this technique.

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Health Promoting Lifestyle and Its Associated Factors Among Undergraduate Students in Faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka

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Abstract: Health promoting life style is the main strategy to improve health status of an individual .The objective of this study was to assess the health promoting lifestyle and its determinants among undergraduate students.

A descriptive cross -sectional study was conducted among 380 students in Faculty of Allied Health Sciences, University of Peradeniya .Health-promoting lifestyle was measured using Walker's health-promoting lifestyle profile II) HPLP II.(Weight and height of the students were measured using electronic weight scale and stadiometer .Data was analyzed using SPSS version 25 and 0.05 p value was considered as the level of significance .Out of 380 students 70.5 %were females and 29.5 %were males .The total mean score of HPLP II was 120.69±16.51 . Spiritual growth had the highest score)24.16±5.18 (in subscales and the lowest was physical activity)14.39±4.02 .(Mean BMI of the students was 21.28±3.47 .Religion)p=0.024(, course of study) P=0.008 (and involvement in leisure activities) p=<0.001 (were significantly associated with the HPLP II total score .Majority)92.4 (%of them stated that they have barriers towards implementing health promoting lifestyle at the university and the lack of time was the most common barrier .Health promoting lifestyle of the students was at moderate level and the identified barriers should be addressed to improve the healthy life styles among this student population.

Keywords :University Students, Health Promoting Lifestyle, Sri Lanka

Introduction:

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity)WHO,1948 .(The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political believes, economic or social condition .The most important Health Promoting Behaviours)HPB(include healthy eating, physical activities, stress management, interpersonal communication, spiritual growth, and health responsibility)Shaheen *et al.*, 2015.(Healthy eating or nutrition involves correct selection and consumption of foods that essential for health and well-being)Walker, Sechrist and Pender, 1995 .(Physical activity means bodily movement that is produced by the contraction of skeletal muscles which substantially increases energy expenditure)Fuchs, 2015 .(Stress is a collection of physiological, emotional, behavioral and cognitive reactions that occur in response to a stressor .Stress should be managed very well to maintain a healthy lifestyle)Mehta and Sharma, 2015 .(Interpersonal relationship is a connection or an association between two or more people . Spiritual growth means an increased depth of awareness, connection to the transcendent, search for ultimate meaning and engage in spiritual activities)Brown, 2012 .(Health responsibility means being responsible for one's own personal health)Steinbrook, 2006 .(The living way of individuals, families, and societies called a lifestyle .It can be

healthy or unhealthy .A healthy lifestyle important for good quality of life and an unhealthy lifestyle is the important risk factor contributing to the progression of suboptimal health status into a disease condition)Mehri *et al.*, 2016 .(Health-promoting lifestyle is a determinant of health to maintain a healthy lifestyle)Masina and , Tomislav and Madzar, 2017.(To measure the level of health-promoting lifestyle of an individual mainly six dimensions of health are used .They are physical activity, nutrition, stress management, health responsibility , interpersonal relationships, and self-actualization) Shaheen *et al.*, 2015.(

University students are a distinct group of students who have unique needs and problems .They have particular physical, social and emotional characteristics .Since they are at young age, they believe that they are in good health condition and they do not need to maintain a health-promoting lifestyle)Mehri *et al*., 2016.(Students 'health status and behaviours may be affected by their circumstances)Peker and Bermek, 2011 .(Moreover, students are away from parents and they enter a period of new independence . This leads to rapid changes in body, mind, and relationships .Also, students who live independently are subject to less parental control that can inhibit healthy behaviour . Such students are more prone to have poor eating habits, lack of sleep, or the acquisition of new habits, such as smoking or usage of drugs .All these factors do not contribute positively to the development of a healthy lifestyle .Because of unhealthy lifestyles, students are subjected to experience stress, impaired eating and sleeping disturbances, gastrointestinal disturbances, body weakness, and mental problems .It affects the learning activities of the students and as well as the social reactions of the students .Therefore, university life is the best time and place that can provide education regarding health promotion for the young people)Peker and Bermek, 2011 .(It is important to maintain a health-promoting lifestyle among university students because they are educated well and their behaviour affects the health status and well -being of the society)Garrusi, Safizadeh and Pourhosseini, 2008.(

Especially the university students who are going to be health workers are expected to be role models in society .It is assumed that health workers who adopt and display healthy lifestyle behaviours throughout their professional lives can motivate their patients to improve their health, which can also contribute to improving health care from the viewpoint of public health)Wolf, 1994 .(The general objective of the study was to assess the health-promoting lifestyle and its determinants among undergraduate students in Faculty of Allied Health Sciences, University of Peradeniya and also it was conducted to determine the relationship in between health-promoting lifestyle behavior subscales, to assess the relationship between health-promoting lifestyle behaviors and socio-demographic characteristics and to identify the barriers towards implementing health-promoting lifestyle behaviors among undergraduate students in, Faculty of Allied Health Sciences, University of Peradeniya.

Methodology:

This was a descriptive cross- sectional study conducted among 380 undergraduate students in Faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka. Stratified random sampling method was used as the sampling technique. Data was collected using a pre-validated, pre-tested, self-administered questionnaire .No changes were done to the questionnaire after the pre-test and the medium of the questionnaire was English .The questionnaire consisted of 4 parts, part A – Anthropometric measurements, part B -socio-demographic data, part C -HPLP II)Walker's Health Promoting Life Style Profile II (and part D -Barriers towards implementing health

promoting life style .Weight and height of the students were measured using electronic weight scale and stadiometer .Data was analyzed using SPSS version 25.0 and Categorical data was described by using frequencies and percentages giving the 95 % confident intervals .Continuous scale data was described by using mean and Standard Deviation)SD .(Associated factors were analyzed using odds ratios and the significances were assessed at the *p* value of 0.05.

Results and Discussion:

The study enrolled 380 undergraduate students, of which 70.5 %were females and 29.5 %were males .Response rate was 90.05 .%Mean BMI of the students was 21.28±3.47 .The total mean score of HPLP II was 120.69±16.51 .Spiritual growth had the highest score)24.16±5.18) in subscales and the lowest was physical activity)14.39±4.02) .

Table1: Students' HPLP II scores (n=380)

HPLP II and subscale of HPLP	Min	Max	Mean	SD
Health responsibility	0	33	17.49	4.14
Physical activity	5	27	14.39	4.02
Nutrition	0	33	17.49	4.14
Spiritual growth	0	36	24.16	5.18
Interpersonal relationship	9	36	23.93	4.67
Stress management	3	32	19.56	3.89
Total HPLP II	76	175	120.69	16.51

Similar to the present study, a cross -sectional, descriptive study was conducted to assess the Health-promoting lifestyle profile and associated factors among the medical students in a Saudi university .The sample was 243 medical students .The total HPLP II was 123.8±19.8 .The total HPLP II score were same in both studies .Though the participants in both studies were medical related students, their total HPLP II values were moderate)Alzahrani *et al.*, 2019.(

Certain demographic factors were significantly associated with the HPLP II total score such as religion)p=0.024(, course of study)P=0.008 (and involvement in leisure time activities)P=0.016.(

Table 2: Distribution of HPLP scores according to demographic characteristics

Descriptive feature	Health responsibility	Physical activity	Nutrition	Spiritual growth	Interpersonal relationship	Stress management	HPLP II Total
Age P	0.275	0.089	0.449	0.015 *	0.102	0.489	0.583
Gender P	0.434	0.006 *	0.085	0.358	0.238	0.725	0.520
Religion P	0.905	0.965	0.290	0.002 *	0.354	0.010 *	0.024 *
Academic year P	0.739	0.001 *	0.996	0.299	0.012 *	<0.001*	0.249
Courses P	0.001 *	0.006 *	0.115	0.016 *	0.218	0.428	0.008 *
Current living status P	0.001 *	0.042 *	0.052	0.889	0.341	0.613	0.092

Leisure Activities P	0.034 *	0.016 *	0.016 *	0.016 *	0.016 *	0.016 *	0.016 *

* p values are significant at 0.05

In a college based cross -sectional study conducted among college students in India had a mean of 138.69 as the total HPLP score)Senjam and Singh, 2012 .(Comparing to the present study, slight deviations could be identified in the mean scores .Above study found that female students had higher sense of health responsibility comparing to male students .Furthermore, male students were more likely to engage in physical activities than female students .Other sub scales were similar in both male and female students .The present study also found that male students are more likely to engage in physical activity than female .This might be due to nature of males as they are more involved in outdoor activities, games and exercise etc.

Table 3: Correlation between sub scales of HPLP

Subscales	**Physical activity**	**Health responsibility**	**Nutrition**	**Inter-personal relations**	**Stress management**	**Spiritual growth**
Physical activity (r=)		0.290	0.245	0.158	0.219	0.203
Health responsibility (r=)	0.290		0.254	0.316	0.096	0.100
Nutrition (r=)	0.245	0.254		0.338	0.281	0.347
Interpersonal relations (r=)	0.158	0.316	0.338		0.361	0.491
Stress management (r=)	0.219	0.096	0.281	0.361		0.547
Spiritual growth (r=)	0.203	0.100	0.347	0.491	0.547	

There was a statistically significant linear relationship between most of the sub scales in HPLPII. The direction of the relationship was positive, meaning that these sub scales tend to increase together. For example, higher interpersonal relationships associated with good stress management among the participants. Although statistically significant linear relationship is not able in most of the sub scales in HPLPII the magnitude of strength of the association is approximately moderate.

Table 4: Barriers towards implementing health promoting lifestyle

Type of barrier	frequency	Percentage %
Lack of time	325	86.3
Lack of guidance	98	25.8
Lack of resources	100	26.3
Lack of personal interest	72	18.9
Financial problems	131	34.5

Majority 351)92.4 (%of the students have stated that they have barriers towards implementing health promoting lifestyle at the university and the lack of time was the most common barrier.

Conclusion:

Health promoting lifestyle of the undergraduates was at moderate level . Religion, course of study and involvement in leisure time activities were significantly associated with the HPLP II total score .There was a statistically significant positive linear relationship between most of the subscales, but the magnitude was approximately moderate .Most common barriers towards

maintaining health promoting lifestyle activities were lack of time and financial problems .Therefore, this study emphasizes the importance of addressing the barriers towards maintaining healthy life styles among this university student population.

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Evaluation of Physicochemical Properties of Starch from Two Modified Sri Lankan Rice Varieties to Be Used as Excipients in the Pharmaceutical Industry

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Abstracts: Starches are the main excipients used in the formulation of solid oral dosage forms and the majority of the excipients are imported to Sri Lanka for the country's pharmaceutical manufacturing industry. Therefore, research studies need to be done on finding the suitability of the available sources as pharmaceutical excipients which in return would be more beneficial for the country when making it self-reliant and secured in healthcare. Thus, the present study was aimed at evaluation of the physicochemical properties of rice starch isolated from two modified Sri Lankan varieties of rice, in order to facilitate their exploitation as suitable excipients for the local pharmaceutical manufacturing industry. Two Sri Lankan varieties of rice, BW 267/3 and BW 367 were subjected to experiments in the present study. Starches were isolated following the alkali extraction method used by Valgadde *et al.,* 2015. The starches obtained were characterized by their physical and chemical properties. The results showed both the rice varieties have favourable physicochemical characteristics in their starches as pharmaceutical excipients while some modifications in the isolation and storage procedures would rather enhance those characteristics more precisely. This knowledge of starch properties will be helpful in explaining the behaviour of these starches and selecting them as necessary when used as pharmaceutical excipients.

Keywords: Rice varieties, Rice Starch, Physicochemical properties, Pharmaceutical excipient

Introduction:

According to the International Pharmaceutical Excipient Council, "Excipient" is defined as "Any substance other than active drug or prodrug that is included in the manufacturing process or is contained in finished pharmaceutical dosage forms" (Hartesi *et al.*, 2016). In the pharmaceutical industry starch is an important excipient that has been commonly used because of its versatility and cheapness (Muazu *et al.*, 2012).

Rice (*Oryza sativa* L) is the staple food for millions of people in Southeast Asia. The climate and the fertile soil of Sri Lanka are favorable for growing different types of rice crops. Sri Lanka has about 730,000 ha available land for rice cultivation. It is grown under both irrigated and rain fed conditions in the dry, intermediate, and wet zones. Cultivation is done in two main cropping seasons [Maha (October to March) and Yala (April to August)], (Premasiri *et al.*, 2016).

Rice starch has commercial value in different industries because of its smallest particle size among commercial starches, whitest color and neutral state such as in cosmetic and tableting industries (Vithyashini and Wickramasinghe, 2016).

The whole pharmaceutical manufacturing in Sri Lanka imports the total quantity of starches that are required for manufacturing. In general, the manufacturing of tablets and capsules are higher due to its high consumption. The importation cost could be minimized resulting reduction of total manufacturing cost if the manufactures can obtain raw materials such as starch from the most available sources in Sri Lanka. Because some of the crops cultivated in Sri Lanka could be used to extract excipients. Research studies can be carried out to assess the suitability of the extracted starches from such crops as excipients. The priority must be given to those with characteristics such as high availability, cost-effectiveness and high yield of targeted excipient. Rice (*Oryza sativa*) is a commonly grown crop in Sri Lanka and rice starch is already being used as an excipient in the pharmaceutical industry (Rowe,2009). In Sri Lanka, many varieties of rice are being grown and the excipient properties of starches extracted from those need to be studied to confirm the most suitable variety. Therefore, this study would focus on the evaluation of the excipient properties of starch from two modified Sri Lankan varieties of rice (BW 267/3 and BW 367) for oral dosage forms that satisfy the aforesaid characteristics. Thus; focusing on the attempt to make Sri Lanka self-reliant and secure in healthcare.

Methodology:

Modified rice varieties of BW 267/3 and BW 367 were collected under the authentication of Rice Research and Development Institute, Bombuwala, Sri Lanka. The authentication was also granted from National Herbarium, Peradeniya, Sri Lanka.

The alkali starch extraction method described in Valgadde *et al.,* 2015 was used to isolate the starch from rice grains. Starch identification was done according to the method mentioned in British Pharmacopoeia 2015. The texture, colour, odour and taste of starch powders were examined via sensory evaluations.

The starch yield of rice was calculated according to the following equation.

dry weight of starch

$$\text{Starch yield percentage of rice} = \frac{\text{dry weight of starch}}{\text{weight of rice}} * 100\%$$

pH values of the starches were determined following the method in British Pharmacopoeia, 2015.

Scanning Electron Microscopic images of starches were obtained according to the method described in Sainio (2011) by using a Carl Zeiss EVO 18 Scan Electron Microscope (SEM).

Particle size distribution was estimated by dry sieving method described in British Pharmacopoeia 2015 by allowing the powders to pass through the nest of sieves.

Moisture contents of the dried starches were calculated by using a moisture analyzer. Proximate composition analysis of starch samples was evaluated according to the methods described in AOAC: Official Methods of Analysis, 1990 and the purity of the starches were calculated from the following equation (Vasanthan, 2001

$$\text{Percentage of starch purity} = \frac{\%\text{carbohydrate}}{(100 - \%\text{moisture})} * 100\%$$

The methods used by Tuffor (2013) and Mosisa (2014) were used to find the Amylose contents of the two starch samples. The swelling capacity of the starch powders was determined by the method of Hasan *et al.,* 2015. The solubility of the starches was calculated from the test carried out according to Emenike *et al.,* 2017.

To evaluate the True densities, the fluid displacement method described in the

Standard Test Method for Specific Gravity of Soil Solids by Water Pycnometer, 1997 was performed. Tapped densities and Bulk densities were evaluated using the methods in Obitte and Chukwu (2007).

Angle of Repose, Hausner Ratio and Compressibility Indices of the starches were measured and calculated according to the methods in British Pharmacopoeia, 2015. The method which was described in Emenike *et al.,* 2017 was used to measure the flow rate.

The test results were expressed as Mean ± Standard Deviation using SPSS software version 23 following results gained each test for both varieties, BW 267/3 and BW 367.

Results and Discussion:

Extractions from BW 267/3 and BW 367 were able to satisfy the Pharmacopoeia's specifications for identification of starch by the conversion of orange-red to dark blue colour following the iodine test and disappearing of colour upon heating (British Pharmacopoeia, 2015), confirming the extractions consisted of starch. Both the starch samples were smooth and creamy in texture, white in colour, odourless and neutral in taste which would be advantageous in using these starches in dosage forms as excipients.

The starch yield percentages were 41.36% (w/w) for BW 267/3 and 37.88% (w/w) for BW 367. Meanwhile, the pH value of BW 267/3 was 9.63 and BW 367 was 9.50 which were above the reference range of the pH value of rice starch, 5.00-8.00 as pharmaceutical excipient (Bao, 2019). Modifications in the extraction procedure might be a solution in gaining more starch yield within the preferred pH value range.

The SEM images (see Figure 1 and Figure 2) showed they were diverse in size, and irregular and polygonal in shape due to the damage of the starch during the isolation process (Bhotmange and Reddy, 2013). The mean particle diameter of the starch from BW 267/3 was 5.52 µm and BW 367 was 5.34 µm as observed by the SEM. The average diameter of a rice starch particle is referred to be as 5 µm while all the particles having diameters within the range of 2-20 µm (Rowe *et al.,* 2009). The particle size and shape can influence a large variety of important physical properties, manufacturing processability and quality attribute including dissolution rate, drug release rate for sustained and controlled release dosage formulations (Shekunov *et al.*, 2007).

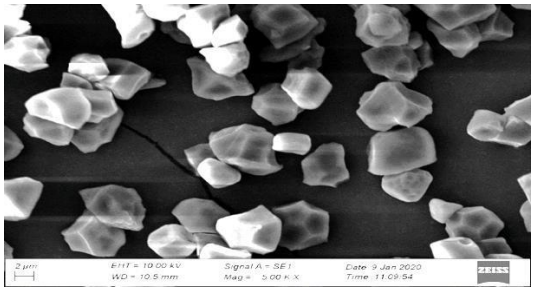

Figure 1: SEM image of starch from BW 267/3

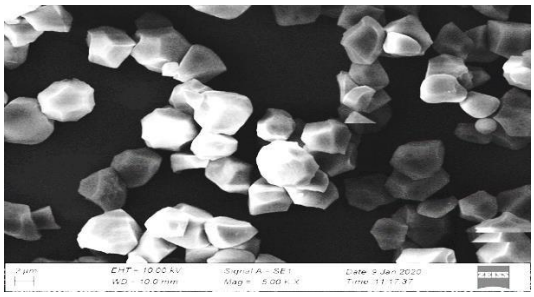

Figure 2: SEM Image of starch from BW 367

Sieve analyses are one of the most widely used methods for the determination of the dispersive composition of the dust and powders (Bayvel and Jones, 1981). The highest particle size distribution of BW 267/3 was observed within the 150-300 µm range while BW 367 was observed within the range 300-850 µm range (see Table 1).

Table 1: Particle size distribution of starches

Starch Variety	Particle size range (µm)	Percentage retained (%)
BW 26	>850	9.68

	300-850	31.84
	150-300	45.56
	<150	12.92
	>850	9.82
	300-850	52.20
BW 367	150-300	35.32
	<150	2.66

All starches are hygroscopic in nature. They absorb atmospheric moisture to reach equilibrium humidity (Crouter and Briens, 2014). For many powders including starches, moisture is known to modify the flow and mechanical properties (Tester *et al.,* 2004). With compared to the recommended moisture percentage (14%) of rice starch as pharmaceutical excipients (Rowe *et al.,* 2009), moisture content percentages of 15.78% (w/w) and 19.78% (w/w) were obtained respectively for BW 267/3 and BW 367 were higher. The quality of starches is adversely affected by the high amount of moisture content than the recommended level. The high moisture content of starch is favorable for molds to grow resulting in reduced shelf life. The quantity of starch is also reduced and as a result, the market value is also reduced as there is a weight loss on drying. To produce compacts with high tensile strength and low friability, it is essential to have the moisture contents of starches at optimum levels (Staniforth, 1971). Improvements in the starch drying process will help to lower the moisture contents of the starches.

Devoid of other plant components such as fibre, protein and lipid, a good starch material for pharmaceutical application should contain more than 96% (w/w) of starch and as much as possible (Vasanthan, 2001). Along with the results of proximate composition analysis and moisture content, the purities of starches were calculated as 97.73% (w/w) for BW 267/3 and 95.98% (w/w) for BW 367 which indicated that they were good starch materials for pharmaceutical applications.

Amylose content appears to be the major factor controlling almost all physicochemical properties of rice starch such as turbidity, syneresis, freeze-thaw stability, pasting, gelatinization, and retro degradation properties (Wickramasinghe and Noda, 2008). The amylose contents of BW 267/3 and BW 367 were estimated to be 9.5% and 46.0% respectively. The higher the amylose content, the lower is the swelling power and the smaller is the gel strength for the same starch concentration. To a certain extent, however, a smaller swelling power due to high amylose content can be counteracted by a larger granule size and therefore expected to exert stronger disintegrant action (Tuffour, 2013). The swelling capacity of a material is the ability of a material to absorb water and swell up. Materials with high swelling power have good disintegrating properties. Results obtained from BW 267/3 and BW 367 were 27.40% (w/v) and 21.34% (w/v) respectively. The results indicated that the swelling capacity of BW 267/3 was faster than BW 367. Both varieties were insoluble at the cold water, hot water and ethanol (96%). British Pharmacopoeia, 2015 reveals that rice starch is insoluble in cold water and ethanol (96%).

One of the critical importance of powders to be considered in the pharmaceutical dosage forms is the ability of the powder to flow. The flowability of powders is of immense importance in the manufacture of pharmaceutical tablets and capsules with the correct amount of pharmaceutical active ingredients (Staniforth, 1971). The compendial methods available for the measurement of powder flow are flow rate, measurement of angle of repose, bulk density, tapped density, true density, compressibility index and Hausner ratio.

The test results for True density, Bulk density and Tapped density are in the Table. When the powder is free flowing the ratio of bulk density over tapped density is small in value and when the powder is poor in the flowability that value

is also greater. This due to the inter-particular interactions of the powder particles (United States Pharmacopoeia, 2016).

Table 2: Flow properties of starches

Flow property	Results	
	BW 267/3	**BW 367**
Bulk density (g/mL)	0.46±0.01	0.44±0.00
Tapped density (g/mL)	0.58±0.01	0.58±0.01
True density (g/mL)	1.69±0.42	1.54±0.46
Flow rate (g/s)	2.26±0.12	2.83±0.16
Angle of Repose (º)	42.07±1.76	43.64±1.89
Hausner Ratio	1.26±0.01	1.32±0.06
Compressibility Index	20.57±0.33	24.09±0.37

The flow rate of powder is an essential parameter of powder in determining the ability of powder as a direct compression excipient. Flow rate is the time taken by a powder mass to pass through an orifice (United States Pharmacopoeia, 2016). The flow rate of powder is good if it is below 5 g/s (Rowe *et al.,* 2009) where for BW 267/3 and BW 367 the powder flow rates (see Table 2) were good.

The angle of repose of powder is an indicator that shows how easily particles in a powder roll over one another (Edde, 2016). The Hausner ratio indicates the degree of densification which could occur during tableting and with higher values better the densification and flowability (Gbenga *et al.,* 2014). The compressibility of a powder can be described as the ability of a powder to reduce its volume (Klevan, 2011). According to the general scales of flowability for Angle of Repose, Hausner Ratio and Compressibility Index (British Pharmacopoeia, 2015) the results (see Table 2) obtained by both the starches show passable flow properties. The flow properties of these starches can be further improved with the use of glidants, lowered moisture content and precise particle sizes.

Conclusion:

The study showed that starches from the two modified Sri Lankan Rice varieties BW 267/3 and BW 367, have favourable physicochemical properties to be used as pharmaceutical excipients. Suitable modifications in the isolation and storage procedures would rather enhance some of these properties more precisely. Furthermore, it is recommended to study the properties of the above starches incorporated into pharmaceutical dosage forms together with active pharmaceutical ingredients and other excipients.

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Health Related Quality of Life among Patients with Chronic Kidney Disease in Sri Lanka; a Review

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Abstract: Chronic Kidney Disease (CKD) gives a considerable burden to the Sri Lankan health care delivery system. Prevalence of CKD rise due to the high prevalence of non-communicable diseases and unknown aetiologies. Health Related Quality of Life (HRQOL) reduced with the initiation and progression of the disease. Many factors significantly influenced HRQOL of CKD patients. This study reviews the state of HRQOL among Sri Lankan CKD patients and factors associated with the HRQOL. The search was done via PubMed, CINAHL, Web of Science, and Google Scholar according to the predefined criteria. Selected articles were reviewed and extracted the data which were relevant to the study. Extracted data were entered into the summary table and organized according to the research objectives. Seven articles selected for the final analysis. All the studies were cross-sectional studies. Sample size range from 120 to 1174. Haemoglobin level, being employed, high education level, and advanced stages of CKD were identified as factors that positively influenced HRQOL in CKD patients. Depression, psychological distress, symptom burden, and age negatively influenced on HRQOL. Depression and psychological distress are common among Sri Lankan patients with CKD. Impaired social support, perception of low social support, economic burden, high out pocket expenditure, unemployment are the main causes for the depression and psychological distress among patients with CKD in Sri Lanka. Health care professionals need to pay more attention on HRQOL and factors associated with HRQOL among patients CKD.

Keywords: Chronic Kidney Disease, Quality of life, Health related Quality of Life, Sri Lanka

Introduction:

Chronic kidney disease (CKD) is a global health burden and it affects the physical, psychological cultural, and socio-economic status of the current global population (S. Senanayake, Gunawardena, Palihawadana, Bandara, *et al.*, 2017) with many adverse events such as CVD and death (Levey *et al.*, 2005). chronic kidney disease is one of the major suffering problem in Sri Lanka in the present time due to chronic kidney disease unknown etiology(CKDu) (Rajapakse, Shivanthan and Selvarajah, 2016; Wimalawansa, 2016). With the time, prevalence of non- communicable diseases such as hypertension and diabetes mellitus are increasing and those are the other causes for rising CKD in Sri Lanka (Rajapakse, Shivanthan, and Selvarajah, 2016). CKDu is prominent in north-central province in Sri Lanka and most of the affected individuals are farmers, agricultural field workers, or people who live around the agricultural area (Wimalawansa, 2016). In some Districts, CKDu prevalence is 15.1%-22.9%; especially in rural Dry zones of Sri Lanka (Rajapakse, Shivanthan and Selvarajah, 2016). CKD classified according to the estimated Glomerular Filtration Rate (eGFR): Stage 1; renal damage with normal or high eGFR: >90ml/min/1.73m^2, Stage 2; renal damage

with mild reduced eGFR: 60-89ml/min/1.73m^2, Stage 3; moderately reduced eGFR: 30- 59ml/min/1.73m^2, Stage 4; severely impaired eGFR: 15-29ml/min/1.73m^2, Stage 5; renal failure: <15 ml/min/1.73m^2 or with dialysis (Levey *et al.*, 2005). Stage one accompanied with perceived glomerular filtration rate and protein urea and end stage renal disease accompanied with impaired or absence urine filtration and entire renal sclerosis, interstitial fibrosis, and interstitial inflammation with high protein urea. Most of the people who are affected with renal disease identified at the end stage/ End Stage Renal Disease (ESRD) (Rajapakse, Shivanthan and Selvarajah, 2016). CKD patients experience reduced life expectancy and patients who progress to ESRD (End Stage Renal Disease) reduced their life expectance 20 times compared to the age and sex matched individuals with ordinal kidney function (Liyanage *et al.*, 2017). Diabetes mellitus type II and chronic hypertension associated with chronic kidney disease record all over the country

Health-related quality of life (HRQOL) is a subjective indicator of an individual's health status which depends on beliefs, experiences, perceptions, expectations, present health status, and their influences on the enjoyment of life (Khatib *et al.*, 2018). Physical, psychological, and lifestyle disturbances along with physical and emotional symptoms directly affect on HRQOL among patients with renal replacement therapy (Unruh, Weisbord and Kimmel, 2005). Identification of HRQOL status and factors associated with HRQOL are important because it is a tool to improve clinical care and it provide information for clinical decision making (Unruh, Weisbord and Kimmel, 2005). Generic and disease-specific tools can be used to measure HRQOL. SF 36, WHOQOL BREF, and EQ 5D/EQ 5D 3L/EQ 5D 5L are generic tools and KDQOL is a disease specific tool to measure HRQOL among patients with CKD.

This study aims to review the quality of life among CKD patients in Sri Lanka and factors associated with their HRQOL. Sri Lanka is a middle-income country and the burden of CKD is considerable with the increased CKD affected population.

Methods:

Inclusion criteria;

Original studies published in English and examine QOL through the standard validated instrument (SF 36, EQ 5D 5L/EQ 5D 3L or KDQOL/KDQOL-SF, WHOQOL BREF have to be used in each study to assess HRQOL) in diagnosed patients with CKD.

Participants' age more than 18 years old.

The geographical location of the study: studies should be done in Sri Lanka.

Published year: after 2000

Exclusion criteria;

Study design; qualitative studies, case reports, personal opinions, conference presentations, books, review articles.

Studies with insufficient data and incomprehensive methodology.

Search strategy;

Original English publications were searched via: PubMed, CINAHL, Web of science, and google scholar. Keywords were quality of life, chronic kidney disease, CKD, Sri Lanka, End Stage Renal Disease, Health related quality of life. Keywords were combined through Boolean operators ("and", "or"). The search was limited to the studies published after 2000. Reference lists and citations of the identified articles were reviewed for additional resources.

Evaluation and data extraction

Identified study abstracts were screen two times to confirm incompatibility with the study. Eleven articles were selected for final review. From that, 4 studies were excluded;

two article findings were incompatible with the objectives of the study and another two were conference abstracts. Duplications were merged by using Mendeley. Remained 7 articles were individually appraised by the principal author and supervisor. Discrepancies and gaps were identified and discussed. Expert opinion was taken when data extraction could not obtain through discussion.

Study method, sample size, participant's demographic and clinical characteristics, Quality of life (QOL) instruments, QOL scores were extracted separately and recorded.

Results:

Table 1: Study Characteristics

Author and year	**Study design**	**Sample size and characteristics**	**Participant's characteristics**
(Abeywickrama *et al.*, 2020)	Descriptive cross-sectional Study	120 CKDu	Male; 83 Female; 37 Mean age; 61.87±11.31
(Senanayake *et al.*, 2020)	Descriptive cross-sectional study	1174 CKD+ CKDu	Male; 681 Female; 398 Mean age; 58.3±10.7
(Premadasa *et al.*, 2019)	Descriptive cross-sectional study	250 CKD+ HD more than 3 months	Male; 184 Female; 66 Median age; 30-49
(Senanayake *et al.*, 2019)	descriptive cross-sectional study	1036 CKD	Male; 646 Female; 390
(Kularatna *et al.*, 2019)	Descriptive cross-sectional	1096 CKD	Male; 686 Female; 410
(Senanayake *et al.*, 2018)	Descriptive cross-sectional	1174 CKD	Male; 701 Female; 417
(S. Senanayake *et al.*, 2017)	Descriptive cross-sectional	250 CKD	Male;105 Female; 145 Mean age; 57.7 years

HRQOL among Sri Lankan CKD patients were explained by seven articles in here (see Table 1). Sample size range from 120 to 1174. Other than HRQOL assessment tools, CES D (Centre for Epidemiological Depression Scale) to measure depression, GHQ 12 (General Health Questionnaire 12) to measure psychological distress, IPAQ (International Physical Activity Questionnaire) to measure physical activity level had been used in some studies. KDQOL SF had been used in 3 articles. Mean Kidney disease summary component (KDSC) scores range from 81.57±5.86 (Abeywickrama *et al.*, 2020) to 58.7±7.7 (Senanayake *et al.*, 2020). Physical component summary (PCS) scores rage from 68.63±19.58 (Abeywickrama *et al.*, 2020) to 35.5±15 (Senanayake *et al.*, 2020) and Mental component summary (MCS) range from 78.53±18.78 (Abeywickrama *et al.*, 2020) to 39.6±12.3 (Senanayake *et al.*, 2020). Abeywickrama *et al.,* 2020 was indicated the age and symptom burden score as independent predictors which negatively influenced all summary scores (KDSC, PCS, and MCS). However, in Senanayake *et al.,* 2020, Age was negatively correlated with KDSC, PCS and it was not an independent predictor of MCS scores. (Abeywickrama *et al.*, 2020; Senanayake *et al.*, 2020). And it identified that Haemoglobin (Hb) level as a positive indicator of high PCS ($P<0.05$, beta; 0.177) score (Abeywickrama *et al.*, 2020). Senanayake *et al.*, 2020 found several independent predictors of KDQOL SF summary scores. High educational status independently predicts the high KDSC and MCS scores, being employed independently improves KDSC and PCS scores. Advanced stages of CKD, psychological distress and depression independently reduce all summary component's scores (Senanayake *et al.*, 2020).

Senanayake *et al.,* 2019 assessed the relationship between HRQOL, depression, and the psychological distress of patients with CKD. EQ 5D 3L index score, Visual analogue scale (VAS), PCS, and MCS score values were significantly different between patients with and without depression (P<0.001). And the same findings were noted for the patients with and without psychological distress (P<0.001) (Senanayake *et al.*, 2019). Senanayake *et al.*, 2018 indicated that KDSC, PCS, and MCS were negatively correlated with depression; Spearman correlations were r;-0.544, r;-0.285, r; -0.339 respectively, and the relationship was statistically significant (P<0.001). Also, KDSC PCS and MCS were negatively significant with psychological distress; Spearman correlations were respectively r; 0.373, r; -0.383, r;-0.373 (P<0.001) (Senanayake *et al.*, 2018). In Senanayake *et al.*, 2017, KDSC's highest score was reported in hospital staff encouragement while the lowest score was reported in the work status. In PCS, the highest was physical functioning and the lowest was role physical. In MCS, the highest was social functioning and the lowest was role emotional (S. Senanayake, Gunawardena, Palihawadana, Kularatna, *et al.*, 2017). Premadasa *et al.*, 2019 indicated that the majority of the HD population report their overall perception on QOL as "neither poor nor good" (54%), only 2.4% were reported as "very good". And this study revealed that education level, average monthly income were significant with overall QOL which were identified as independent predictors of HRQOL in the previous study (Senanayake *et al.*, 2020). And HD duration also significant with overall QOL among chronic haemodialysis patients (Premadasa *et al.*, 2019).

Discussion:

Several factors which effect on Health-Related Quality of Life have been identified through the subjective articles. Health interventions and support systems can target factors effect on HRQOL to improve the HRQOL of the CKD patients. It's a known phenomenon, HRQOL of the CKD patients were lowers than the general population and related factors aid on the improvement or reduction of QOL. Therefore, health professionals can make decisions based on factors that influenced HRQOL in CKD patients.

Depression and psychological distress are the most common psychological disorders among the CKD population (Sumanathissa, De Silva, and Hanwella, 2011). It is negatively associated with HRQOL of the affected individuals (Senanayake, 2016; Senanayake *et al.*, 2018) and there are many factors associated with depression and psychological distress among patients with CKD in Sri Lanka. The mode of renal replacement therapy is a factor that affects an individual's depression level. Patients who are undergoing dialysis have been reported higher depression status compared to the patients without dialysis. Some studies indicated that depression was prominent among HD patients than the PD (Chilcot *et al.*, 2008; Ozcan *et al.*, 2015; Hiramatsu *et al.*, 2019) and transplant patients were reported the lowest depression score (Ozcan *et al.*, 2015). Indian study indicated, age below 60, absence of treatment funding, education less than grade 12, monthly income, CKD stage, patient on haemodialysis and associated comorbidities more than 3 were associated with higher depression scores. In Sri Lanka, several studies had been done to assess depression and psychological distress among CKD patients. Poor social support, low satisfaction with social support received, within one year of diagnosis, low monthly income, high out pocket expenditure, being a female, unemployment has a positive relationship with distress (Hettiarachchi and Abeysena, 2018; Senanayake *et al.*, 2018). Female sex, unemployment, being dialysed, advanced age, and presence of comorbidities are positively significant with depression (Senanayake *et al.*,

2018). But another study indicated that the age, gender, income, employment status, and education were not significant with depression and the patient's understanding of prognosis is the only significant associated factor that affects depression among CKD patients (Sumanathissa, De Silva and Hanwella, 2011). Factors associated with depression and distress can be directly or indirectly associated with HRQOL among CKD individuals as there is a negative correlation between HRQOL vs depression and psychological distress. In Sri Lanka, most of the affected people are male farmers and with the disease progression, they have low monthly income and high out pocket expenditure. Most of the affected people engaged in the earning process and with the disease they cannot engage with their jobs as usual. In Sri Lanka, out pocket expenditure for each dialysis episode in a government hospital is Rs 595 (415-995) and for the transportation, they have to pay Rs. 320 (IQR 320-500) per one episode. Patients have to go 2 or 3 times per week for dialysis. Transportation expenses are considerable (S. J. Senanayake *et al.*, 2017). Therefore, the government has to pay much attention to initiate a well-designed insurance system and patients should be released from transportation expenses, and a well-improved transportation system should be established for Sri Lankan CKD patients. Having an occupation is positively correlated with HRQOL (Blake *et al.*, 2000; Tamura *et al.*, 2018) and unemployment was significantly reduced the HRQOL (Lopes *et al.*, 2007). Having an occupation improves of economic stability of affected individuals and it improves physical functioning.

Conclusion:

This study aimed to identify the state of HRQOL among patients with CKD and Factors associated with their HRQOL. HRQOL is subjective in nature and various prominent factors were identified in this review. Psychological burden is a considerable issue among patients with CKD as they experience many psychological symptoms. Many factors seems to be associated with depression and distress and those were directly or indirectly associated with HRQOL. Especially, Educational level, monthly income are associated with HRQOL among patients with CKD in Sri Lanka. Interventions need to be planed based on research evidence to improve HRQOL.

The identified factors that have an effect on HRQOL seems to be interrelated. When improving HRQOL, health professionals should follow a holistic approach. It reduces the socio-economic and public health burden due to chronic kidney disease.

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Knowledge And Practices Regarding Open-System Endotracheal Suctioning Among Intensive Care Unit Nurses At The National Hospital Of Sri Lanka

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Abstracts: Open-system endotracheal suctioning (OS-ETS) is performed on critically ill requiring mechanical ventilation to keep the airway patent. Intensive care unit (ICU) nurses need to perform this procedure ensuring patient safety while taking measures to prevent ventilator associated pneumonia. This study aimed at assessing knowledge and practices of ICU nurses regarding OS-ETS. In phase I, a descriptive cross-sectional survey was carried out to assess knowledge regarding OS-ETS among a convenience sample of 150 ICU nurses from the National Hospital of Sri Lanka using a pre-tested self-administered questionnaire. In phase II, a subsample of 50 ICU nurses who participated in the survey were observed while performing OS-ETS by two trained independent raters using a pre-tested previously validated structured 20 item check list. Data were analyzed using SPSS version 21. Mean overall knowledge score was 57.93 ± 12.81, while the mean overall practice score was 63.70 ± 7.81. Participants had good knowledge on indications, suction catheter selection criteria, infection control practices, hyperoxygenation, suction pressure selection and post suction practices. Poor knowledge was evident regarding contraindications, hazards/ complications, patient positioning and suctioning techniques. Good practices were observed among 26 (56%), while poor practices were observed in areas of patient positioning, verbal reassurance, infection control practices and chest auscultation. The findings revealed that ICU nurses have poor overall knowledge on OS-ETS though their practices were favorable. The study highlights the need for continuous professional education for nurses to address the gaps identified and establishing practice guidelines regarding OS-ETS for improving quality and safety in health care.

Keywords: Intensive care nurses, open system endotracheal suctioning, knowledge and practices

Introduction:

Open-system endotracheal suctioning (OS-ETS) procedure is done to keep the airway patency among critically ill patients requiring mechanical ventilation. It is a component of bronchial hygiene therapy and mechanical ventilation (MV) that involves the mechanical aspiration of pulmonary secretions from a patient's artificial airway to prevent its' obstruction (Guglielminotti, et al., 1998). There are guidelines and best practices recommended to prevent the risk of adverse effects of endotracheal suctioning (ETS). The Main aim of ETS is to keep air pathways permeability; provide sufficient oxygenation; avoid the risk of ventilator-associated pneumonia (VAP), prevent atelectasis and pulmonary consolidation (Seckel, 2008). Intensive care unit (ICU) nurses who care for critically ill patients 24 hours need to follow guidelines to ensure patient safety and prevent VAP. However, previous studies showed that ICU nurses' knowledge and

practices in adhering to current guidelines were insufficient. Purpose of this study was to assess knowledge and practices of ICU nurses' regarding OS-ETS.

Methodology:

The study was designed as a single center survey and observational study and took place at the largest teaching hospital in Sri Lanka. A descriptive cross-sectional survey (phase I) was carried out to assess knowledge among a convenience sample of 150 ICU nurses working at eleven ICUs at the National Hospital of Sri Lanka (NHSL) using a pre-tested self- administered questionnaire adopted from a previously validated tool with expert opinion. An overall score of ≥57.93 was considered as good knowledge and <57.93 as poor according to means. A proportionate convenience sample of 50 nurses from those who participated in the survey were observed (phase II) by two trained independent raters while performing OS-ETS procedure using a structured observational check list adapted from a previously validated structured 20 item check list evaluated on a dichotomous scale; 0=incorrect, 1= correct. An overall score of ≥63.70 was considered as good practice and <63.70 as poor practice according to mean score. Inter-rater reliability was established. Ethical approval was obtained from Ethics Review Committee of University of Sri Jayewardenepura for the study. Data analysis was done using Statistical Package for the Social Sciences (SPSS) version 21.

Results and discussion:

Most of the participants 88.7% (n=133) were female and 48% (n=72) of participants included in age range of 30-39 years. The mean age of the Participants was 31.61±5.37 SD years. Majority 56% (n=84) of the Participants were married and (n=82) 54.7% of ICU nurses categorized under grade III. Majority of the Participants (n=125) 83.3% had highest educational qualification as Diploma in nursing. Most of the participants 82% (n=123) were educated/trained on ETS procedure and only 12% (n=19) had special training in intensive care nursing (Table 1). The mean overall knowledge regarding OS-ETS was 57.93± 12.81, while the mean overall practice level was 63.70 ± 7.81. Among the participants only 44.7% had good knowledge on OS-ETS (Table 2) and 52% had good practice on OS-ETS procedure (Table 3). The findings are of great concern as many nurses failed to demonstrate an acceptable level of knowledge but good practice level that support previous findings of Day, et al., (2001). Poor knowledge regarding ETS among intensive care unit nurses could be dangerous for the patient who have artificial airways (Negro, et al., 2014). Findings of the current study shows a disparity between the participants' knowledge and practice.

Table 1: Socio-demographic characteristics of participants

Variable	Category	Number (n=150)	Percent (%)
Gender	Female	133	88.7
	Male	17	11.3
Age Age	20-29 years	63	42
	30-39 years	72	48
	40-49 years	13	8.7
	More than 50 years	2	1.3
Civil status	Married	84	56
	Unmarried	66	44
Grade	Grade I	11	7.3
	Grade II	57	38
	Grade III	82	54.7
Highest educational qualification	Diploma in nursing	125	83.3
	Graduate	25	16.7

Variable	Category	Number (n=150)	Percent (%)
Total experience as a nurse	Less than 1 year	33	22
	1-2 years	11	7.3
	3-5 years	27	18
	6-10 years	57	38
	More than 10 years	22	14.7
ICU work experience	Less than 1 year	42	28
	1-2 years	15	10
	3-5 years	35	23.3
	6-10 years	38	25.3
	More than 10 years	20	13.3
Any education/training on OS-ETS	Yes	123	82
	No	27	18
Special training on intensive care	Yes	19	12.7
	No	131	87.3

Table 2: Distribution of practice level among ICU nurses (N=50)

Variable	Frequency (n=150)	Percent (%)
Good knowledge	67	44.7
Poor knowledge	83	55.3

Table 3: Distribution of practice level among ICU nurses (N=50)

Variable	Frequency (N)	Percent (%)
Good practice	26	52
Poor practice	24	48

Gender had significant relationship with knowledge regarding open-system endotracheal suctioning (p=0.02). The Participants had good knowledge on indications (93.3%), accurate suction catheter selection criteria (84%), infection control practices (82.7%), hyperoxygenation (75.3%), selection of negative pressure range (51.3%), catheter insertion technique (54.7%), suction application stage (86.7%) and post suction practices (78%). But some deficiencies were identified in some knowledge areas on contraindications, hazards/complications, patient positioning (48%), normal saline instillation (27.3%), suction pressure application technique (36%), suction catheter withdrawal technique (12%), time duration per suction pass (48%), hyperoxygenation period in between suction passes (28.7%). Particular attention should be paid to technical aspects of the procedure, such as suction catheter size, the level of negative pressure, the depth of suction catheter insertion, and the duration of suctioning, which have a huge impact on ES related complications (Maggiore & Volpe, 2010). During the observation good practice (56%) was observed only in areas such as preoxygenation, hyperinflation, normal saline instillation, selection of suction catheter, negative pressure application technique and time duration per suction pass. Almost half of the participants (48%) have not adhered to the practice guidelines in some areas such as patient positioning, verbal reassurance, infection control practices, negative pressure range selection, suction catheter withdrawal technique and auscultation of the chest.

The observational design was used to gain insight into what was happening in actual practice. Observational study involved collection of data that specify practices or events selected for observation and are conducted in participants' natural environments (Kelleher & Andrews, 2008). Direct observation was potentially a more comprehensive method to ascertain how nurses performed in real situations and to identify differences if any in practice (Said,

2012). Nosocomial infection (NI) which also called "hospital-acquired or health care-associated infection" is a serious public health issue affecting hundreds of millions of people every year worldwide (WHO, 2016). Health care associated infections (HCAI) increase morbidity, mortality, length of hospital stays, and costs (Collins, 2008); therefore, more research and changes in practice are needed to ensure hospital safety and prevent HCAIs (WHO, 2011). Infection control practices of OS-ETS prior to suction showed that 80% of the participants did not wash hands before starting the procedure and out of them 28% used alcohol hand rub as an alternative for hand washing prior to suction.

Almost all participants in the observational study used at least a single personal protective equipment, but none used all the PPE necessary. All of them, n=50 (100%) were wearing a mask, 14% (n=7) were wearing a polythene disposable apron, 70% (n=35) were wearing gown and only 4% (n=2) wore goggles/eyewear before practice. This may suggest a perconception among nurses that wearing gloves and using 'non-touch' aseptic technique when inserting the suction catheter that neglects the need for frequent hand washing. Yet, the literature clearly suggests that use of gloves do not replace the need for hand washing (Pratt, et al., 2001).

A majority of participants (66.7%) in the survey revealed that not having formal training on OS-ETS as the most common barrier. Half of the participants (50%) noted that lack of knowledge on OS-ETS as another barrier. Moreover, 44% of them identified no supervisory guidance to monitor the effectiveness of ETS practice and lack of experience/practice on OS-ETS as barriers. Only 38% of the participants reported that unavailability guidelines in the unit/hospital for ETS as a barrier.

Conclusion

ICU nurses have poor overall knowledge on OS-ETS. Their overall practices were favorable but deficiencies that could affect patient safety were evident. The study highlights the need for continuing education for nurses to address the gaps identified and establishing practice guidelines regarding OS-ETS for improving quality and safety in health care. Therefore, on-going education programmers focusing on improving both theory and practice should be implemented by the hospital authorities. In addition, practice guidelines on ETS should be implemented and continuous monitoring through nursing audits should be done for prevention of VAP and thereby to improve the quality of care and safety of patients.

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Prevalence of Unintentional Home Injuries and Awareness of Child Safety among the Parents of Inpatient Children at Sirimavo Bandaranayake Specialized Children's Hospital Peradeniya

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Abstract: Unintentional injuries are estimated to cause 389,000 annual child deaths in Southern Asia resulting in an annual loss of 74 healthy lives per 1000 population. In Sri Lanka, childhood injuries have been reported as the fourth leading cause of child mortality under 5 years. A descriptive cross-sectional study was conducted in Sirimavo Bandaranayake Specialized Children's Hospital-Peradeniya, Sri Lanka with the aims of identifying commonly reported types of unintentional home injuries and to assess the effects of parental factors on awareness of child safety. Under 6-year-old inpatient children and their parents were included in the study. Data were collected from 99 child-parent pairs within one-month period starting from 31st January 2020. An interviewer-administered questionnaire was used to collect data, followed by a simple physical examination of each child. Data were analyzed using Minitab 18 statistical software. Among the participants, majority of the children were male (64.6%). The most common type of unintentional home injury was fall injuries (75.76%). In more than one-third of cases (39.39%), mother was the person who was presented with the child at the time of injury. It was found that unemployed mothers were having significantly higher awareness on child safety and injury prevention compared to mothers who were working (p=0.005). The results of this study suggest that falls as the most commonly reported unintentional home injuries which lead to hospital admission among the children under 6 years of age. The findings also reveal that unemployed mothers were having better awareness on child safety and injury prevention.

Keywords: Unintentional home injuries, parental awareness, child safety

Introduction:

Accidental injuries remain the leading cause of death among children aged 1 to 18 years. Every year, millions of children are permanently disabled or disfigured because of accidents (Laursen, Møller, 2009). Most injury-related deaths occur in low and middle-income countries where knowledge is limited regarding injury prevention (Rezapur et al., 2008). In Sri Lanka, childhood injury has been reported as the fourth leading cause of death among children younger than 5 years (Punyadasa and Samarakkody, 2016). Home accidents have been identified as the largest single cause of death after the age of one year and are among the most severe health problems facing the world today. Unintentional injuries are estimated to cause 389,000 annual child deaths in Southern Asia resulting in an annual loss of 74 healthy lives per 1000 population (Hyder et al., 2008). Unintentional injuries refer to the injuries that are unplanned or unexpected. According to the National Safe Kids Campaign in USA, 40% of deaths and 50% of nonfatal unintentional injuries occur in and around the home (Peden and Oyegbite, 2013). Falls, scalds, and burns, glass-related accidents, poisoning, suffocating and choking, strangulation and blind cords, drowning can be considered as most common home accidents (Fox, 2015). In Sri Lanka, the

available literature on accidents among young children is scarce and therefore this study aimed to find out the prevalence of different types of unintentional home injuries among the children under 6 years of age and assess the relationship between the parental factors and awareness on prevention of unintentional home injuries among parents.

Methodology:

A descriptive cross-sectional study was conducted in Sirimavo Bandaranayake Specialized Children's Hospital (SBSCH), Peradeniya. All the children under 6 years, who were receiving treatment at SBSCH, Peradeniya between 31st January to 29th February 2020 and their parents were included in the sample. The selection of the study subjects was done by the researcher by using the available data in the respective bed head ticket (BHT) of each child. Children who were with a clinical diagnosis of unintentional home injury (or any type of injury which comes under unintentional home injuries) were selected as the eligible participants for the study. After selecting the eligible children, permission to include their children in to the study was obtained from each parent or caregiver. Informed written consent was obtained from the respective parent or guardian before the data collection after explaining the study purpose, data collection methods, time duration for data collection, and confidentiality of personal information. A parental interview was done using a strutted interviewer administer questionnaire. The questionnaire consisted of 4 parts socio-demographic characters of the child, description of unintentional injuries, socio-economic characteristic of the parents and parental awareness on child safety. Approximately 20 minutes were taken to fill one questionnaire. Besides the questionnaire, a simple physical examination of each child was carried. The physical examination was carried out with the presence of relevant parent or guardian and the privacy of the children was maintained throughout the examination. Pretest of the study was done with 10 parent-child pairs who were admitted to the SBSCH, Peradeniya due to unintentional home injuries and they were excluded from the final sample. Ethical clearance for the study was obtained from the Ethics Review Committee of the Faculty of Allied Health Sciences, University of Peradeniya (AHS/ERC/2019/074). And the permission to collect data was obtained from the director, SBSCH. Informed written consent was obtained from the participants before data collection after explaining the purpose of the study. Privacy and confidentiality of the collected data were strictly maintained throughout the study. All the data collected were entered into an excel spreadsheet and then analyzed using Minitab 18 statistical software. Descriptive statistics were presented as mean±standard deviation (SD) and as percentages. In order to assess the impact of parental factors on parental awareness on child safety, 18 questions from part 4 of the questionnaire were selected. The answers which indicate the parental awareness was good have been given score “1” (one) and answers which indicate poor parental awareness were given score “0” (zero). One-way ANOVA test was carried out to assess the effects of parental factors on the score of parental awareness on child safety (Table 1). Then the analysis was repeated by diving parents into two groups based on the total score on child safety awareness as; “group 1 = having good awareness on child safety” and “group 2 = having poor awareness on child safety”. Accordingly, those who gained scores of equal or above 11 were categorized as group 1 and those who scored 10 or below were categorized as group 2 (Figure 1). A chi-square test was carried out to assess the relationship between 2 parental groups based on awareness score and the maternal employability.

Results and Discussion:

Unintentional home injuries are among the leading causes for hospitalization of young children. In the present study, data were collected from 99 parent-child pairs who were admitted due to unintentional home injuries to the SBSCH, Peradeniya. The mean age of the children was 40.9±15.3 months. Majority of children were males (64.6%). This finding is consistent with the findings of Schwebel in 2014 (Schwebel, 2014). The reason behind this finding might be because of the higher activity level of male children compared to female children. SBSCH is the only one hospital solely dedicated only for children's care in Central Province, Sri Lanka and it accommodates patients from all over the country. Supporting this, the current study sample consisted of residents from urban (37.4%), rural (53.5 %), and estate (9.1%) areas with the highest proportion from rural areas. A quasi-experimental study which was conducted by Ihalahewage, Fernando and Weliange in 2018 revealed that burn injuries (31%) as the most common type of injury among the children under five years of age in two villages in Sri Lanka. In contrast, the findings of the current study revealed falls (75.8%) as the most common type of unintentional home injury among the children under 6 years of age. The other types of reported injuries in Ihalagama *et al*.'s study were cut injuries (18.2%), fall (18.2%), animal bites (13.6%), and chemical/invasive things penetrating body (13.6%), while the current study reported burns (4%), animal bite (1%), foreign body ingestion (5.1%), cut injuries (5.1%) and other injuries (5.1%). Among the children who were admitted due to the foreign body ingestion, 80% of the children were ingested small watch batteries. Besides the main types of injuries, crush injury was reported under the category of other injuries. One reason for this difference might be due to the conducting of current study in a specialized children's hospital whereas Ihalagama *et al*.'s study was conducted in the community. Also, the slight difference of age limits of the two studies might affect the results.

The current study also assessed the risks of home environments such as in kitchen, bedroom, living room, garden, and other places, and the findings revealed that most of the injuries occurred in living room. This was evidently shown from the injury prevalence data of the current study by highlighting living room (46.5%), bedroom (23.2%), garden (20.2%), and kitchen (10.1%) as the places where injuries occurred. Among the accidents which were occurred in living rooms, 76.1% accidents were fall injuries and the mean age of this group (falls in the living room) was 43.9±12.4 months. These findings stressed the need of improving parental awareness on arranging living rooms to maximize the child's safety. It is important to educate the parents to avoid high places inside the living rooms where children can easily climb and not to keep the children in high places/chairs without attention especially when they are having children under 4 years of age. However, the study done by Ihalahewage *et al*. revealed more accidents occurred in kitchen and garden (31.8%), and other places were bed room (23.2%) and living room (13.6%). Ihalahewage *et al*.'s study also revealed that most home injuries (82%) had occurred when someone was near or around the injured child and in consistent, the current study found that more than one third of children were injured while their mothers with them (39.4 %). Also, the currents study found that 74.8% of parents were aware that there are many chances for their children to meet with severe accidents in their home environments. At the same time, more than half of the parents (60.6%) mentioned that their houses provide some kind of safety to their children to protect against unintentional injuries. Moreover, the present study found that mean score for the parental awareness on child safety was 11.2±1.9 (range 6.0 to 15.0). The results of the one-way ANOVA revealed that none of the

studied parental factors was found to be associated with their awareness on child safety and injury prevention. However, even though it was not reached the level of significance, it has found that mothers who were not employed (11.6±1.9) having a higher mean score of awareness on child safety compared to mothers who were employed (10.9±1.9) (p=0.059) (Table 1).

Table 8: Relationship between parental factors and awareness on child safety and injury prevention

Characteristics		**n**	**Parental awareness mean score ± SD**	***p*[a]**
Living area	Urban	37	11.5 ± 1.7	0.094
	Rural	53	11.2 ± 1.9	
	Estate	09	10.0 ± 2.4	
History of having previous accidents to this child	None	82	11.4 ± 1.9	0.231
	Once	15	10.5 ± 1.8	
	Twice	02	11.5 ± 0.7	
Maternal age	Less than 25 years	05	10.4 ± 1.5	0.656
	25-34 years	51	11.4 ± 1.9	
	35-44 years	38	11.2 ± 1.9	
	Above 45 years	05	10.8 ± 1.8	
Maternal level of education	Grade 6-O/Level	04	10.5 ± 3.7	0.671
	Passed O/Level	56	11.1 ± 1.8	
	Passed A/Level	33	11.5 ± 1.7	
	Higher education/degree	06	11.0 ± 2.0	
Maternal employability	Employed	50	10.9 ± 1.9	0.059
	Not employed	49	11.6 ± 1.9	
Father's age	Less than 25 years	03	11.0 ± 1.0	0.985
	25-34 years	37	11.2 ± 1.9	
	35-44 years	53	11.3 ± 1.9	

	Above 45 years	06	11.0 ± 1.7	
Father's level of education	Grade 6-O/Level	11	10.2 ± 2.2	0.231
	Passed O/Level	48	11.3 ± 1.9	
	Passed A/Level	34	11.5 ± 1.7	
	Higher education/degree	06	11.0 ± 2.0	

[a] *p* value generated from the one-way ANOVA test.

According to the chi-square test statistics, it was found that mothers who were not employed are having a significantly higher mean score compared to those who were employed (p=0.005) (Figure 1).

A community-based descriptive cross-sectional study which was carried out among children aged 1 to 4 years residing in an urban setting of Sri Lanka by Punyadasa and colleague in 2015, found that low monthly income of the family, the children being care by person other than mother, and frequent alcohol consumption of father were significantly associated with the occurrence of unintentional home injuries among children. Even though the current study was not to assess the overall prevalence of injuries among children as it included all injured children, it was found that none of the studied parental factors were associated with parental awareness on child safety and injury prevention other than the maternal employability. This might be due to the mothers who were not employed are having more time to spend with their children compared to those who are employed. However, the sample size of the current study was limited to 99 child-parent pairs and it may affect the findings of the study.

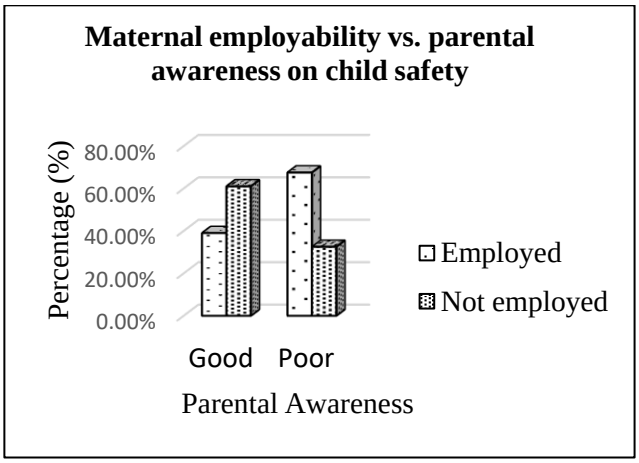

Figure.1: Maternal employability vs. parental awareness on child safety and injury prevention

Conclusion and Recommendations:

In summary, the results of the current study suggest that the most common type of unintentional injury leading to hospital admission among children under 6 years of age was fall injuries. The findings also reveal that unemployed mothers were having better awareness on child safety and injury prevention. However, this study has potential limitations. Small sample size is the major limitation of this study. Besides, these findings may not be able to generalize into the whole Sri Lankan population as it was conducted only with inpatient children at one of the Specialized Children Hospitals in Sri Lanka. As the majority of the unintentional home injury cases were fall injuries, programs to improve the parental awareness on child safety can be implemented at community-level especially through maternal and child welfare clinics. It is recommended to do further studies to assess the parental awareness on child safety and injury prevention and affecting factors, addressing some of the limitations of this study.

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Relationship Between Hip Abductor Muscle Strength And Flatfoot Deformity Among Undergraduates At Faculty Of Allied Health Sciences, General Sir John Kotelawala Defence University

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Abstract: Numerous factors and many inter relationships between various anatomical deformities affect flatfoot. The objective of this study was to find the relationship between Arch Index and hip abductor muscle strength in both unilateral and bilateral flatfoot among undergraduates, at the Faculty of Allied Health Sciences (FAHS), General Sir John Kotelawala Defence University (KDU). A descriptive cross-sectional study was carried out including 510 students, aged between 19 - 40 years. Flat foot students were identified using the Arch index (AI) using modified Harris matt and AUTOCAD software. The hip abductor muscle strength was measured using modified Sphygmomanometer. The results indicated statistically significant relationships between unilateral and bilateral flatfoot with hip abductor muscle strength. A weak negative correlation was noted between left side hip abductor muscle strength and AI among the students with bilateral flatfoot ($p=0.04$, $r= -0.15$) and also between left side hip abductor muscle strength and left side AI in left unilateral flatfoot students ($p=0.04$, $r= -0.32$). However, no significant difference was noted between hip abductor muscle strength and the presence of flatfoot.

Keywords: Flatfoot, Hip abductors, Arch index

Introduction:

Flatfoot is any condition of the foot in which the medial longitudinal arch of the foot is lowered or lost. Therefore, the medial longitudinal arch is a main reference for the diagnosis of flatfoot (Villarroya et al., 2008). The foot typically is characterized as having three arches: medial and lateral longitudinal arches and the transverse arch, of which the medial longitudinal arch is the largest. These three arches fully integrated with one another to enhance the dynamic function of the foot (Levangie, Norkin and Lewek, 2019). A study done in India revealed 13.6% (for males-12.8%; for females-14.4%) prevalence of flat foot population (Aenumulapalli, 2017). Furthermore, no research had been conducted on prevalence of flatfoot among undergraduate students in Sri Lanka. A research was conducted among: 6-10-year-old children to find the flatfoot prevalence in the central province of Sri Lanka and to identify the associated factors of flatfoot. The prevalence was found to be: 16.06 %. (V. Senadheera, V., 2016). Objectives of the study were to determine the proportion of flatfoot among undergraduates of FAHS, KDU, to identify the hip abductor muscle strength in both flat foot and non-flatfoot group of students in FAHS, KDU and to identify the relationship between hip abductor muscle

strength and arch index in both bilateral and unilateral flatfoot.

Methodology:

Study design was descriptive cross-sectional study at the Faculty of Allied health sciences, General Sir John Kotelawala Defence University. All the undergraduates of Faculty of Allied Health Sciences, General Sir John Kotelawala Defence University, during the study period of July – August, 2019 were selected as the study population (n=510). Convenience sampling method was used.

Figure 1: Taking foot prints

Demographic characteristics including weight, height, age, and gender was noted prior to footprint analysis. Harris mat was used to take the flatfoot measurements. Harris mat is a noninvasive, sensitive and specific method in recording foot patterns in order to aid clinical diagnosis, decision making and follow-up of flatfoot (Welton, 1992). Researchers had created Modified Harris mat using locally available resources which gives similar foot print to Harris mat to obtain foot prints as the original Harris mat was expensive and difficult to find. (Kilmartin et al., 1994).

Figure 2: Foot print

Flatfoot measurements were taken according to the arch index. The normal Foot arch index is 0.21- 0.26. Flatfoot is diagnosed when AI Ratio is >0.26, and high arch foot is when arch index is <0.21. While taking hip abductor muscle strength measurements, test limb is kept at 0° flexion and 0° abduction at the hip and full knee extension. The contralateral hip and knee was flexed to 90° to provide stability. A pillow was placed in between the two lower limbs to maintain neutral position of hip and prevent abduction or adduction of the test limb. The center of the device was placed 5 cm proximal to the lateral malleolus (Steffen et al. 2008). The participant was instructed to maximally push upward into the device for 5 seconds that was stabilized by the rater's hands to create a make test procedure, which has been demonstrated to be more accurate than a break test for hip abduction assessment. A rest period of 60 seconds was provided between each maximal contraction of both tests, allowing adequate time for muscle restoration (Hébert et al. 2011).

Body weight and height was measured on a stadiometer with a weighing scale (China, 2018) and measurements were taken in same room temperature and time frame. Height was measured to the nearest centimeter and weight was measured to the nearest kilogram. Each measurement was taken thrice and mean value was recorded.

Height, weight, hip abductor muscle strength measurement and flatfoot analysis was performed by different examiners throughout the data collection procedures. This eliminated the subjective human errors that could occur during the process of obtaining measurement. All the data collected was analyzed using the IBM SPSS Statistics software version 20. $P<0.05$ will be considered statistically significant among the obtained parameters.

Results, discussion and conclusion:

To determine the proportion of flat foot among undergraduates of Faculty of Allied

Health Science, Sir John Kotelawala Defense University

When measuring the arch index (AI); the foot prints were taken by using Harris mat and AI were calculated by using AutoCAD software (version 20). Among the students 201(39.4%) were bilateral flatfoot, 47(9.2%) were right sided flatfoot, 45(8.8%) were left sided flatfoot, 184(36.1%) were normal footed, 8(1.6%) were right sided high arched, 11(2.2%) were left sided high arched, 14(2.7%) were bilaterally high arched. The flatfoot prevalence of the study is high compared to other related studies. This could be due to the increased sample size in our research compared to these studies and the other reason would be due to the different age ranges compared to these studies. As in our study the age ranges from 19 to 40 years while other studies could be stated as; (Bhoir,Anap and Diwate,2014) 18 – 25 years,(Porghasam,2016) 6 - 18 years, (Aneumulapalli,2017)18 - 21 years.

To identify the hip abductor muscle strength in both flat foot and non-flat foot groups of students in Faculty of Allied Health Science, Kotelawela Defense University

The mean hip abductor muscle strength in right and left sides of both flat-foot and non-flat foot groups respectively was 69.15 (SD 21.845) and 67.73 (SD 22.919). In the flat foot population; right side mean hip abductor muscle strength was 67.63 and left side mean hip abductor muscle strength was 17.64. In non-flatfoot population; right side mean hip abductor muscle strength was 71.2 and left side mean hip abductor muscle strength was 15.45. Independent sample t test was used to analyze data. Comparing hip abductor muscle strength in males and females, in male population; right side mean hip abductor muscle strength was 76.17 and left side mean hip abductor muscle strength was 73.12. In female population; right side mean hip abductor muscle strength was 66.06 and left side mean hip abductor muscle strength was 65.36. Independent sample t test was used to analyze data. The significance value of right side and left side hip abductor muscle strength in males and females are 0.00. When considering the hip abductor muscle strength of both flat foot and non-flat foot group of students; we found a significant difference in hip abductor muscle strength of males and females. Similar results were reported by Elisabath, Coombs and Daielsvy, 2018 where male's hip abductor strength was higher than females. Considering the muscle mass to body mass ratio, this ratio is more in males compared to females as male's fiber mass is considerably higher compared to females and males exert more force compared to females.

To identify the relationship between hip abductor muscle strength and arch index in bilateral and unilateral flatfoot

Pearson correlation test was used to find the relationship between hip abductor muscle strength and arch index in bilateral and unilateral flatfoot students. In bilateral flatfoot, considering the left side hip abductor muscle strength and AI index; right side dominant had a significance value of 0.04 and Pearson correlation coefficient of -0.15. In left unilateral flatfoot, considering the left side hip abductor muscle strength and AI index; left side dominant had a significance value of 0.05 and Pearson correlation coefficient of -0.32. According to our study we found a significant relationship between hip abductor muscle strength and AI index; increased arch index causes reduction in hip abductor muscle strength. A similar finding was suggested in a study done by Noorollah and Yashar, 2015. This could be due to a neuromuscular compensation of the body resulting from over loading of the medial longitudinal arch and changes in medial longitudinal arch.

In conclusion, a significant difference in hip abductor muscle strength between males and females was identified. A weak negative

relationship between hip abductor muscle strength and arch index in unilateral and bilateral flatfoot individuals was also found in our study.

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Family Members Experiences Related to Organ Donation of their Brain Death Patient

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Abstract: Organ transplantation from brain dead patients in Sri Lanka has become a critical medical intervention since the availability of organs has fallen behind the requirement. Nonetheless, the difficulty in obtaining the consent by the family members still exists as it was. This study aimed to describe the family members' experiences related to organ donation of their brain death patients in Neuro - Surgical Intensive Care Unit in National Hospital of Sri Lanka. Ten immediate family members who have provided their consent to proceed with an organ donation of their loved ones were selected purposively. The interviewing was held at the hospital premises. This was conducted as a phenomenological study. Data collection was performed with semi-structured interviews using a theme guide from March to June 2019. Thematic analysis was used for data analysis. Ethical approval was obtained from the National Hospital of Sri Lanka. Three themes that emerged from the transcribed interviews were: decision conflict, respecting the donor and acceptance of the unexpected death. Stressful decision making, family involvement and internal dissonance were the sub-themes emerged from decision conflict. Further, religious beliefs, honouring the donors' wishes, saving recipient life, letting the donor live on and comforting the grief were the sub-themes derived from respecting the donor. Dedication of health care professionals, the ambiguity of brain death and awareness derived from the last theme. The study revealed that the overall attitudes towards organ donation of a brain death patient exist to a slight negative bias among Sri Lankan society. Hence it is recommended to have public educational interventions to educate the society regarding organ donation.

Keywords: Brain death, Organ donation, Family Members, Experience

Introduction:

The concept of brain death can be defined as the irreversible end of all brain and brain stem activities. Moreover the concept of brain death varies with other acute brain disorders like the vegetative state and coma (Yousefi et al, 2012). Due to the existing cultural and religious diversity in the world, different imaginations are embedded among people regarding brain death patients. Further their experiences were also affecting for their attitudes regarding brain death (Groot et al, 2012). The concept of brain death have paved pathways in a new dimension for the organ donation process. Instructions for the organ transplantation is also appearing in WHO guiding principles on human cell, tissue and organ transplantation, 2010.

Considering the organ donation in the international context, the rates on organ donation in India was identified as 0.26 per million, United States, it was 25.6 per million, 18.3 per million in United Kingdom and 32 per million in Spain (Wig et al, 2003). Considering the Asian context, it is clear that the family members of the brain death patients with other intact organs have to face an ethical dilemma. Providing the consent or taking the decision to donate organs were mentioned as the most difficult and complicated issue).

Furthermore factors like bodily disfigurement of the dead patient, failure of the families to understand the concept of brain death have highly influenced in decision making (Anker, A., 2010). Global statistics have confirmed that only 10% of the global needs of the organ transplantation is met (Matesanze et al, 2017). Each day around 60 patients all over the world were getting an organ transplantation. Nevertheless 13 patients die with unavailability of organs all over the world (Sulania et al, 2016)

As a developing country still Sri Lanka has many people who are in the waiting list for an organ transplantation. Yet the donated organs were less than the requirement. Most of the patients who are brain death are buried in Sri Lanka due to the unwillingness of the family members to donate. Therefore this was conducted in the aim of exploring the family members' experience who are directly involving with the organ donation of their brain death patients in Neuro- Surgical Intensive Care Units in National Hospital of Sri Lanka. Specific objectives of the study were, to identify psychological experiences of the family members related to the organ donation of their brain death patients, to explore socio-cultural experiences of the family members related to the organ donation of their brain death patients and to describe institutional experiences of the family members related to the organ donation of their brain death patients in Neuro- Surgical Intensive Care Units in National Hospital of Sri Lanka.

Methodology:

This was a qualitative study with descriptive phenomenological approach. The study was conducted in the premises of the National Hospital of Sri Lanka (NHSL). Study participants were the family members of brain death patients who were admitted to Neuro – Surgical Intensive Care Units. They were in the age group of 30 -67. There are five Neuro Trauma Intensive Care Units in the NHSL including an emergency treatment unit. Ten immediate family members from ten families were selected purposively joined the study to provide face to face semi structured in depth interviews. The inclusion criteria for the participants was being an immediate family member who has signed a consent form for an organ donation. Ethical approval for the study was granted from the ethics review committee of the NHSL.

Written invitations were provided for the participants and obtained the informed consent to conduct the study. Semi-structured in-depth interviews were conducted with the ten participants for a half an hour to one-hour length depending on the participant's demand. The participant's confidentiality was maintained throughout the study by using a specific code to identify the participant. An interview guide developed by exploring the literature provided the main structure for the interviewing process. The theme guide was validated with the expert guidance and opinion. Interviews were initiated with the question "can you disclose about yourself". Eventually the investigators have asked about the experiences of the family members. Interviews were ended when the investigators were satisfied and believed that all the necessary information were gathered and the data were saturated. All the recorded interviews were transcribed and primary codes were derived. Then the subthemes and themes were derived according to the thematic analysis. The rigor of the study was maintained by the investigators by consulting the supervisors and the subject experts.

Findings:

Three main themes and eleven sub themes were generated with the data analysis. Main findings were represented in the table 1. Three main themes emerged were the decision conflict, respecting the donor and the acceptance of the unexpected death.

The theme of 'decision conflict' explored the stressful decision making, family involvement and internal dissonance. Stressful decision making expressed by the family members are in a shocked and panicking behaviour. They are expecting a miracle to happen and save the patient.

"*I saw my sister was sleeping on the bed. She breathe well with the help of a machines. First I can't believe that her brain was not working. (Silence) I thought she was having a comfortable sleep there" (Participant A)*

Family involvement plays a major role in attempting to do an organ donation, there the immediate kin of the donor was not the only person to take decisions but his/her other relatives involve too. Cooperativeness and the understanding is a much more convenient in this regard.

"Organ donation is such an important issue. During our gathering we were used to spoke about such topics. We donated our father's eyes also when he was died. I also spoke to my children about my wishes. My other two sisters and their children also accepted the decision without any hesitation. One of our daughter is married to a doctor. As a health care person his involvement made the family decision more comfortable." (Participant B)

Most of the family members experience uncertainty and dissonance after making the final decision, some of the families who have agreed to donate their loved one's organs suffered from uncertainty and dissonance regarding the organ donation process. Some internal conflicts have also emerged on the confirmation of the death as well. They think that their relative physically appeared alive and normal since they don't have any visible injuries.

"Sometimes I thought that I should have kept him. May be he would have recovered from the coma. Sometime I asked myself if I was on the wrong side…….. (Sigh)."(Participant C)

Table 1: Family members' experiences related to organ donation of their brain death patient

Themes	Sub Themes
Decision Conflict	Stressful Decision Making, Family Involvement Internal Dissonance
Respecting the Donor	Religious Beliefs Honoring the Donors' wishes Saving Recipient's Life Letting the Donor live on Comforting the Grief
Acceptance of Unexpected Death	Dedication of Hospital Staff Ambiguity of Brain Death Awareness

Respecting the donor has derived five sub themes as, religious beliefs, honoring the donor's wishes, saving recipient's life, letting the donor live on and comforting the grief. Religious beliefs are one of the main concerns that are embedded among the family members. Most of them believed that donation will help the dead person in their afterlife.

"My sister is young. There is no meaning to just bury her body in vain. By giving her organ to another one can survive another life. Because of this she will be merited. Not only her, we too got a chance to involve in a donation."(Participant A).

Honouring the donors' wishes help in making the relations to conclude about the act of donation.

"My husband had a living will that in the case of his death. He wanted to donate his body…..then we agreed to donate his organ according to his will to honour him."(Participant G)

Saving recipient's life came up with the relative's perceptions on improving the survival and quality of life in patients regarding a transplant and therefore participants appeared to believe that the consent for the donation should be given without expecting anything in return.

"*Even though we don't know the person who received the organs, it is very pleasure to think*

that we helped to save another person's life."(Participant G)

Letting the donor live on provide the idea that the family members believe their loved one will be living on another person's body. So that it provides them the idea that the patient is no longer dead.

"I know that my husband's organ alive on somebody. I'm happy to think about that. Even though I was alone he gave life to another one. I think that I should remind this at three month Dana Ceremony." (participant J)

Comforting the grief in the sense of relieving from the thought of separation from the family. They think donation will make them a factor to celebrate in a good manner.

"We wish not to have unexpected death after a while. We made up our minds by giving his organ". *(Participant I)*

The theme 'accepting the unexpected death' has derived three subthemes as dedication of the hospital staff, ambiguity of brain death and awareness. Dedication of the hospital staff was derived due to the immense dedication that is being provided by the staff of the hospital, specially the intensive care units. They try their best to save the lives yet at last they failed.

"Doctors and nurses do everything to save my son. I don't know what to do. They do everything to my son. There's nothing I can do. I only trust about the medical team. We saw how much they try to save my son. But at last we all failed. (crying……..)." (Participant F)

Ambiguity of brain death signifies that the most of the family members were very unlikely knowing the terms and conditions related to brain death. They were so frustrated with this new information. All the terms are a lot new for them.

"*I never got to know about brain death. I was confused how other body parts live in a brain death person."(Participant C)*

Awareness explains the brain death and organ donation is a new concept to the Sri Lankan society. Since then there is no well-planned public awareness program to update the public. As well as normally Sri Lankans are not motivated enough to see medical information as a habit. So giving adequate information is a key role in organ donation process. Most of the participants had positive responses about the information from health professionals.

"Doctors explained me that even though my father's brain was death his organs work well. The doctor calmly explained the situation in detailed. After that we gave consent." (Participant C)

Discussion:

The study identified both positive and negative experiences of family members regarding organ donation of their brain death patient. Several Themes that were based on lived experiences of the participants were emerged with the organ donation process of the brain death patient. The discussion highlights the importance of the study and the findings of the study that may be benefitted in filling the existing gap in the field.

Psychological experiences of family members regarding organ donation

Stressful decision making is the most significant finding of this study. It is because most of the brain deaths are unexpected ones and the relatives feel sense of shock and panic. Some relations think that the patient's condition will reverse by miracle. This is consistent with a study conducted in China where it is described that disbelief, anxiety and acute psychological stress have been experienced in most of the families when faced with a brain death member (Wong & Chan, 2007).

Study revealed that the positive attitudes and cooperative involvement of the family members help to get concrete decisions. An Australian study findings also suggest that

existing, conflicting views and tensions ended up with anxiety and once the family member is over powered by another member make them reluctant to take decisions (Ralph et al, 2013). Moreover the internal dissonance directly affecting the decision making process. Healthy appearance of the body of the patient other than the severe injuries hidden increases the hope of recovery of the patient. According an Iranian study it is revealed that the more important the family role the patient plays, more the expectation of the recovery of the patient (Yousefi et al, 2012)

Socio cultural experiences of family members regarding organ donation

The current study revealed that religious beliefs play a key role in the decision making. Findings of an Iranian study stated that the chance of donation increases by the increasing one score in the domain religious beliefs (Ahmadian et al, 2009). Moreover another study revealed donating families are highly religious. Family members of these families express that donating is saving life of others in need. Furthermore and Australian study revealed that the diseased donor would be rewarded in their afterlife for fulfilling the religious teachings. It is seen that families tend to donate organs to save others' lives and helping them in the necessity. (Wilson et al, 2006)

Moreover honouring the donor's decision was very much important in organ donation. This finding was consistent with an Australian study, where the family members were confident about the patient's decision that makes them comfortable with donating. (Ralph et al, 2013). Further this allows the donor live on which was also confirmed by the Australian study where they have stated, donating the organ will let them live on another person body. This makes them to release the grievance come with the complete departure from the family as well (Ralphe et al, 2013).

Institutional experiences of family member regarding organ donation

It is clear that the awareness provided on organ donation support the procedure, further this was also confirmed with Australian study where increasing the awareness of the family would be benefiting on late support in donation of the organs. Ambiguity of brain death happens due to the lack of knowledge on brain death on family members. The same concept evolved since participants request more comprehensive information on brain injuries and how they are medically confirmed (Ralph et al, 2013).

Conclusion

Beliefs and experiences revealed by the participants along with the ambiguity on brain death and organ donation is clearly emerged through the interviewing process. Family members of the brain death patients would be much benefited if much information about brain death identification is disclosed. This might help in improving the rate of organ donation currently existing in Sri Lanka.

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Investigation of Nasal Colonization of Methicillin-Resistant *Staphylococcus aureus* Among Nursing Students at a University in Sri Lanka

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Abstract Methicillin-Resistant *Staphylococcus aureus* (MRSA) is one of the important pathogenic bacteria within the hospital and the community. Asymptotic nasal carriers are potential sources for transmission and subsequent infection. Objectives of this study were to determine the MRSA nasal colonization among nursing students of the Department of Nursing, Faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka and to assess associated risk factors. This was a descriptive cross-sectional study which was conducted from January 2020 to March 2020 with voluntary participation of 135 nursing students. Relevant data were collected by using a pre-tested, self-administrated questionnaire. Participants were requested to collect nasal swabs to investigate colonization of MRSA. Routine standard microbiological methods were used to isolate *Staphylococcus aureus* and cefoxitin disk diffusion method used to detect methicillin sensitivity. Collected data were statistically analyzed and the possible associations with risk factors were assessed by cross tabulations and chi-square test. Total of 135 participants constituted with 34 males and 101 females between 21-27 years. Out of them 15.56% (21/135) were identified as colonized with *Staphylococcus aureus* and 5.19 % (7/135) were MRSA. History of skin infection was the only known risk factor identified as associated with MRSA nasal colonization (OR=26, CI=2.99-226.13, p=0.00). Although identified MRSA colonizers are relatively low in the present study they are potential candidates for transmission and is a concern in healthcare facilities. As screening programs are limited in Sri Lanka due to lack of facilities and financial resources, students should be emphasized regarding simple preventive measures such as hand hygiene.

Keywords: Methicillin-Resistant *Staphylococcus aureus* (MRSA), Nasal colonization, Nursing students, Risk factors

Introduction:

Staphylococcus aureus is a human commensal bacterium, 20-30% of the healthy human population carries it on the skin and mucous membranes especially in nose and perineum (Sakr *et al.*, 2018). Although it is a human commensal it can invasive and cause wide range of infections including skin abscess, post-operative wound infections, septicemia and pneumonia. (Guidelines for the Control of Methicillin-resistant *Staphylococcus aureus* in New Zealand, 2002).Treatment of *Staphylococcus aureus* infections has become more complicated and significantly limited due to MRSA strains(Prates *et al.*, 2010) (Al-tamimi *et al.*, 2018). The majority of hospital-acquired infections (HAI) are caused by MRSA Strains. Worldwide largely concern about increasing prevalence of MRSA infections and controlling the spread of organisms (Thevanesam *et al.*, 2013). The primary route of MRSA transmission in the health care setting is through, direct contact with an infected person, contaminated hands of healthcare workers and, asymptomatic carriers of MRSA (Tong *et al.*, 2015).Usually, MRSA carriers are not clinically infected but MRSA organisms can be colonized on their

skin (odu NN, 2012). Most areas of the body can colonize with MRSA, but nose, throat, groin, and hands have been identified as hotspots for MRSA colonization (Brown *et al.*, 2015). It has identified nasal carriers are playing a key role in pathogenesis and subsequent MRSA infections (Prates *et al.*, 2010). Screening has facilitated the early identification of the MRSA colonized individual and promote contact precautions. It is involved performing culture and sensitivity test on a collected sample such as nasal, groin, and throat. Nursing students are encountered with more patients and involved in direct patient care during the clinical practice at the hospital. Due to prolonged contact with the patients, there is a significant risk of transmission pathogens among nursing students and patients. Hence, this study was designed to identify the nasal colonization of MRSA, and to evaluate the associated risk factors among nursing students at the Department of Nursing, Faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka.

Methodology:

Study design and Setting

A descriptive cross-sectional study was conducted from January 2020 to March 2020 at the Faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka. A total of 135 undergraduate nursing students from first year to the final year, who are currently engaged in hospital based clinical training were recruited according to the inclusion and exclusion criteria. Therefore Students who had contraindications for nasal sampling such as recent nasal surgery, active nasal bleeding and use of nasal medications were excluded.

Data collection and sample processing:

A pre-tested, self-administered questionnaire was administered to the participants to assess socio-demographic factors and known MRSA risk factors.

Self-collected nasal swab samples were used to investigate the colonization of MRSA in the nasal cavity. Pre-moistened (with sterile saline) swab used to collect sample along with the questionnaire. Collected samples were transferred to the Department of Microbiology, Faculty of Medicine, University of Peradeniya with minimum delay for specimen processing. Collected nasal swabs were enriched in 7% NaCl nutrient broth individually and incubated for overnight at 35° C. Enriched samples were inoculated on mannitol salt agar and incubated at 35° C for 18-24 hours. Following the incubation, observed for suspected staphylococcus colonies according to colony morphology (suspected colonies appeared yellow colour in mannitol salt agar).

Suspected staphylococcus colonies sub cultured on blood agar and incubated at 35° C for 18- 24 hours to obtain pure-isolates. Gram staining, catalase enzyme test, slide coagulase, tube coagulase and DNase test performed for identification of *Staphylococcus aureus*. Methicillin sensitivity test for *Staphylococcus aureus* were tested by using the standard cefoxitin disc diffusion method according to guidelines of the Clinical and Laboratory Standards Institute. The inhibition zone diameter was measured and interpreted using CLSI recommendations (resistant≤ 21 mm, sensitive ≥ 22 mm)(Clinical and Laboratory Standards Institute, 2018).

Ethical consideration:

Ethical clearance was obtained from the Ethics Review Committee of Faculty of Allied health Sciences, University of Peradeniya *(AHS/ERC/2019/064)* on 19th December 2019.

Data analysis

Data were analyzed by statistical package for social sciences (SPSS) 25.0 version. First analyzed for frequencies and then descriptively. Cross tabulation by the chi-square test were done to explore possible association between MRSA nasal colonization and known risk factors.

Results and Discussion:

Out of 160 nursing students, 135 (84.4%) students from first year to final year, who were matched with inclusion and exclusion criteria were voluntarily recruited for the current study. The age ranged between 21 and 27 years and mean age of the participants were 23.66 years ± 1.10. Among the participants, 25.19% (34/135) were males and females were constituted 74.81% (101/135). The distribution of students according to the year of study as follows; 32.6% (44/135) were from the first year and respectively, 32.6% (44/135), 19.3% (26/135), 15.6% (21/135) from the second year, third year and fourth year. The majority of study participants are residing in university hostels 83.7% (113/135), students from boarding houses and homes were 16.3% (22/135). Among the participants 83.7% (113/135) are living with three or more members in above said accommodation facility and 16.3% (22/135) were living with less than three members.

Staphylococcus aureus nasal colonization and methicillin resistance

Out of 135 nursing students, *Staphylococcus aureus* was identified among 21 amounting to 15.56% (21/135), out of them 7 were identified as MRSA 5.19% (7/135). Accordingly Out of all identified *Staphylococcus aureus* isolates only 33.3% (7/21) were Methicillin resistant.

MRSA nasal colonization among male participants were 8.8% (3/34) and among females were 4.0% (4/101). All the

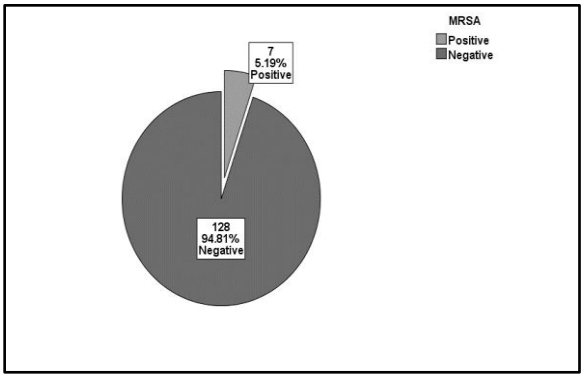

Figure: 1. Representing nasal colonization of MRSA among the participants

participants with MRSA nasal colonization were residents of the university hostels amounting to 6.2% (7/113) and crowded with three or more members in their living room 6.2% (7/113). There was a statistically significant association between history of skin infection in the past 12 months and MRSA nasal colonization 20% (6/30) (OR=26, CI=2.99-226.13, p= 0.000) but any other risk factor did not show any significant association between risk factors and MRSA nasal colonization. Although there was not statistically significant association between MRSA nasal colonization and clinical meeting with a MRSA infected or colonized patient majority of participants have met a patient with MRSA infection or colonization during their clinical training. Out of them 6.7% (7/89) were colonized MRSA while 5.6% (4/71) had nursing care experience with a MRSA infected or colonized patient. Almost, all the participants with MRSA nasal colonization 100% (7/7) practiced hand hygiene after contact with patients. Among the MRSA colonizers only one have used antibiotic in the past three months 1.8% (1/56).

Table: 1. Association of socio-demographic factors and risk factors for nasal colonization of MRSA among the participants (n=135)

Associated factor		MRSA colonization		p value
		Positive n (%)	Negative n (%)	
Demographic factors				
Gender	Male (n=34)	3(8.8)	31(91.2)	0.269
	Female (n=101)	4(4.0)	97(96.0)	

Accommodation	Home or Boarding room (n=22)	0(0.0)	22(100.0)	0.231
	Hostel (n=113)	7(6.2)	106(93.8)	
Number of room members living in one room with participant	Less than 3 (n=22)	0(0.0)	22(100.0)	0.231
	Three or more together (n=113)	7(6.2)	106(93.8)	
Risk factors				
Family history of infection and colonization	Yes (n=5)	0(0.0)	5(100)	0.739
	No (n=130)	7(5.3)	123(94.6)	
Clinical exposure to a patient with MRSA infection or colonization	Yes (n=89)	6(6.7)	83(93.3)	0.257
	No (n=46)	1(2.2)	45(97.8)	
Provided nursing care to a patient with MRSA infection or colonization	Yes (n=71)	4(5.6)	67(94.4)	0.804
	No (n=64)	3(4.7)	61(95.3)	
Hand hygiene after contact with patient	Yes (n=131)	7(5.3)	124(94.7)	0.635
	No (n=4)	0(0.0)	4(100)	
Hospitalization in the past 12 months	Yes (n=16)	0(0.0)	16(100)	0.319
	No (n=119)	7(5.9)	112(94.1)	
Undergone surgery in the past 12 months	Yes (n=4)	0(0.0)	4(100)	0.635
	No (n=131)	7(5.3)	124(94.7)	
Skin infection in the past 12 months	Yes (n=30)	6(20.0)	24(80)	0.000
	No (n=105)	1(1.0)	104(99.0)	
Use of antibiotics in the past 03 month	Yes (n=56)	1(1.8)	55(98.2)	0.134
	No (n=79)	6(7.6)	73(92.4)	
Involvement of sports	Yes (n=37)	1(2.7)	36(97.3)	0.424
	No (n=98)	6(6.1)	92(93.9)	

Prevalence of MRSA colonization among different communities is reported worldwide including hospital in patients, healthcare workers, medical students, and community (Kim, Yim and Jeon, 2015). Approximately MRSA colonization rate ranged from 5.8 - 17% among health care workers worldwide. Literature showed high prevalence rate of MRSA colonization among health care workers in developing countries (Shibabaw, Abebe and Mihret, 2013). Results of present study is lower than MRSA colonization rates reported among healthcare workers in worldwide.

International studies reported with different rates of *Staphylococcus aureus* colonization among medical students, with the range of 14-45% while MRSA colonization rate within 0 - 14.3% (Al-tamimi *et al.*, 2018). Results of the present study are within the range MRSA colonization rate which reported among medical students. Published data regarding MRSA colonization among nursing students are limited. The MRSA nasal carriage rate of 1.4% (3/215) among nursing students at university in Chungcheongbuk-do, Korea (Kim, Yim and Jeon, 2015) is lower than the findings of the present study.

In Sri Lanka, hospital isolation rates of MRSA is relatively high. MRSA colonization rate was 15.4% (260/1684) on admission among orthopedic patients at Teaching Hospital Peadeniya and patients who negative on admission were rescreened weekly during the hospital stay. Out of 1424 rescreened patients 170/1424 acquired MRSA (Thevanesam *et al.*, 2013). MRSA nasal colonization rate was 6.2% (31/502) among patients admitted to the Karapitiya Teaching Hospital (Kurukulasooriya *et al.*, 2018). But MRSA colonization identified in the present study is (5.19%) relatively lower than MRSA colonization rates identified among hospital inpatients in above studies. Furthermore, MRSA colonization rate was 4.3% among healthy university residential students representing five different faculties at University Peradeniya. Both nasal swabs and peri-rectal swabs were collected in this study. But nasal colonization rate identified in the present study(5.19%) is higher than the rate identified by that study (Munasinghe *et al.*, 2019).

History of skin infection is the only risk factor statistically associated with MRSA

colonization (20.0%, OR=26, CI=2.99-226.13, p value=0.000) in the current study while other studies reported statistically significant association with gender, chronic illness, history of hospitalization and antibiotic usage. But in the present study, none of the MRSA colonizers have been hospitalized for the past 12 months while only one colonizer reported with antibiotic usage during the past 3 months of period. Interestingly in the present study, there was no significant association between clinical exposure and MRSA colonization whereas 6.7% (6/7) of the MRSA colonizers have met a patient with MRSA infection or colonization during hospital training while 5.6% (4/7) had an experience of providing nursing care to a patient with MRSA infection or colonization. Knowledge of basic infection management, proper hand hygiene, and use of protective equipment in nursing care may have affected the transmission of MRSA among patients and students. As most of the known risk factors have not shown to be associated with MRSA colonization in the present study, this may indicate that possible risk factors yet to be identified if any which associate with the nasal colonization of MRSA among nursing students.

Conclusion and Recommendations:

The present study provides an overview of MRSA nasal colonization of the nursing students attached to a university in Sri Lanka. Among 135 nursing students, 15.6% (21/135) which is a significant percentage, was identified as colonized with *Staphylococcus aureus* and 5.2% (7/21) of those were MRSA. As nursing students are involved with healthcare, carriage of MRSA is a concern in infection control. History of skin infection in the past 12 months was the only known risk factor identified in this study with significant association with MRSA colonization. Screening programs are limited in Sri Lanka due to lack of facilities and financial resources. But simple preventive measures such as hand hygiene which is both affordable and effective for preventing MRSA transmission need to be strengthened in healthcare. Awareness of MRSA is vital to prevent transmission and subsequent infections, especially students' exposure to the clinical-setting. Future studies should be conducted in a large population with healthy participants to identify the extent of the carriage and the possible risk factors associated with MRSA colonization. Further molecular studies will be beneficial to characterize MRSA strains associated with healthy individuals.

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Manual Immature Reticulocyte Fraction: a reliable marker to assess post traumatic blood loss.

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Abstract. Hemorrhage is a common stress condition following acute trauma that needs prompt medical attention as it can be fatal. Traumatic haemorrhage be classified into three categories; mild, moderate and severe based on clinical manifestations and outcomes expected with each. However, some instances, clinical features may not reflect exact degree of blood loss due to other comorbid factors etc. Rapid marrow response to haemorrhage includes release of more immature red cells; reticulocytes and normoblasts depending on haemopoietic stimulus. Therefore, the presence of red cell precursors in peripheral blood is an expected marker following acute hemorrhage. Among reticulocyte parameters, Immature Reticulocyte Fraction (IRF) is widely used to indicate the erythropoietic activity of the bone marrow in stress conditions. Even though the manual reticulocyte count is performed in laboratories, calculation of manual IRF is not routinely practiced. Based on morphology, reticulocytes can be classified in to immature and mature sub types. Although automated method is available, it is costly to use. Therefore this study was performed to evaluate the relationship of manual IRF with degree of hemorrhage in acute trauma. In this analytical cross-sectional study, 38 blood samples of acute trauma patients admitted to emergency trauma care at a tertiary care hospital were analyzed. The IRF values were significantly higher in study subjects with severe hemorrhage than mild and moderate. When the time duration from trauma to admission was considered, subjects with clinically severe hemorrhage showed high IRF values within one hour. Appearance of the most immature (stage I) reticulocytes were noted after two hours of trauma in study subjects. Therefore, this study supports us ability of manual IRF in objective assessment of early marrow response to hemorrhage thus assessment of severity of acute trauma. Thus the manual IRF in peripheral blood can be considered an important, reliable and cheap laboratory indicator in acute trauma care in the diagnosis and management acute blood loss.

Keywords: Immature Reticulocyte Fraction, Degree of hemorrhage, Acute trauma

Introduction:

Haemorrhage is a common major complication in acute trauma that needs prompt medical attention as it can cause significant morbidity and mortality due to acute hypovolemia and shock. Clinically, blood loss in trauma care is classified into three categories according to the severity as mild, moderate and severe.This clinical classification aid patient management thus outcomes. Following acute hemorrhage, red cell production is activated in response to impaired tissue perfusion through increased erythropoietin secreted by kidneys. More immature stages of red cells are released into circulation and remain longer in circulationin the presence of erythropoieticdrive together with massive production of red cells predominantly. This is well documented in both haemorrhage and haemolysis.

Immature red cells are detected using a special supra-vital stain and the test is called reticulocyte count. This test specifically stain ribosomes and RNA present in the cytoplasm (and nuclear material). Due to the absence of nuclei in reticulocytes, only cytoplasmic stain of reticulum differentiates immature red cells from other cells with cytoplasmic RNA and ribosomes. According to the Heilmeyer classification, reticulocytes in peripheral blood smears can be classified into four stages (Piva et al., 2015).Those stages of maturation can be identified and counted manually by their morphological features ranging from the most immature reticulocytes with large clump of reticulum (stage I), to the most mature with few granules of reticulum (stage IV). Automated Immature Reticulocyte Fraction (IRF) is a new diagnostic parameter available in novel automated full blood count analyzers, which is widely used to indicate the erythropoietic activity of the bone marrow in stress conditions. However, automated method is prohibitively costly to use in routine care.Therefore, this study was carried out to evaluate the relationship of manual IRF with the degree of hemorrhage in acute trauma.

Methodology:

Ethical approval was obtained from ethical review committee of Faculty of Allied Health Sciences and the permission to collect data from Director, Teaching Hospital, Karapitiya and the relevant Consultants of the units. A total of 38 study subjects including 14 mild, 19 moderate and 5 severe trauma with acute haemorrhage who were admitted to Emergency Treatment unit of Teaching Hospital Karapitiya,Galle were recruited in this study. Individuals with known clinical conditions that could directly affect hematological results were excluded. Venous blood samples collected in to dipotassium ethylenediaminetetraacetic acid (K_2EDTA) containing tubes during routine standard care were used to perform reticulocyte counting. The reticulocyte staining was performed by the researcher according to the standard procedures previously described within one hour of collection of samples. The quality of the stain was verified with the presence of stained platelets and white blood cells as the positive control. The reticulocyte counting was performed using oil immersion bright field microscopy (Olympus CX 32) fitted with an ocular graticule. Immature reticulocytes were enumerated as per the previously defined morphology, Heilmeyer classification (Figure 1).All the reticulocyte counts & IRF counts were performed in duplicates by the researcher and were verified by a Consultant Haematologist. A difference of 10% or less in the duplicate counts was considered as acceptable.

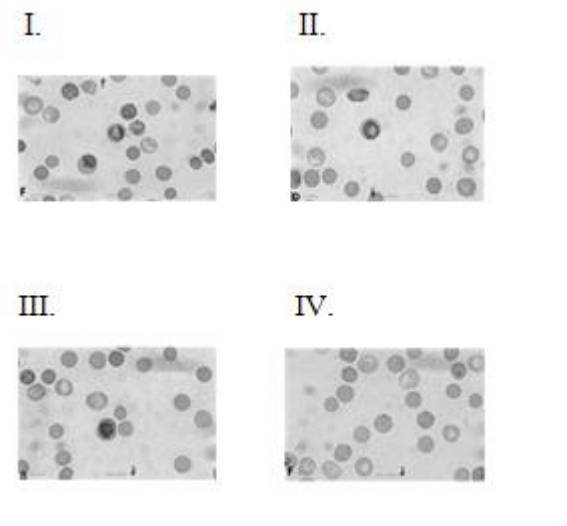

***Figure1**:Maturation stages of reticulocytes according to Heilmeyer classification: Stage I: non nucleated red cells appearing with a dense clumped reticulum; Stage II: extended network of loose reticulum; Stage III: scattered granules with residual reticulum network; Stage IV: scattered granules*

Source: KDU IRC 2020

Clinical assessment of on admission severity of blood loss was extracted from patient record at ETU. Time taken for admission since traumatic event as well recorded. Results of IRF was tabulated for each patient with their blood loss severity. The results of IRF were expressed as mean along with the standard deviation (SD). Each IRF value

fraction was counted & presented as a percentage (%). Data were analyzed by using Excel 2010 and R-Studio statistical software. The differences between groups (mild, moderate, severe) were assessed by t-Test. Level of p <0.05 was considered as significant. Correlation was analyzed using the Spearman correlation coefficient.

Results:

A total of 38 patients with acute trauma including 14 mild, 19 moderate and 5 severe blood loss were included in this study. The mean age of the patients was 36.55±16.95 years. There were 24 males and 14 females reflecting male predominance for trauma.

The mean immature reticulocyte fraction of mild, moderate and severe hemorrhage were 1.86± 1.03%, 3.16 ± 2.32%and 10.4 ± 3.85% respectively. The IRF value of severe haemorrhage was significantly different from those of mild and moderate haemorrhage (P < 0.05) and the value of moderate haemorrhage was also significantly different from that of mild haemorrhage.

It showed a moderate positive relationship between manual IRF count and degree of haemorrhage according to the correlation coefficient (r) of IRF value with the degree of hemorrhage.

***Table1**: t-Test results of IRF values comparison between mild, moderate & severe haemorrhage conditions*

Source: KDU IRC 2020

Severity	P(T<=t) two-tail
Mild – Moderate	0.021947
Mild – Severe	0.007165
Moderate - Severe	0.008740

When compare the time duration for reticulocyte / IRF increment, patients with severe haemorrhage showed higher IRF within 1st hour compared to mild and moderate blood loss. With the progress of the time, there was an increase of percentage of immature reticulocytes (stage I & II)while Stage III & IV fractions were decreased out of total reticulocytes present in peripheral blood. There was a progressive increase of percentage of immature stages after two hours of trauma in patients with severe haemorrhage.

Percentage of maturation stages obtained within different time durations in severe haemorrhage and their trend lines are shown in following graph.

Severe Haemorrhage Time gaps

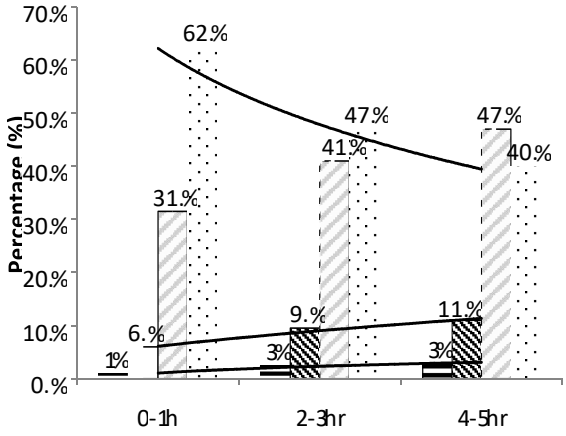

Figure 2 Stage I Stage II Stage III Stage IV

Source: KDU IRC 2020

Discussion and conclusion –

According to the literature, IRF is considered as one of the best parameter of marrow response (Buttarello et al., 2002). However, use of IRF in routine trauma care is limited to ascertain or to support the degree of haemorrhage. According to this study, the patients with severe haemorrhage showed higher IRF values compared to mild and moderate haemorrhage. Therefore, higher manual IRF results can be considered as an objective marker of severe haemorrhage. High IRF reflects prompt marrow response to blood loss thus it is useful even in acute concealed haemorrhage such as retroperitoneal, intra-abdominal or intra muscular bleeding following trauma or due to other reasons.

The reticulocyte count in the peripheral blood of a healthy individual is 1-2% and all of them belong to Heilmeyer group III and IV reticulocytes (considered mature forms).

The group I and II reticulocytes are not normally found in peripheral circulation (Crouch et al., 1985) in healthy subjects. In this study, stage I reticulocytes appeared in higher percentages (>3%) in the blood samples which were collected two hours after the trauma. In compliance with literature available, this study too shows that the time taken for marrow response to occur in severe haemorrhage is over two hours.

Findings of this study show the importance of properly performed manual IRF in differentiating the severity of haemorrhage in patients with trauma. Therefore, we conclude that, the manual IRF can be considered as a reliable, cheaper alternative marker of post traumatic blood loss.

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Awareness on Prevention of Common Oral Diseases Among Non –Dental Undergraduate Students of University of Peradeniya

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Abstract:. In Sri Lankan context, dental caries, periodontal diseases and oral cancers are the common oral diseases with a higher prevalence .Objective of this study was to assess the awareness on prevention of common oral diseases among non-dental undergraduate students of University of Peradeniya.A descriptive cross-sectional study was conducted among 489 non-dental undergraduate students in University of Peradeniya .A self-administered questionnaire was used to collect data in the study .Awareness of the participants was categorized into three groups according to the scores they have obtained)≥75 –High Awareness, 74-50 –Moderate Awareness,≥ 50 –Low Awareness .(Data was analyzed using SPSS version 25 and 0.05 p value was considered as the level of significance .Out of 489 students, 243)49.7 (%were male and 246)50.3 (%were female .Majority of the participants)82.82 (%had lower awareness level on prevention of common oral diseases while only 0.2 %had high awareness .Students from faculty of Medicine were having the highest awareness and students from faculty of Management were having the lowest awareness .Statistically significant difference was observed in awareness levels between the health related and non-health related faculties)p<0.01 (This study reveals that the non-dental undergraduates of University of Peradeniya have a low awareness on prevention of common oral diseases .Thus, it is suggested to make measures to improve awareness on common oral diseases among the university students 'population which will be very effective in preventing oral diseases and building up a healthy population.

Keywords :Common oral diseases, Awareness on prevention, University undergraduates

Introduction:

In recent time, oral health has gained equal importance as general health in the world . Furthermore, knowledge regarding oral health has been introduced as an important factor that determines overall health .Various oral diseases such as Dental caries, Periodontal diseases and Oral cancers are considered to be major public health problems worldwide and they can be 100 %prevented)Vodanovic, 2013.(

Dental caries also called as tooth decay, is one of the most common and most preventable diseases .Dental caries is the localized destruction of susceptible dental hard tissues by acidic productions from bacterial fermentation of dietary carbohydrates) Selwitz, Ismail and Pitts, 2007 .(Dental caries is still a major health problem in most industrialized countries as it affects 60 %– 90 %of school-aged children and the enormous majority of adults)Petersen *et al.*, 2005 .(Periodontal or gum disease is an inflammatory condition of the gum, alveolar bone, connective tissue attachments and periodontal tissues surrounding the teeth)Loe, 1993 .(This is said to be the most common chronic disorder of the humans)Williams, 1990 .(There are two main categories of periodontal diseases, namely

gingivitis and periodontitis .Mouth cancer or oral cancer can be identified anywhere in the oral cavity, the surface of the tongue, on the lips, in the gums, inside the cheeks, in the tonsils and in the salivary glands .Tobacco, alcohol, betel and similar products are prominent risk factors for the mouth cancer)Scully and Porter, 2001 .(Oral cancer is the commonest cancer among males and 3rd commonest among females in Sri Lanka)'International Congress on Oral Cancer, Smokeless Tobacco and Arecanut ICO', no date .(The burden of common oral diseases is especially high for the disadvantaged and poor population groups in both developing and developed countries .Main reason is the arrangements for oral health care in developing countries, like Sri Lanka is limited due to inadequate dental manpower, financial resources, and lack of knowledge need for dental care among the people)Gunawardena et al, 2016.(

According to Global Burden of Disease study, unrelated tooth decay has become one of the most
common disease conditions in 2010 .But it can be prevented through simple and cost-effective
interventions .Reducing sugar consumption and promoting good delivery habits are the main
preventive measures of the tooth decay . Exposure to fluoride and universal access to primary
oral healthcare are most cost-effective preventive measures .Periodontal disease is a major public health problem that challenges health systems around the world .However, in prevention of periodontal disease, low exposure to risk factors such as alcohol or tobacco use, good personal oral hygiene, awareness and regular check-ups are important elements .Early detection and management are another important preventive measure for periodontal disease . Generally, death rates for oral cancer become increased .Early detection and timely referral directly help to the treatment and prevention for the oral cancer) FDI, 2015(

Knowing the preventive methods for the common oral diseases would help the prevention and early detection of the diseases .University students come across a great number of people of different age groups from different backgrounds in their day to day course of study hence with proper knowledge and oral health behaviors they can act as role models for their family and community at large .Therefore, aim of this study was to identify the level of awareness on prevention of common oral disease amongst the non-dental students of University of Peradeniya .And to determine the awareness on prevention of common oral diseases according to gender and the studying faculty .

Methodology:

This study was designed as a descriptive cross-sectional study and 489 students were selected from eight faculties of University of Peradeniya, Sri Lanka .Since Dental students get to learn about the preventive methods of common oral diseases as a part of their curriculum, they were exempted from the study sample to avoid bias .Stratified random sampling method was used as the sampling technique. Data was collected using a pre-tested self-administered questionnaire .The questionnaire consisted of demographic information, open and closed ended questions related with prevention of common oral diseases .Awareness of the participants was categorized into three groups according to the scores they have obtained for the questionnaire)≥75 –High Awareness, 74-50 – Moderate Awareness, ≥50 –Low Awareness.(Data analyze was done using SPSS version 25.0 .Categorical data was described using frequencies and percentages giving the 95 % confident intervals .Continuous scale data was described using mean values. Significances were assessed at the *p* value of 0.05.

Results and Discussion:

This study was conducted in University of Peradeniya using a sample of 489 students from eight faculties to determine the awareness on prevention of common oral diseases among non-dental undergraduate students of University of Peradeniya .These 489 participants who responded for the study were from both health related and non-health related faculties.

Total number of students in health-related faculties was 139)28.4 (%and number of students in non-health related faculties was 350)71.6 .(%As a whole there were 243)49.7 (%male and 246)50.3 (%female in the study conducted.

Table 1 :Distribution of the sample

			Gender		
			Male	**Female**	**Total**
Type of Faculty	Non-Health Related	Count	174	176	350
		%of Total	35.6%	36.0%	71.6%
	Health Related	Count	69	70	139
		%of Total	14.1%	14.3%	28.4%
Total		Count	243	246	489
		%of Total	49.7%	50.3%	100.0%

Out of the 489 participants, a majority of 405)82.8(% participants scored less than 50 marks which was considered as 'Low Awareness'. Among the participants, 83 undergraduates) 17.0 (%scored between 74 and 50 for the questionnaire and they were at the level of 'Moderate Awareness'. Only 1 participant) 0.2 (%obtained more than 75 marks and that undergraduate student was the only participant with 'High Awareness ' level .Mean percentage score of male students was 37.36 and for female students it was 37.36 .There was no significant difference in the mean scores of the students according to the gender.

Table 2: Awareness on prevention of common oral diseases

			Awareness of Prevention			**Total**
			Low Awareness	**Moderate Awareness**	**High Awareness**	
Gender	Male	Count	198	45	0	243
		% within Gender	81.5%	18.5%	0.0%	100.0 %
	Female	Count	207	38	1	246
		% within Gender	84.1%	15.4%	0.4%	100.0 %
Total		Count	405	83	1	489
		% within Gender	82.8%	17.0%	0.2%	100.0 %

These results may be an indicating the low knowledge of the undergraduates 'lack of knowledge for day today health information . Because disregard of the gender, 82 %of the whole population are at low awareness levels for the undergraduate this level is not acceptable whether they are related to health field or not as they have the power to deliver information to the society.

Awareness level on the prevention of common oral diseases were assessed according to the faculty of the participants and the highest awareness level was observed in Medical Faculty with a moderate awareness level in 50 %of the participants .In contrast, faculty of Management displayed the lowest awareness level where the moderate awareness was 2.2 .%The only participant who displayed a high awareness was from the faculty of Medicine .These results may be due to the reason that the medical students are getting knowledge regarding these disease conditions and students studying non health related

subjects are not getting that much of knowledge on oral diseases.

Following table displays the different types of awareness levels in different faculties.

Table 3 :Awareness on prevention of common oral diseases according to the faculty

			Level of awareness			Total
			Low	Moderate	High	
Faculty of Study	Faculty of Agriculture	Count	52	12	0	64
		%of Total	81.3%	18.8%	0.0%	100.0 %
	Faculty of Allied Health Sciences	Count	28	17	0	45
		%of Total	62.2%	37.8%	0.0%	100.0 %
	Faculty of Arts	Count	75	5	0	80
		%of Total	93.8%	6.3%	0.0%	100.0 %
	Faculty of Engineering	Count	76	4	0	80
		%of Total	95.0%	5.0%	0.0%	100.0 %
	Faculty of Management	Count	44	1	0	45
		%of Total	97.8%	2.2%	0.0%	100.0 %
	Faculty of Medicine	Count	31	32	1	64
		%of Total	48.4%	50.0%	1.6%	100.0 %
	Faculty of Science	Count	77	4	0	81
		%of Total	95.1%	4.9%	0.0%	100.0 %
	Faculty of Veterinary Medicine and Animal Sciences	Count	22	8	0	30
		%of Total	73.3%	26.7%	0.0%	100.0 %
Total		Count	405	83	1	489
		%of Total	82.8%	17.0%	0.2%	100.0 %

When the faculties considered as health related and non-health related faculties, a statistically significant difference could be identified between the type of faculty and level of awareness according to the paired t-test)p<0.001.(

Table 4 :Level of awareness according to the type of faculty

			Awareness Level of Prevention			Total
			Low	Moderate	High	
Type of Faculty	Non-Health Related	Count	324	26	0	350
		%within Type of Faculty	92.6%	7.4%	0.0%	100.0%
		%within Awareness of Prevention	80.0%	31.3%	0.0%	71.6 %
	Health Related	Count	81	57	1	139
		%within Type of Faculty	58.3%	41.0%	0.7%	100.0%
		%within Awareness of Prevention	20.0%	68.7%	100.0 %	28.4 %
Total		Count	405	83	1	489
		%within Type of Faculty	82.8%	17.0%	0.2%	100.0%
		%within Awareness of Prevention	100.0%	100.0 %	100.0 %	100.0%

Conclusion

This study reveals that the non-dental undergraduates of University of Peradeniya are having a low awareness on prevention of common oral diseases .Furthermore, level of awareness on prevention of common oral diseases among undergraduates from non-health related faculties is significantly lower than the undergraduates from health-related faculties, while male and female non-dental undergraduates show no significant difference on awareness levels. Thus, it is suggested to make measures to improve awareness of common oral disease among the university student population which will be very effective in prevention of oral diseases and building up a healthy population.

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Behavioural and Psychological Impact of Covid-19 on a Group of Youth and Young Adults Repatriated Back to Sri lanka from the uk: a qualitative study

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Abstract. The COVID-19 pandemic affected international students around the world, including the Sri Lankan undergraduate and post-graduate students who were studying in the UK, and they were repatriated to Sri Lanka by the government last May. The current study aimed to explore and understand the impact on behaviour and psychological changes on this youth and young adult group of being under lockdown in the UK, repatriation, quarantine processes and self-isolation, as well as the experience during the journey from the UK to Sri Lanka. This qualitative study was planned and conducted in a quarantine environment based on the lived experiences of investigators, who were also students repatriated back to Sri Lanka from the UK due to COVID-19 pandemic, which is also the significance of this study. A convenient sample of sixteen (16) students (age ranged from 18 – 34) participated in the study. Data was collected using three investigative methods: questionnaires, researcher's objective observations and semi-structured interviews (over the phone or online). Data analysis was done using thematic analysis method. There were three preliminary themes that emerged from the study: (1) Fear, worry and anxiety, (2) Adherence to safety precautions, and (3) Agitation. Findings indicate that the abrupt changes to their education and day-to-day lifestyles, perceived stigma and emotional imbalance during this stressful situation caused psychological as well as behavioural challenges and difficulty in coping among this group. Findings highlight the need for addressing their age-specific psychological needs when developing guidelines to manage similar situations in the future and to increase resilience.

Keywords: COVID-19, repatriation, youth and young adults, psychological and behavioural patterns.

Introduction:

With its highly prestigious, world-recognised universities and the culturally diverse environment, the United Kingdom (UK) is popular among thousands of international students choosing to pursue their higher educational qualifications. According to the Higher Education Statistics Agency, over five million international students were pursuing their degree in the UK under Tier 4 and tier 5 visa categories in year 2018/2019. Majority of these students are from China, India, Thailand, Hong-Kong as well as African countries. Twenty-nine percent of all students in the UK are from former colonies including India,

Thailand and Sri Lanka (International Student Statistics in UK 2020).

During December 2019, a novel Coronavirus disease (COVID-19) outbreak was reported from Wuhan, China, soon progressing it to an epidemic distinct from SARS-Cov and MERS-Cov (Zhu et al., 2020). COVID-19 was then identified as a highly contagious disease, making it a pandemic that led the whole world to shut down and undergo lockdown periods (Watkins, 2020). While countries started proceeding with lockdown and social distancing measures, people started working from home, home-schooling and major consequences such as Airport closures occurred due to the fast spread of the disease. The COVID-19 pandemic affected international students around the world, including the Sri Lankan students who are studying in the UK, as it resulted in disruption of their daily routines, sudden and abrupt changes to their academic activities, social lives and lifestyles. For example, the lockdown, social distancing and self-isolation procedures led Sri Lankan students studying in the UK to be confined to their accommodations, being unable to move to Sri Lanka causing a negative effect towards their psychological wellbeing. Throughout this difficult period, the Sri Lankan students (aged 18 – 34) in the UK were advised and supported by their universities, immigration compliance and the Sri Lanka High Commission (SLHC). On 03rd and 05th May, 2020 they were repatriated to Sri Lanka by the government and quarantined in Colombo.

It is not clear how long the COVID-19 pandemic will continue to limit the usual academic activities and lifestyles of this group of students. Clearly, there are challenges of continuing academic activities such as attending online virtual classes and completing assignments while being under quarantine with limited resources and distractions and also being far away from their universities in a different time zone. Young adults are one of the high-risk category group of individuals who are more likely to develop negative psychological and behavioural patterns due to outbreaks and self-isolation (Pang et al., 2004; Brooks et al., 2020). Therefore, it is important to explore and understand the impact of being under lockdown, self-isolation, repatriation and quarantine processes during the journey from the UK to Sri Lanka, on the behaviour and psychological changes on this youth and young adult group.

Taking this into account, the present study opens an avenue to see how these youth and young adults stranded in overseas could be subjected to different psychological and behavioural issues due to the COVID-19 pandemic. Also, this study was conducted in the natural setting of the participants and it was first-hand experience research where the researchers were also present in the setting, overtly observing the particular group of participants. Having a real-life experience of being affected by the lockdown, repatriated back to Sri Lanka from the UK due to COVID-19 pandemic and being under quarantine as Sri Lankans based in the UK, we aimed to carry out a qualitative study to explore and understand the experience (including views, perceptions and attitudes) of youth and young adults. This study also aimed to observe and describe the psychological and behavioural impact of COVID-19 global pandemic on the lives of this group. In this paper, we wish to describe the methodology and preliminary findings of the study.

Methodology:

This research study was developed based on the lived experiences of the investigators (KA, NW and MH), who are also international Sri Lankan students, repatriated back to Sri Lanka from the UK due to COVID-19 pandemic. The study setting was one of the government quarantine centres located in Colombo. Ethical clearance for the study was obtained from the

expedition review committee at Rajarata University (Ref: ERC/2020/38)

A convenient sample of undergraduates and post-graduate level students who were repatriated back to Sri Lanka due to COVID-19 and underwent quarantine in the selected study setting were recruited in the study. Investigators shared information about the study via a closed WhatsApp group and invited the students to take part in the study. Those who wished to take part voluntarily were recruited using an online consent form, developed via google forms. Then they were encouraged to contact the study team (KA, NW, MH and TK) via the online messaging platform, considering the ease of convenience and the need of maintaining physical distancing measures at the quarantine centre.

Three investigative methods were used for data collection: (1) Researcher's objective observations (Ethnographic research approach), (2) Questionnaires (including demographic information questions, The Generalized Anxiety Disorder 7-item (GAD-7) scale and the 'Ways of Coping Checklist-Revised (WCCL-R) scale; Sawang et al., 2010) and (3) Semi-structured interviews (over the phone or online) to explore participants' lived experience. Data collection was conducted at three phases.

Phase 01: At the time of obtaining the consent, participants were asked to complete a short demographic questionnaire and the GAD-7 scale (circulated online via closed WhatsApp group or email). In-depth, semi-structured interviews were conducted using a topic guide to further explore the real-life experience and perceptions of being locked down in the UK, repatriated to Sri Lanka and quarantined. The ethnographic research approach was considered most appropriate as the investigators interact with the participants while observing them in a real-life environment. Journal keeping was a continuation of a fun activity among this group of students while they were under lockdown in the UK as a coping method. The student group were informed verbally regarding the objective observation of their psychological and behavioural patterns on the day one at the arrival of Heathrow, London, where they first met in person. KA, NW and MH maintained independent personal journals based on their experience and objective observations in the UK and continued this exercise during their stay at quarantine centre and entered daily notes in their own time.

Phase 02: GAD-7 scale was administered online at the end of the quarantine period in Sri Lanka.

Phase 03: GAD-7 scale and WCCL-R scale was administered three weeks after the students being sent home at the completion of quarantine (after a week of completion of self-isolation at home).

The research team used these personal journals as a data source for the current study. However, this was reminded to the participants at the time of obtaining consent; observations of those who did not give the consent for the study will not be entered in any research report/ publication.

All the interviews were transcribed verbatim. Diary entries and interview transcripts were anonymised in order to maintain the confidentiality of the participants and to prevent them from being traced back. Qualitative data analysis was conducted using thematic analysis. Relevant descriptive and inferential statistics measures were also used when presenting demographic information.

Results:

Sixteen undergraduates and post-graduate level students completed phase one. Among them, all agreed for observations and seven agreed to take part in interviews. However, dropout rate was high after the quarantine period; thirteen of them completed the second phase (GAD-7 scale) and only 08 students

completed the final phase of the study (GAD-7 and WCCL-R scales).

Findings indicated both positive and negative psychological and behavioural impacts. There were three themes emerged: (1) Fear, worry and anxiety, (2) Adherence to safety precautions and (3) Agitation.

Fear, worry and anxiety

Many young adults reported that they were not worried or did not take the condition seriously during the epidemic level at China and carried out their normal routines until the lockdown started in the UK or the outbreak reached Sri Lanka and Europe.

"At first, I thought it would not go for a pandemic scale. I thought it would just stay in China. So, I wasn't taking it that seriously. When the outbreak reached around Europe… Italy and Spain, I realised it's a serious issue." (P01)

Almost all students reported that they were stressed or worried that their academic activities were hindered during the lockdown period due to the university closure and after repatriation mode of studies changed to distanced and online learning. Students' main concerns during the lockdown in the UK were that their loved ones being overly worried and afraid of them staying in the UK alone, with lack or no access to health care facilities if things went wrong.

"I wasn't worried or panicking that much. But my parents were… since they were in SL and I was in the UK. They kept on thinking about the distance between us […] It was quite of pressure for me. Actually, I was worried about them more than worrying about myself." (P04)

"I started getting anxious at the end. I realised that it's not that easy as you think it is since I didn't have any flatmate or friend whom I can rely on in an emergency." (P03)

Fear of being exposed to COVID-19 infection during repatriation and anxiety caused by perceived social stigma and judgements related to the quarantine also commonly reported.

"I still don't know what to expect once I go home, how people view me… whether as a diseased person or I'm like Coronavirus career, like I would just be spreading all over… I kept thinking about what would people think about my parents as well." (P01)

When asked about how they were coping, many reported that they *'felt at ease'* after coming back to Sri Lanka:

"In the UK… I had the worst mental break downs. I overslept and just kept thinking 'is this going to finish or not?' The travelling part… It was a bit overwhelming. But, the overall process in quarantine is good." (P01)

"I knew I'm safe and in good hands at the very moment I stepped out from the flight. What a relief!" (P02)

During the interviews the students reported that they experienced moderate to severe anxiety levels during the lockdown period and repatriation process as well as the last day of quarantine. However, the GAD scores show minimal or mild anxiety levels and therefore indicate a discrepancy between the verbalised anxiety levels and the evidence reflected by the GAD scale.

Adherence to safety precautions

Level of adherence to the safety precautions among the study participants was varied over time. Best adherence was reported at the beginning of the lockdown in the UK and during the repatriation process.

"Whenever I get my groceries I would come back and washed most of the things. I think I got pretty paranoid about it… I realised that I should do it [smiles], I can't take a risk. I kept washing my hands and I made sure that I had at least 3 sanitizers with me. Even my shoes, I sprayed them with Ethanol and stuff [laugh]. (P01)

Girls reported more adherence when compared to boys all the time. However, the students appeared to become normalised living with COVID- 19 over time and complained of getting bored, forgetting to adhere to strict safety precautions:

"At the beginning, I was very keen. Later on, I started forgetting things… perhaps I got bored and wasn't bothered to do it. Sometimes I did it just because my mother or boyfriend reminded me so often." (P02)

"I was like, 'why should I keep doing this?' It's a headache. It's too much of work." (P01)

Observation notes from the researchers' diaries support the interview findings and reveal strict adherence on the first few days at the quarantine Centre but gradual decrease towards the end of the quarantine period.

"The students were afraid of the staff who were wearing PPE. They asked many questions [from the nurses] and worried about their temperature levels, about the passengers who had fever and hospitalised. They all wore masks; only appeared at the door for checking temperature and went into their rooms quickly." (R03, Observation notes- Day 01 at quarantine)

"Some of the students appeared not following the instructions. Some even walked along the corridors without wearing masks and chatting with each other." (R01, Observation notes- Day 10 at quarantine)

Agitation

Majority of this group reported that they experienced hostility, irritability or agitation as well as low mood and frequent arguments with their roommates, parents or partners during this period. Over-sleeping, smoking, alcohol consumption, gaming or increased screen times and avoidance of adherence to strict physical distancing and safety guidelines were reported as a result.

"I got quite irritated even for smaller things really quickly... Even if my parents called me and say something really simple, like 'are you okay?' that irritated me pretty easily. At some point I even wanted to avoid people, I mean the phone calls came from [my loved ones]." (P05)

"We played cards, sometimes smoked and had a beer to relieve our stress." (P06)

However, positive experiences such as improved work efficiency, making new friends and changes to one's lifestyle, perspectives and behaviour was also reported. Some students appreciated increased productivity during self-isolation due to fewer distractions, enhanced tolerance and coping, team working, new connections established via online communication, peer support during the quarantine period and especially the opportunity they got to return to their families in Sri Lanka as a result of the pandemic.

"It was an adventure, a good experience. I managed to get most of my work done during the lockdown as well as while being under quarantine." (P02)

"I became really close to some. Met interesting people unexpectedly. We were in the same boat since we all faced the similar situation, maybe that made us bond easily. So, that togetherness was quite a good feeling. I feel really good, I felt quite comfortable around them as well." (P06)

Discussion:

Prior to the outbreak of COVID-19, similar epidemics such as SARS (during 2002-2003), led to major self-isolation procedures and quarantining of individuals, during the absence of a proper treatment method (Yan, Zou 2009). Similar to the findings of the current study, Chan et al., (2007) reported that dramatic changes in lifestyles may be accompanied by fear of being infected to self or loved ones resulting in a significant negative impact to their psychological wellbeing.

In line with the findings, existing evidence also reports that prolong home confinement during a disease outbreak can have negative effects on young people's mental and physical health (Liu et al., 2020). Less physical activities, outdoor activities and inability to interact with friends and family may cause changes to their psychological and behavioural patterns. For example, an exhibition of discomfort in forms of confusion, anger, aggressiveness, irregular sleep patterns, addiction to internet or screen time (TV or computer) and less favourable diet preferences were commonly reported among young people (Brooks et al., 2020; Wang et al., 2020). Empirical evidence indicates that quarantine processes result in depression, low mood, fear, confusion, anger and other psychological issues such as post-trauma stress symptoms among youth (Pang et al., 2004; Brooks et al., 2020). Young age (16-24), lower levels of educational qualifications and female gender are some of the predictors that may increase negative psychological symptoms (Brooks et al., 2020). Nevertheless, the current study shows positive experiences (e.g. adventure and befriending) as well. Investigators (KA, NW, MH and TK) think that objective observations and journal keeping was fun and also was a good coping mechanism during this difficult period.

The ethnographical method is fully immersive, 'live and work' approach where the researchers observe and reflect people's behaviour patterns (Dwyer and Buckle, 2009). Ethnographic research approach (i.e., use of objective observations written in personal journals as research data) was very much appropriate for the current study as the investigators could interact with the participants while observing them in a real-life environment. It was also pragmatic for this research because objective observations and online interviews were feasible (while maintaining physical distancing and safety precautions (such as wearing a mask) as three members of the study team were residing with the study sample in the same quarantine centre. WhatsApp platform allowed sending photos, voice clips and texts so that participants could easily send their expressions when they go home after quarantine; WhatsApp was easier for the participants than email as it has one-to-one secure encryption.

Conclusion:

This qualitative study was planned and conducted in a quarantine environment based on the lived experiences of investigators, who were also students repatriated back to Sri Lanka from the UK due to COVID-19 pandemic. Therefore, the current study provided evidence-based guidance on identifying how the students responded to the closure of schools and universities, how they coped with their studies during a time of a pandemic. Findings identified the psychological and educational needs, challenges, coping strategies of youth and young adults in this group and indicate the need of addressing them and developing guidelines to manage similar situations in future and increase resilience. The investigators learnt positive life lessons by actively participating in this research and being able to share their lived experience during this difficult period. The study contributes to the research gap in the present literature regarding the impact of COVID-19 on a group of young academics in Sri Lanka.

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Usefulness of Timed Up and Go test, Berg Balance Scale and Six Minute Walk Test as fall risk predictors in post stroke adults attending Rehabilitation Hospital Ragama

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Abstract: Stroke is a major risk factors for falls. However, there are no established practices being used to predict fall risk with Stroke patients in Sri Lankan stroke care settings. The purpose of this study is to determine the usefulness of Timed Up and Go test (TUG), Berg Balance Scale (BBS) and Six Minute Walk Test (6MWT) as fall risk predictors in post stroke individuals and to introduce cut off values to predict fall risk. 74 patients with first ever stroke during past year (mean age 56.5± 28.5, males 67.6%) recruited from the Physiotherapy Unit, Rehabilitation Hospital, Ragama; 17 (23%) had history of falls. History of falls was recorded from participants' interview. Each participant underwent TUG, BBS and 6MWT. Scores were compared with existing cut off values. Receiver Operating Characteristic (ROC) curves were constructed to describe sensitivity, specificity and predictive values. Optimum cut off values for fall risk prediction were determined. There is no significant difference in the baseline characteristics between the two groups. The cut off values for fall prediction of three tests were recognized as follows; TUG ≥ 23s, p = 0.044, AUC = 0.662; BBS <45, p = 0.001, AUC = 0.773; 6MWT <193 meters, p =0.020, AUC = 0.686. The BBS performed better than TUG and 6MWT in predicting fall risk in stroke individuals. We recommend the use of physical performance tests as TUG test, BBS and 6MWT to predict fall risk and to minimize risk of falling in stroke individuals in Sri Lanka.

KeyWords: Stroke, fall risk, Timed Up and Go Test, Berg Balance scale, six Minute walk Test

Introduction:

Stroke is the second leading cause of death worldwide among top ten leading causes. There were about 14 million first ever stroke victims in 2016. According to the WHO statistics approximately 6.2 million deaths occur due to stroke and also rated as third most common cause of disability of the adults globally. Stroke leads to functional disability of a stroke survivor and effect of stroke causes paralysis of the body. The stroke prevalence in Sri Lanka increased during the past decades with changes of demography**.** However improvements in the healthcare facilities may lead to increase in the number of survived stroke victims in Sri Lanka. Rheumatology and Rehabilitation Hospital Ragama is the main rehabilitation hospital in Sri Lanka for stroke rehabilitation. According to the Medical Statistics Unit of Rheumatology and Rehabilitation hospital, 402 post stroke survivors were admitted to the hospital in the year 2018. There were 339 males and 63 females. When considering the 2019 statistics, 108 post stroke individuals were admitted during the first five months. The disability of the wage earner may be a burden to the family and also to the community. In this sense, stroke is a burden not only globally but also in Sri Lanka, as it affects patient's abilities physically and psychologically

Post stroke individuals are more prone to fall as they present with impaired weight bearing to paretic limb and increased muscle tone. Frequent falls may be a cause for increased length of hospital stay and it could increase health care costs. Stroke causes severe disability in post stroke survivors. This sudden onset disability is a life changing stressful incident for family members. In this context, caregiving for the post stroke survivor is a responsible and stressful task for the family caregivers and also this situation badly influence financially. Falls can be predicted as well as prevented. Falls can occur repeatedly if preventive measures are not taken Hence, prediction and prevention of falls should be a key component in stroke rehabilitation. The unexpected incidence of falls and fear of falling may have a negative impact on rehabilitation process and can lead to lack of socialization with depression. The consequences of accidental falls also may be a burden for family members and healthcare professionals. Unprovoked incidence of falls during the hospital stay has been identified as an adverse effect, which need special consideration. It will increase the healthcare cost if there is a fracture which can increase the length of stay. Therefore, it is important to identify which patient is having a risk of falling and provide with fall prevention interventions. This task can be achieved by assessing the patients using valid and reliable clinical tests which can be used easily. The fall risk prediction has been done in many countries using Timed Up and Go test, Berg balance scale and Six Minute Walk Test. Though there are previous studies, data from one country would not reflect the fall risk of another country. There may be differences in demographic factors between the countries. Considering the above factors, the importance of fall risk prediction and its value cannot be underestimated. Hence, this study aimed to investigate the contribution of TUG test, BBS and Six minute walk test within the context of fall risk prediction, quantifying fall risk in post stroke individuals and providing information to family members.

Methodology:

A cross sectional descriptive study was carried out from May 2019 to August 2019, at the Physiotherapy Department of Rehabilitation Hospital, Ragama. The appropriateness of the subjects was evaluated by the researcher according to their past medical records in the BHT or clinic book. 74 first ever post stroke adults (>18 years) were recruited to the present study. Demographic data collected using Participants' Data Collection Form and fall history was recorded. The enrolled participants were tested with three clinical tests. (1) Timed Up and Go test (TUG), (2) Berg Balance Scale (BBS) and (3) Six Minute Walk Test (6MWT). The TUG test was used to assess functional mobility and was performed according to the international guidelines. The cut off value for the TUG test was determined as ≥14s for fall risk prediction.

BBS which comprises of 14 components used to assess functional balance. Maximum score was 56/56 and <45 was suggested as cut point to predict fall risk. The 6MWT was used to assess walking capacity of post stroke individuals. The test was carried out according to American Thoracic Society guidelines and protocols (2002) and reference value for normal healthy adults was 510m. But this value cannot be justified for post stroke adults. Hence, we consider new cut value of 285m which was proposed by Dunn et al. in 2015 specifically for post stroke adults. The entitled subjects participated above three physical performance tests and individual scores were recorded.

The data analyses were performed using program SPSS version 22.0 and both univariate and bivariate analyzing methods were used. To find the association between categorical variables Chi-square test was used. Independent sample t-test was used for analysis of numeric data. The p value < 0.05

was considered as significant value. A receiver operating characteristic curves (ROC) analysis and areas under the curves (AUC) were used to determine the cut off points of TUG, BBS and 6MWT. (0.5< AUC≤ 0.7 = less accurate, 0.7<AUC≤ 0.9 = moderately accurate, 0.9<AUC ≤1.0 = very accurate, AUC = 1 perfectly accurate). Ethical approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Kelaniya. Administrative authorization was obtained from the Deputy Director and the Rheumatology and Rehabilitation Consultants of Rehabilitation Hospital, Ragama.

Results and Discussion:

This study population comprised of 74 post stroke individuals (mean age 56.5± 28.5, males 67.6%) and 17 (23%) had history of falls. There is no significant difference in baseline characteristics for instance age, gender, duration of stroke, type, use of orthses and use of assistive device.

Association between physical performance tests and fall history

TUG test

Table 1: *Results of the Timed Up and Go test in relation to fall history*

Characteristic	Fallers	Non fallers	p-value	Total
BBS < 45	15 (88.2%)	27 (47.4 %)		42 (56.8%)
BBS > 45	02 (11.8%)	30 (52.6 %)		32 (43.2%)
Mean BBS± SD	37.59 ± 6.2	44.37± 6.88	0.001	

Note: TUG- Timed Up and Go test, SD- Standard Deviation , TUG test duration of ≥ 14s indicate high fall risk (G. Andersson et al., 2006; Jalayondeja et al., 2014)

Receiver operating characteristic curve (ROC) analysis of TUG test

In accordance with Receiver Operating Curve Analysis (ROC) for the TUG test introduced cut off value was 23 seconds (77% sensitivity, 50% specificity). Area Under the Curve (AUC) of all measured TUG values was 0.662, provide less accurate prediction. (p = 0.044)

BBS

Table 2: *Results of the Berg Balance Scale in relation to fall history*

Characteristic	Fallers	Non fallers	p-value	Total
	16(94.1%)	49(86%)		TUG
≥ 14 seconds				65 (87.8%)
TUG ≤ 14 seconds	01 (5.9%)	08 (14%)		09 (12.2%)
Mean TUG±SD	35.92±19.72	25.86±12.55	0.061	28.17±14.97

Receiver operating characteristic curve (ROC) analysis of BBS

According to Receiver Operating Curve Analysis (ROC) for the BBS cut off value was 45 (88% sensitivity, 50% specificity). Area Under the Curve (AUC) of all measured BBS values was 0.773 provide moderately accurate prediction. (p = 0.001)

6MWT

Receiver operating characteristic curve (ROC) analysis of 6MWT

ROC curve analysis for 6MWT indicated a cut off value of 193metres (76% sensitivity, 50% specificity) and the Area Under the Curve (AUC) for all measured 6MWT distances was 0.686 provide less accurate prediction. (p = 0.020)

Table 3: *Results of the Six Minute Walk test in relation to fall history*

Characteristic	Fallers	Non fallers	p-value	Total
6MWT > 285m	Mean 6MWT±S	19(33.3 %)		21(28.4%)
6MWT < 285m	15(88.2%)	38(66.7 %)		53(71.6%)
Mean 6MWT± S	144.62±121.42	216.37±123.77	0.039	

The aim of the present study was to determine the usefulness of assessment of mobility, functional balance and endurance among the post stroke individuals. We have investigated whether there is fall predictive ability in physical performance tests. In present study TUG test did not have significant association with fall history. Though TUG test has been widely used in clinical settings, literature reveals that TUG has to be used along with other clinical tests to make future fall prediction. In the current study we used cut off value of 45 for BBS as stated by previous literature. We could correctly identify 15 of the 17 previous Fallers' while incorrectly identifying 27 of the 57 non Fallers' Hence, BBS might be useful to identify potential fallers than non Fallers'. Present study confirms that there is a statistical significance of BBS with fall history. ROC curve for the BBS shows moderate predictive ability to discriminate Fallers' and non Fallers'. We conducted 6MWT to assess walking capacity of our study population. During the 6MWT subjects were allowed to use their assistive devices and orthoses. But, there is no significant association between history of falls and utility of assistive devices and orthoses. Nevertheless, there may be an association between walking distance and gait speed. The orthoses and assistive devices were used to minimize gait deviations in post stroke individuals As expected, the mean value for the entire participants was 199.89m which was significantly lower than the cut off. Furthermore, there is a mean difference between Fallers' and non Fallers' in the current study. Even though non Fallers' had a relatively better walking capacity, mean value reduced than existing cut off value. In the current study, new fall predictive cut off value is 193m which is relatively equal to mean value of 6MWT. There is a statistical significance between 6MWT and history of falls ($p < 0.05$). We can enhance utility of physical performance tests such as TUG and BBS in our clinical settings as fall risk prediction measures within first week following primary strokes. Among the three tests only the BBS performed better in predicting fall risk. Though there is a less predictive ability 6MWT is significantly associate with fall history. Similarly, the TUG test can be used in conjunction with other clinical tests.

Conclusion:

The BBS and 6MWT were significantly associated with falls. BBS was better than 6MWT and TUG test in predicting fall risk. We recommend the use of physical performance tests, ideally the BBS, to identify those at a higher risk of falling among those individuals recovering from a stroke in Sri Lanka.

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Formulation development for a herbal cream incorporating the extracts of *Curcuma zedoaria* rhizome

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Abstract: *Curcuma zedoaria* is a perennial herb which belongs to the family Zingiberaceae. In traditional medicine, the rhizome of *Curcuma zedoaria* is used to treat various diseases including inflammatory conditions. The objectives of the study were to formulate a stable anti-inflammatory cream by incorporating aqueous extract of *Curcuma zedoaria* rhizome (ARE) and to investigate its phytochemicals. ARE was screened for phytochemicals. Fourteen different trial base formulations were developed by drop-wise addition of aqueous phase to the oil phase with continuous stirring at 60^0C (fusion method). The formulations were subjected to characterization tests and stability tests (real time and accelerated) for 90 days. Among them, the best two base formulations, which were stable for the tested period of 90 days, were selected. Creams with 0.75%, 1% and 1.5% (w /w) of ARE were prepared using the selected two base formulations and characterization and stability studies were conducted. Creams with 0.75% and 1% (w/w) ARE were stable for 90 days at both real and accelerated conditions. According to the characterization, all creams were identified as oil in water emulsions with pH of 6. The parent base texture was not changed after incorporating the extract. Flavonoids, tannins, alkaloids, saponins, terpenoids, carbohydrates and gums were present in ARE. It is concluded that using newly formulated bases, stable anti-inflammatory cream can be formulated by incorporating ARE of *Curcuma zedoaria*, a plant which is well known to have anti-inflammatory activity in traditional medicine. It is recommended to establish quality control standards for the novel formulation for future studies.

Keywords: *Curcuma zedoaria*, formulation, cream, stability

Introduction:

Inflammation is a protective response against harmful agents. But, the unregulated inflammation can cause harmful conditions such as life-threatening hypersensitivity reactions, cardiovascular diseases, neurogenerative diseases, cancer, *etc* (Kumar *et al*., 2005). Many currently used drugs to suppress such unregulated inflammatory activity have less curability and more side effects (Okin and Medzhitov., 2012). So, there is a huge interest in developing anti-inflammatory drugs having better efficacy and fewer side effects. Natural plant extracts are rich in many active constituents and give considerably fewer side effects. Therefore, they can be considered as possible candidates for preparing such novel drugs with better efficacy and lesser side effects (Okin and Medzhitov., 2012). *Curcuma zedoaria* belongs to the genus Curcuma Linn of the

family Zingiberaceae and it is a perennial herb which is identified to have anti-inflammatory, antinociceptive, anti-tumor, antimicrobial, analgesic and wound healing activity (Add reference). In traditional medicines, *Curcuma zedoaria* is used to treat various diseases such as inflammation, wounds, pain, skin ailments, menstrual irregularities, malaria fever,*etc.* (Ullah*et al*., 2014). The objectives of this study were to develop a stable anti-inflammatory cream by incorporating the extracts of *Curcuma zedoaria* rhizome and to investigate its phytochemicals.

Methodology:

Sample collection and authentication

The fresh rhizomes from the mature plant of *Curcuma zedoaria* were collected from Kegalle District (Coordinates: 7015'11" N 80020'43" E), Sabaragamuwa Province, Sri Lanka in June 2019. The collected plant parts were identified and their authenticity was confirmed by national herbarium, Royal Botanic Gardens, Peradeniya, Sri Lanka.

Preparation of aqueous extract of the rhizome

Fresh powdered rhizomes of *Curcuma zedoaria* (100.0 g) were boiled with 1500 mL of distilled water and the resulting filtrate was evaporated using a rotary vacuum evaporator. The resulting sludge was dried and **a**queous extract of the rhizome (ARE) was obtained.

Phytochemical analysis

The extract was screened qualitatively for the presence of alkaloids, tannins, flavonoids, saponins, terpenoids, carbohydrates and gums using standard methods of analysis described in Vishnoi (1979) and Sofowara (1993).

Preparation, stability evaluation and characterization of the base formulations.

A set of fourteen bases (S1 -S14) were prepared using different ratios of white soft paraffin, Eucalyptus oil, water, surfactants (polyethylene glycol, Tween 80), emulsifying wax, hard paraffin, liquid paraffin and stearic acid by fusion method. In fusion method, the required weight of distilled water was taken to a dry beaker and heated up to 60^0C using a water bath. At the same time, components of the oil phase including emulsifying agents were weighed to another container and heated up to 60^0C using a water bath. When components of both aqueous and oil phases were dissolved at 60^0C, the aqueous phase was added drop wise to the mixture of oil phase with continuous stirring. The prepared bases were transferred into universal bottles and centrifuge tubes and labeled accordingly.

Base formulations were subjected to real time and accelerated stability testings over a period of 3 months and observations were made on 1st, 3rd ,5th, 10th, 15th, 29th ,45th ,60th ,75th and 90th day at specific storage conditions [8 °C (in refrigerator), 25 °C, 40 °C (in oven)]. In addition, base formulations were subjected to centrifugation stability test.

In characterization, microscopic analysis, measuring pH, organoleptic evaluation and evaluation of homogenicity were performed.

Incorporation of ARE to base formulations and of preparation, stability evaluation and characterization of cream formulations

Creams with 1%, 0.75% and 1.5% (w/w) ARE of *Curcuma zedoaria* were formulated with the best two stable base formulations (S5 and S13) as mentioned in Table 1. Initially the aqueous phase was prepared by mixing the required weight of the powder of the aqueous extract with required quantity of distilled water and

heated to 60^0C sing a water bath. The components of the oil phase were weighed in to another container and heated up to the

same temperature (60^{0}C) using a water bath. Then, the mixture of oil phase was added drop wise to the aqueous phase with continuous stirring. The prepared creams were cooled to room temperature with continuous stirring and transferred into universal bottles and centrifuge tubes and labeled accordingly.

Results and Discussion:

Nature and yield of the extracts and phytochemical analysis

ARE of *Curcuma zedoaria* was dry, reddish powder with a characteristic odour and the percentage yield was 7.3%(w/w). Phytochemical study showed that flavonoids, tannins, alkaloids, saponins, terpenoids, carbohydrates and gums were present in ARE.

Table 1. Visual stability observations of S5, S6, S11, S12 and S13

Day	Stability of the base														
	8^{0}C					RT					40^{0}C				
	S5	S6	S11	S12	S13	S5	S6	S11	S12	S13	S5	S6	S11	S12	S13
1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
10	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
15	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
29	S	S	S	S	S	S	S	S	S	S	S	S	P	S	S
45	S	S	S	S	S	S	S	S	S	S	S	P	P	S	S
60	S	S	S	S	S	S	S	S	S	S	S	P	P	P	S
75	S	S	S	S	S	S	S	S	S	S	S	P	P	P	S
90	S	S	S	S	S	S	S	S	S	S	S	P	P	P	S

(S=Stable P= Not stable)

Stability evaluation of trial bases

S5 and S13 bases were stable at all specific storage conditions (8°C, 25 °C and 40°C) and showed no phase separation after centrifugation for all 90-day time period. The stability study of the best five formulas is given in Table 1.

Characterization of trial bases

Microscopic observations revealed that the formulated creams as oil in water emulsions. Initial pH of the creams was 6. All the trial base formulations had moderately fine texture except S5 which has very fine texture.

According to the results of above stability tests and characterization tests, S5 and S13 bases were selected as best base formulations and they were used to develop cream incorporating the plant extract.

Stability evaluation of cream

Creams formulated incorporating 0.75% and, 1.0%(w/w) of ARE of *Curcuma zedoaria* to base formulations of S5 and S13 were stable at all specific storage conditions (8°C, 25 °C and 40°C) and showed no phase separation after centrifugation for all 90-day time period (Table 2).

Table 2. Visual stability observations of cream series

Day	Temperature																	
	8^{0}C						RT						40^{0}C					
	S5			S13			S5			S13			S5			S13		
	0.75%	1%	1.5%	0.75%	1%	1.5%	0.75%	1%	1.5%	0.75%	1%	1.5%	0.75%	1%	1.5%	0.75%	1%	1.5%
1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
10	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
15	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
29	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
45	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	P
60	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	P
75	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	P
90	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	P

(S=Stable P= Not stable)

The creams formulated incorporating 1.5%(w/w) of ARE of S5 were s *Curcuma zedoaria* table at all temperatures. However, the creams formulated incorporating 1.5%(w/w) ARE to S13 were stable only at 8°C and 25 °C.

Characterization of cream

Microscopic observations revealed that the formulated creams as oil in water emulsions. Initial pH of creams was 6. The parent base texture was not changed after incorporating the extract.

According to results and observations, S5 base is more compatible with ARE than S13 base. Also, S5 base in which white soft paraffin used as oil phase is more cost effective than S13 base in which eucalyptus oil used. Both S5 and S13 creams can be improved by incorporating anti-oxidant agents, antimicrobial agents and preservatives.

Resulting cream can be further subjected to anti-inflammatory and quality control studies to produce a marketable drug that serves as an anti-inflammatory cream**.**

Conclusion:

Stable anti-inflammatory cream can be formulated using newly found base formulations incorporating ARE of *Curcuma zedoaria.*

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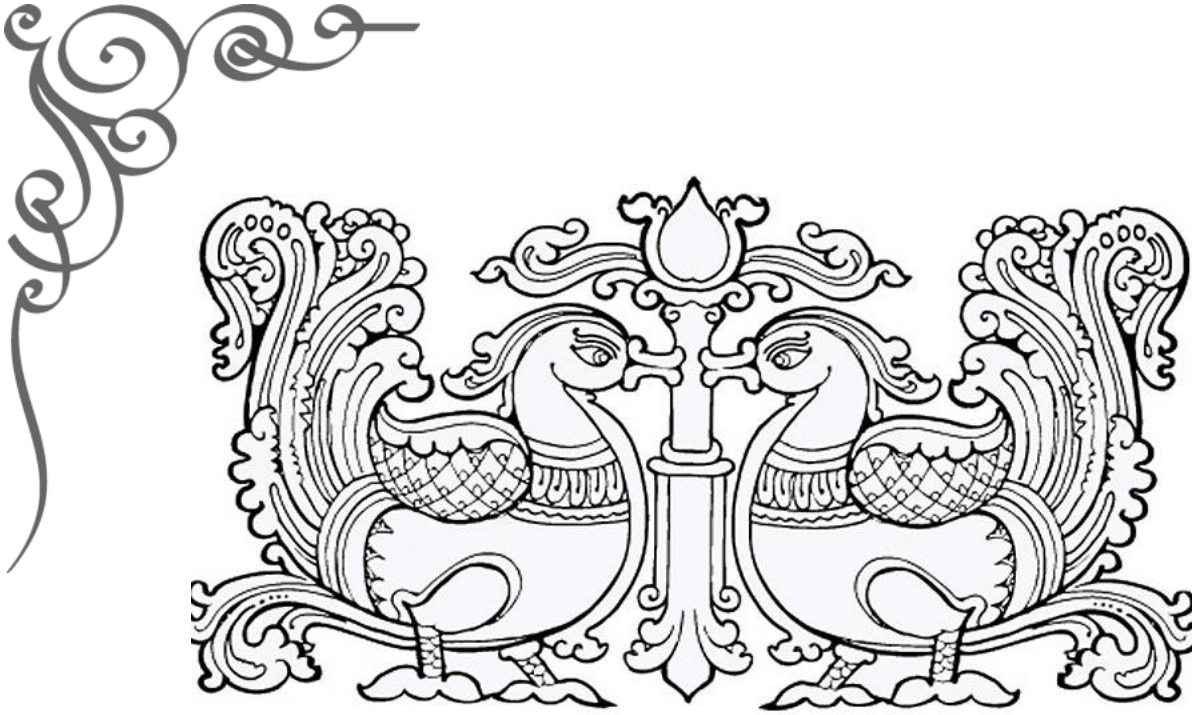

Poster Session

Association of quadriceps and hamstring muscle strengths with low back pain due to non-contact injuries among fast bowlers aged between 15 – 19 years in division 1 boys' schools in Colombo

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Abstract. The purpose of this study was to investigate how quadriceps and hamstring muscle strengths associate with low back pain (LBP) due to non-contact injuries among 102 fast bowlers aged between 15-19 years at Colombo division 1 boys' schools in Sri Lanka. Eighty-five fast bowlers were fulfilled the requirements and an interviewer administered questionnaire was used to gather the demographic data regarding general characteristics and the severity of low back pain respectively. Bowlers were prospectively monitored over the competition period of 2019 cricket season and the quadriceps and hamstring muscle strengths were recorded. SPSS software was used to analyse the data. Thirty-seven (43.5%) of the subjects were presented with LBP due to non-contact injuries. Reduction of quadriceps strength of dominant side leg and hamstring strength of non-dominant side leg were found to be significantly associated with LBP ($P<0.05$). Conflicting results were found for the association of quadriceps strength of non-dominant side leg and hamstring strength of dominant side leg with LBP ($P>0.05$). There was a significant difference for the quadriceps strength of dominant side leg and hamstring strength of non-dominant side leg between the fast bowlers with and without lower back pain. The results concluded that reduced quadriceps muscle strength of dominant side leg and reduced hamstring muscle strength of non-dominant side leg have an important role in predisposing a fast bowler to have an increase in low back pain which occurred due to non-contact injuries.

Keywords: quadriceps strength, hamstring strength, low back pain, non-contact injuries, fast bowlers, age 15-19 years

Extended Abstract

Introduction

Cricket is considered as a team sport which is described as the gentlemen's game originated in South East England and has globally developed by today. Fast bowlers have a long run up and generate more speed in bowling/ releasing the ball when compared with the spinners. Run up, pre-delivery stride, delivery stride and follow through are the main components of a fast bowling action (Mathew et al., 2016).

Non-contact injury is defined as the occurrence of an injury without any collision mechanism with an external force; players or objects (Forrest et al., 2017). Right lower limb can be described as ipsilateral leg/ dominant leg/ non-preferred leg while left lower limb as contralateral leg/ non-dominant leg/ preferred leg regarding to a right arm fast bowler. Fast bowlers are more prone to get injuries due to their heavy workload and repetitive stress acts through body alignments which results from ground reaction force (GRF) during front foot impact and back foot impact comparing to other different roles in cricket (Elliott, 2000). The prevalence of injury among fast bowlers were 8% in international cricket (Mount, et al., 2014) and 14% in Australian first class

level fast bowlers (Orchard, 2002). According to Pardiwala, et al., (2017), Australian, South African, English, West Indian and Indian bowlers are the one who experienced more injuries (41.3%). Gamage et al., (2018) observed lower limbs and lower back strains and sprains are at greatest injury incidence in Sri Lankan junior cricket bowlers with 20.3% and match injury incidence rate is 5.7.

Ground reaction force will result a stress force on lumbar spine through foot, ankle, knee and hip kinematic chain. This GRF is absorbed by the knee joint through the lumbar spine. Weakened quadriceps and hamstring muscles result on stiffness of knee joint and this cause reduction of shock absorption on the knee joint and increase the force on the lumbar spine, which increases the vulnerability to low back injuries (Cai and Kong 2015). Limitations in hamstring and quadriceps strengths have a connection with lower back injuries in highly active sportsmen (Murphy, 1997) especially when they are young and playing a high-risk sport such as cricket fast bowling (Millson et al., 2004). Hamstring and quadriceps strains which occurred secondarily to the weakness of those muscles have an association with lumbar stress fractures (Orchard et al., 2010) which is the most severe condition in young fast bowler (Pardiwala et al., 2017).

Thus, the aim of this study was to examine the association of quadriceps and hamstring muscle strengths with low back pain due to non-contact injuries among fast bowlers aged between 15-19 years in division 1 boy's schools in Colombo. School fast bowlers those who are yet having time to mature physically are susceptible for injuries and they are the ones who are going to represent the national team in near future. This research will open up the pathways to evolving of many other research topics related to school level cricketers about what they are going to face in the future.

Methodology

This descriptive cross-sectional study was conducted with 102 subjects in the competition period of 2019 cricket season among all the division 1 boys' schools in Colombo.

The subjects with a history of any neurological disorders, cardio-vascular diseases, experience a pain in any area that different from lower back region, complaint of pain more than 6 in the NPRS of any joint which will be used in the test procedures and intolerable pain during the measurement gaining procedures were excluded. The data provided by the fast bowlers were collected and recorded following taking the written informed consent and explaining the procedure of the research. Selected subjects performed a 5 minutes warm up session and 5 minutes static stretching exercises specially targeting the quadriceps, hamstring, lower back and upper extremity muscle groups in order to minimize the variability and the standard error of the measurements by reducing the impact of different muscle temperature on muscle flexibility.

Before administrating the questionnaires and the data collection tools to the study participants, it was administered to randomly select 10 male fast bowler between 15-19 years old, who were outside the defined study area.

Height was measured by using the Seca stadiometer 282 (SecaGmBH and Co kg, Hamburg, and Germany) and weight using the Tanita HD 318 digital weighing scale (Tanita Cooperation, Tokyo, Japan). Intensity of pain was measured by using Numerical Pain Rating Scale (NPRS).

Quadriceps and hamstring muscle strength and muscle strength were measured by using a modified sphygmomanometer which was made by making adaptations to a sphygmomanometer. The inflatable part was

folded into four equal parts and the remaining velcro part was wrapped around the inflatable part and fixed with adhesive tape. Before the sphygmomanometer was taken to the data collection it was calibrated using 2kg weights to check whether it provides consistent measurements. When taking the measurement of quadriceps strength, athlete was sitting in 90 degrees flexed hip and 90 degrees flexed knee position. The cuff was placed just above the ankle in line with the knee joint in the anterior side. When assessing the hamstring strength, the athlete was in prone lying position with knees extended fully. During the test, athletes were asked to perform maximum isometric contraction for five seconds. Athletes were given a 10 second rest in between each repetition. Three repetitions were given to an individual athlete to perform.

Data analysis was done using the statistical package for the social science (SPSS) software. As the variable data did not express a normal distribution across the sample, non-parametric tests were used to analyze the data. Mann Whitney U test was used to assess the difference between the fast bowlers with and without LBP. Spearman correlation was used to assess the association between two variables. P < 0.05 was considered for significant level.

Results

Eighty-five (85) fast bowlers were recruited and 17 were excluded from a preliminary sample of 102. No adverse effects were observed during the measurements. The mean age of study population was 16.6 ± 1.0 years. The Prevalence of LBP was 43.5% in the study population. The majority of the population is with right arm bowlers (91%) while the remaining of the population (9%) is with left arm.

Table 1. Distribution of variables in the study population

	Median values (n=85)		P-value
	With LBP (n=37)	Without LBP (n=48)	
Age (years)	17.0	17.0	0.81
Bowling experience (years)	6.0	6.0	0.83
Training period (hours per week)	2.0	3.0	0.08
Body Mass Index (kg/m^{-2})	20.0	21.1	0.26
Quadriceps strength of non-dominant side (mmHg)	142.0	152.5	0.12
Quadriceps strength of dominant side (mmHg)	147.0	163.0	0.01 *
Hamstring strength of non-dominant side (mmHg)	101.0	117.0	0.04 *
Hamstring strength of dominant side (mmHg)	108.0	119.0	0.35

P-value → significant level * p < .05 → significant

Table 2. Association of variables with low back pain of the study population

	Low Back Pain	
	r_{sp}	P-value
Age (years)	-0.01	0.96
Experience (years)	0.01	0.99
Training period (hours per week)	-0.24	0.13
Body Mass Index (kg/m^{-2})	-0.17	0.11
Quadriceps strength of non-dominant side (mmHg)	-0.18	0.11
Quadriceps strength of dominant side (mmHg)	-0.34*	0.01*
Hamstring strength of non-dominant side (mmHg)	-0.28*	0.01*
Hamstring strength of dominant side (mmHg)	-0.15	0.17

r_{sp} → sperman's correlation P-value → significant level * p < .05 → significant

As the data did not show a normal distribution, non-parametric median values were used to assess the difference between two variables (Table 1). The general characteristics (age, experience, training period and BMI) did not show any significant difference between the fast bowlers with and

without LBP (p>0.05). But it showed a highly significant difference for the quadriceps strength of dominant side and hamstring strength of non-dominant side between the fast bowlers with and without LBP (p<0.05).

Association of general characteristics and muscle strengths with the low back pain of the study population was evaluated in Table 2. There were negative correlations for the age, training period and BMI and positive correlation for the bowling experience with LBP of the study population which were insignificant. The quadriceps strength of dominant side and the hamstring strength of non- dominant side were significantly negatively correlated with the LBP (p<0.05) while quadriceps strength of non-dominant side and hamstring strength of dominant side were negatively correlated with the LBP insignificantly.

Discussion

This study describes the association of quadriceps and hamstring muscle strengths with low back pain due to non-contact injuries in adolescent male fast bowlers playing for division 1 Colombo boys' schools aged between 15-19 years. Previously some studies had been conducted, but mostly focusing on only one or different intrinsic factor related to LBP in Asian region and non-Asian region. This is the first research study presenting quadriceps and hamstring muscle strengths as associated intrinsic factors to fast bowlers' low back pain due to non-contact injuries in Sri Lankan region.

In the present study, the mean age of the study population was 16.6 ±1.0 years. Similar to present study, Foster et al., (1989) also explained that the age of the fast bowlers (mean age=16.8) might be susceptible for high incidence of back injuries (LBI) due to incomplete ossification of neural arches of lumbar vertebrae. Many of the research studies revealed that younger players (16-20 years) are more prone for lower back injuries among fast bowlers, mainly lumbar stress injuries (Engstrom and Walker, 2007; Foster et al., 1989; Hardcastle et al., 1992). Young cricketers had more trunk and back injuries, on-field injuries and more recurrent injuries than the adult cricketers (Stretch, 2014).

When considering BMI, there was no significant association between the BMI value of the male fast bowlers and their LBP in the current study. Also, there were lack of evidences to support the resulted conclusion with regard to LBP of fast bowlers and BMI. With opposed in a clinic based cross-sectional studies (with back pain patients) stated that LBI are common among the people with higher BMI and obese and overweight subjects presented with severe LBP (Chowdhury et al., 2014). However, the current study differs from a clinical based study as the current study directed from a sample of elite fast bowlers. Therefore, BMI should be compared using a similar sample of elite fast bowlers with a similar geographical and ethnic area and also differentiate in various age groups for further clarification.

In the current study, reduction of the dominant side quadriceps muscle strength showed a highly significant association with the LBP in fast bowlers. Foster et al. (1989) had supported that weakened quadriceps muscle strength lead to low back injuries. Normally during run up phase, the generated GRF was absorbed by the knee joint and the lumbar spine and the reduction of quadriceps and hamstring muscle strength resulted on improving knee joint stiffness and this caused reduction of shock absorption on the knee joint and increased the force on the lumbar spine, which increases the vulnerability to LBI (Cai and Kong 2015). A systemic review was done using a non-sport population who suffered from nonspecific and chronic LBP for more than 03 months and a healthy population as the control group and lower limb muscle

power was checked. It was determined that muscle power of knee extensors was greatly reduced in nonspecific chronic LPB group than the control group (De Sousa et al., 2019). In contrast, a study was done by using fast bowlers aged between 18- 22 years interpreted that quadriceps muscle strength of non-dominant side was associated with LBP of fast bowlers (Foster et al., 1989). In fast bowlers, quadriceps and hamstrings muscles are repeatedly contracted eccentrically and concentrically through the run up phase and a peak vertical GRF and a horizontal GRF exert on the dominant side leg on delivery stride (Feros, 2015). But the relationship between the hamstrings and quadriceps muscle strength of the dominant side and LBI was not identified clearly (Elliott et al.,1989).

Reduced hamstring strength of the non-dominant side was strongly associated with high risk of LBP among the current study population. Recently it was evident in some articles (Burton, 2012; de Sousa et al., 2019) that reduced hamstring muscle strength cause LBP. Hamstring and quadriceps muscles were possessed with equal flexibility, length and strength in order to stabilize the movements of knee and pelvis as a pulley system. When hamstrings weakened than quadriceps muscle, it resulted a downward pull of pelvis by tightened quadriceps, since hamstring muscles was unable counter balance the pull. That downward pull of pelvis caused hyperextended lumbar spine. Due to the changed vertebral angle of the spine, the pressure placed on intervertebral discs was increased which would lead to lower back injuries (Burton, 2012). To support the current study, Madic et al., (2019) conducted a study with professional soccer players to investigate the correlation of strength and imbalances of knee muscles with LBP. The study showed a satisfactory difference in peak torque of left and right knee flexors between players with and without LBP. Although there were limited literatures done related to association of hamstring strength in prevalence of LBP in cricket fast bowlers, a recent study has interpreted a contrast result to our current study concluded that there was no significant variant between hamstring strength of persons with LBP and without LBP, but using a non-sport related population. (de Sousa et al., 2019).

Conclusions

In summary, the findings of this study revealed that none of the general characteristics which are age, BMI, training hours per week and experience did not contribute to develop low back pain symptoms among the adolescent fast bowlers aged between 15-19 years. The higher muscular strength of dominant side quadriceps muscle and non-dominant side hamstring muscle having less probability to develop LBP.

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Does learning environment differ in BSc. Nursing degree programmes in Sri Lankan state universities?

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Abstract. The optimum learning environment of the degree programme provides better indication of its quality. Therefore, the objective of the study is to assess the learning environment of BSc. Nursing degree programmes in Sri Lankan state universities. A descriptive cross-sectional study conducted among all 4th year nursing undergraduates who were studying in six Sri Lankan state universities; University of Sri Jayewardenepura, Peradeniya, Ruhuna, Jaffna, Eastern and General Sir John Kotelawala Defence University. These universities are mentioned anonymously in arbitrarily order. The sample size was 161 and the data was collected by already validated Dundee Ready Education Environment (DREEM) questionnaire. The questionnaire consisted of five domains; student's perception of learning, student's perception of teachers, student's academic self-perception, student's perception of atmosphere and student's self-perception. Overall scores of DREEM and subdomains scores were calculated and categorized into the very poor, significant problem, more positive than negative and excellent groups. The results revealed that the median score (±IQR) of DREEM were 127 ± 12, 130 ± 31, 127 ± 18, 133 ± 16, 129 ± 23, 126 ± 13 among universities out of 200. It showed that there was more positive than the negative environment in all BSc. Nursing degree programmes. Furthermore, the subdomains of DREEM also revealed that all median scores were within more positive than the negative group but moving to the lower margin. Therefore remedial actions should be taken to uplift the learning environment to improve the quality of all bachelor nursing degree programme in Sri Lanka in future.

Keywords: Learning environment, BSc. Nursing degree programmes, Sri Lankan state universities

Extended Abstract

Introduction

The environment is straightly connected to the attainment, happiness, fulfilment and favorable outcome of the students (Aamer et al., 2018). The quality of environment affects the educational programme effectively (Genn, 2001). The learning environment is one of the most essential element of learning procedure (Roff et al., 2001). Successful learning environment connects with the best results of the learning institute (Abdulrahman, 2013). The learning environment is an inescapable part of the syllabus, influencing the association between students, techniques, assessments and academic consequences. Learning environment refers to weather, atmosphere, and environment and has many different features such as personality, spirit, culture, family background (Palmgren and Chandrathilake, 2011). Development of values, views and professional performances of students are critical factors of the learning environment (Genn, 2001).

Currently, separate nursing schools and universities conduct nursing education programme in Sri Lanka (Jayasekara and Amarasekara, 2016). Nursing schools are joined to the Ministry of Health as governmental institutions. Universities are administered by the University Grants Commission (UGC) and the Ministry of Higher Education in Sri Lanka (Jayasekara and Amarasekara, 2016). Currently, pre-enrollment nursing education in Sri Lanka is based on a nursing programme at the level of a three-year diploma in nursing schools and four-year Bachelor of Science (BSc) degree programme during 2000-2002 (Jayasekara and Amarasekara, 2016).

Consequently, a four-year degree programme leading to B.Sc. in Nursing was started by the University Grants Commission (UGC) in Sri Lanka, in five universities (University of Sri-Jayewardenepura (2005), University of Peradeniya (2006), Eastern University. (2006), University of Jaffna (2006), and University of Ruhuna (2008) (Jayasekara and Amarasekara, 2016). Despite that, the UGC informed universities to remake a curriculum, general grade of three years with an additional year for those students who wish to obtain a special title (Jayasekara and Amarasekara, 2016). At present, two types of nursing degree programme are available in Sri Lanka. Such as direct entry B.Sc. degree programme in state universities and post-registration degree programme at Open University (Jayasekara and Amarasekara, 2016). Five standard universities in Sri Lanka have set up pre-registration degree programme leading to B.Sc. in Nursing, and the Open University offers a bachelor's degree in nursing for registered nurses of the Ministry of Health, Sri Lanka as a post-registration programme (Jayasekara and Amarasekara, 2016).

Current researches in the west revealed that the learning environment straightly impacts the learning process of nursing students (Aamer et al., 2018). However, in west majority universities have observed in positive aspects of learning environment as well as negative aspects have observed in some universities those who are delivering the nursing education curriculum (Aamer et al., 2018 and Aghamolaei and Fazel, 2010).

There were limited types of research findings available in the Sri Lankan context. However it has been done within the single universities to study learning environment among nursing undergraduates in individually in university of Ruhuna in 2012 and university of Eastern in 2016 almost four years (Hettiarachchi and Chandana, 2012 and Punithalingam and Sathaanathan, 2016). Now all the nursing faculties are matured, have enough facilities and staff. Therefore, it is needed to do more studies and best time to evaluate the learning environment of nursing undergraduates in universities, Sri Lanka to achieve best outcomes from nursing undergraduates.

However there were scanty of data in the Sri Lankan context to compare with these results with the global context. And also there is no comparison between universities in globe. There is a paucity data available in learning environment in all state universities in the same time period. And also there is no limit available data in all state universities conducting the B.Sc. degree programmes to see whether the learning environment among these universities.

This study was conducted in all state universities to identify the learning environment and lacking areas of the DREEM questionnaire. Therefore this study is needed to be conducted to compare with all state universities and which may helpful to develop bench mark of the nursing in Sri Lankan context in future.

Methodology

It was a descriptive cross-sectional study conducted in all state universities who having B.Sc. nursing degree programme. These universities are mentioned anonymously based on privacy and confidentially in arbitrarily order (A-F). For this study, 161 fourth year nursing undergraduates who are studying in Sri Lankan state universities A (n=29), B(n=20), C(23), D(n=29), E(n=27) and F(n=43) were selected as

the study population. All lateral entry nursing undergraduates and foreign nursing undergraduates in 4th year in Sri Lankan universities are excluded from this study. Non probability sampling method was used to collect purposive samples from study population.

Firstly, an explanatory statement and consent form were given and described the study. Participants were notified that all data collected last unnamed. Study data were collected using a demographic questionnaire and Dundee Ready Education Environment Measure (DREEM). Self-administrated DREEM questionnaire was used to collect perception data from nursing undergraduates. All questionnaires were coded and entered into an electronic database. The scores for the statements relating to negative attributes were computes in the reverse manner. Statistical Package for the Social Sciences (SPSS) version 23.0 was used to analyze the data and descriptive statistic methods were performed. Kruskal wallis test was done to assess group effect of the five domains and Mann-Whitney U test was done to assess significant association between five domains in each universities keeping university D as the base line. Kruskal wallis test and Mann-Whitney U test were done for assess the group effect of demographic characteristics and five domains in DREEM questionnaire Spearman's correlation was done to assess the correlation between age and the five domains. Ethical approval was obtained from the Ethical Review Committee of the Faculty of Medicine, General Sir John Kotelawala Defence University and other universities in Sri Lanka

Table 1 Score Interpretation

Area	Score	Interpretation
Total score	0-50	Very poor
	51-100	Significant problem
	101-150	More positive than negative
	151-200	Excellent
Sub-domain score		
Perception of learning(SPL)	0-12	Very poor
	13-25	Negatively viewed teaching
	25-37	A more positive perception
	37-49	Teaching highly regarded
Perceptions of teaching/instructors	0-11	Very poor
	12-22	Needs re-education
	23-33	Moving in the right direction
	34-44	Model instructors
Academic self-perceptions(SASP)	0-8	Feelings of total failure
	9-16	Many negative aspects
	17-24	Feeling more on the positive site
	25- 32	Confident
Perceptions of atmosphere(SPA)	0-12	Very poor environment
	13-24	Many issues need changing
	25-36	A more positive attitude
	37-48	A good feeling overall
Social self-perceptions(SSP)	0-7	Miserable

	8-14	Not a nice place
	15-21	Not too bad
	22-28	Very good socially

Results

A total of 161 students completed the questionnaire. The demographic data is shown in the table 4.1.1 majority of the students were in the university F (26.7%) and lowest number of students was in university D (11.8%). Their ages ranged from 22 to 27 years, with a mean age 24.7. Most students were female (68.9%). More than half of the study sample stayed in the hostels (53.4%) and most students arrived to the university on foot (40.4%). Most of the students in the study were having foods from boarding place (41.0%) and spend less than 15 minutes time duration from residence to faculty (40.4%). Majority of the students didn't work part time works (91.9%), extra-curricular activities (53.4%) and also extra diploma (70.2%).

Table 2 Baseline Characteristics of the Study Population (n=161)

Variables	frequency(n)	Percentage (%)
Name of the university	29	18.0
• A	20	12.4
• B	23	14.3
• C	19	11.8
• D	27	16.8
• E	43	26.7
• F		
Gender		
• Male	50	31.1
• Female	111	68.9
Living Arrangement	31	19.3
• Living with parents	44	47.3
• Renting	86	53.4
• Hostel		
Mode of transport	65	40.4
• On foot	55	34.2
• By bus	19	11.8
• By bike	22	13.7
• Any other		
Food get from		
• Home	53	21.7
• Boarding place	66	41.0
• Shop	60	37.3
Time duration from residence to faculty	65	40.4
• Less than 15mins	55	34.2
• Less than 30mins	19	11.8
• Less than 1hours	22	13.7
• More than 1hours		

The results of the current study revealed a median score of DREEM were in 6 universities in Sri Lanka, that 127 ±12 in university A, 130 ± 31 in university B,127 ± 18 in university C, 133 ± 16 in university D, 129 ± 23 in university E, 126 ± 13 in university F of a total of the 200 points. According to the practical guide of MCAleer and Roff this indicated a more positive than negative environment in 6 universities having nursing undergraduates degree programme in Sri Lanka (Roff et al., 2005).

Table 3 Assess the level of Student Perception of Learning in six universities (n = 161)

	A M +I QR	A M +I QR	A M +I QR	A M +I QR	A M +I QR	A M +I QR	A M +I Q R	X^2	p
SPOL	29 ±3	31 .5 ±7	32 ±6	34 ±4	31 ±5	31 ±4	18 .2 3	0. 0 0 3	29 ±3
SPOT	27 ±5	26 ±7	26 ±4	29 ±5	28 ±9	25 ±4	18 .9 92	0. 0 0 2	27 ±5
SASP	22 ±4	23 ±4	24 ±5	22 ±2	22 ±4	23 ±4	2. 65	0. 7 5 4	22 ±4
SPOA	37 ±4	30 ±9	30 ±6	32 ±6	29 ±9	31 ±4	2. 92	0. 7 1 1	37 ±4
SSSP	16 ±4	17 ±5	17 ±4	17 ±3	17 ±4	18 ±4	4. 17	0. 5 2 5	16 ±4
Overall Perception	12 7± 12	13 0± 31	12 7± 18	13 3± 16	12 9± 23	12 6± 13	4. 84	0. 4 3 5	12 7± 12

(M = Median, IQR = Inter-quartile Range, Kruskal wallis test)

The first domain of student perception of learning (SPOL) in all 6 universities (A, B, C, D, E, F) represented more positive status for student perception of learning. It indicates that in learner's opinion, the teaching practices in these universities were stimulating, dedicated and motivates students to become active and lifelong learners.

Student's perceptions of teachers was the second domains, there findings showed students believed their teachers are moving in the right direction. It indicates that student's perception that teachers are using the right techniques and methods. They have good communication skills with students & patients and secondly teachers provide constructive feedback to student. All of these factors contributes effectively in correct diagnosis and treatment planning of patients and enhances the patient care.

In student's academic self-perceptions was the third domain, the findings showed that feeling more on the positive site in learning environment. That indicates student's ideas and opinions regarding the implemented curriculum of each universities. In fourth and fifth subcategories, the median scores were high in student's perception to atmosphere and self-perception. These results clearly indicates the presence of positive learning environment in universities.

Discussion

This study revealed that overall student perception of learning environment all universities which are arbitrary named as A-F is more positive than negative environment. It is evident from comparison of our overall DREEM score with national and international nursing schools.

Results of previous studies conducted in Sri Lanka obtained scores less than our study. In our study all the universities scored higher than 100 out of 200. In similar studies were conducted in University of Ruhuna (109/200) and University of Eastern (111/200) (Hettiarachchi and Chandana, 2012 and Punithalingam and Sathaananthan, 2016). University of Ruhuna and University of Eastern are the universities included in this study which are anonymously named and it revealed similar kind results but it is higher than results of the previous studies. So that gives some positive impression after four years of their teaching methods, they are improving the learning environment than before.That means after four years they have a significant improvement in all aspects of learning environment. So that may be

positive of their teaching experts, staff recruitments and curriculum revisions.

In similar mean scores of DREEM reported in Korea 112/200 (Park KH, et al., 2015), Trinidad 106/200 (Bassaw B et al., 2003) , Iran 113/200 (Bakhialiabad et al., 2019), Nigeria 118/200 (Roff S et al.,2001) and Kuwait 106/200 (Bouhaimed M, et al.,2009).Achieving higher DREEM score for more student centered curricular in these universities and have modified problem-based learning will encourage students to combine available learning resources effectively (Al-Hazimi et al., 2004). These results are below the 120. But these scores implicates that learning environment is positive more than negative.Total mean score of DREEM which is higher than 120 were reported in Lahore at Pakistan, Karachi at Pakistan, Nepal, Indonesia, Eastern Nepal, Australia and Iran (Zafar et al., 2017, Farooq et al., 2016, Roff et al., 2001, Rochmawati et al., 2014, Shrestha et al., 2019 and Starman et al., 2018). There is a study that scored 157 which was conducted in Iran. It scored more than 150 out of 200. It shows that there is an excellent learning environment (Hassanian and Oshvand, 2018).

Conclusion

All the universities who are having B.Sc. nursing degree programme are within the optimum range which is more positive than negative. All are within the normal reference range but they are need to be improved in scores. None of the universities are in the excellent range. So, the next target is to get remedial actions to move all the universities in to the excellent range that may improve the bench mark of the nursing.

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Effects of Exposure to Digital Screens in Children and Adolescence

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Abstract – During the past three decades, using of screen has become an integral part of life. Over the years the screen has become more sophisticated and technologically developed. It has become a concern among parents and medical professionals on using screens by children and adolescence for excessive amount of time. The study focuses on physiological and psychological effects in relation to sleep deprivation, behaviour changes and possible behaviour outcomes of using digital screens. The sample was a convenient random sample of male children from three urban schools covering kindergarten, middle School and senior school, ages between 05-18 years with a total of 600 children. The initial assessment for children from ages 12-18 was done using a questionnaire to assess the current mental status and focused interviews were conducted. For children below the age of 12years were assessed individually through play and paper and pencil activities. Data was collected through parents and teachers regarding their behaviour. The same was cross checked with the participants. Minnesorta leisure time activity questionnaire, State-Trait anxiety inventory and Outcome questionnaire 45 was used to collect data. A self-assessed questionnaire was used to collect data regarding the use of smart devices, frequency of use and the level of addiction. SPSS 22 was used to assess data. Ethical clearance was taken from the Ethics review committee of university of Peradeniya. There was little social interaction even with parents and siblings. They showed a positive correlation with addiction to video games/extended screen time and antisocial behaviour traits (0.60) p0.5. The tendency for violent acts including both verbal and physical aggression was found. The study found moderate evidence of positive association between duration of screen time and severity of symptoms of anxiety (0.55) p0.5. Children below 12 years showed only aggressive behaviour when devises were removed from them. The screen time used by them is higher compared to children over 12 years. Children with long duration of screen time showed, disturbed and restless in sleep and jittery. Moderate evidence was found with screen time including television, computer, video and mobile phone were associated with poor sleep outcomes including delayed bedtimes, shortened total sleep time, sleep-onset-latency and daytime tiredness. In conclusion, it is a common responsibility to develop strategies to build up children in a safer and a supportive environment along with limited and guided exposure to screens in order to help with physiological and psychological wellbeing as they grow.

Keywords: Screens, Physiological responses, Psychological wellbeing,

Extended Abstract –

Introduction - During the past three decades, using of screen has become an integral part of life. Over the years screens has become more sophisticated and technologically developed. It has become a concern among parents and medical professionals on using screens by children and adolescence for excessive amount of time. The evolution of the screen began from a white cloth screen to todays' blue ray light emitting diode screens (LED) which has changed the use of the screen dramatically. In the beginning of the 21st century, with the invention of smart phones, the small screen concept came into limelight and today it has become the most used type of screen in the society. Types of

screens include TV, personal Computers, Laptops, smart phones, tabs and other devices used in day today activities. The world is moving towards paper free storage devices and the mode of entering data has become screens of every sort. Majority of the population of the world including children use smart devices for everyday activities and the time spent in front of a screen has increased over the past decade. Conditioning theories hold that addiction is the cumulative result of the reinforcement. Parents have a tendency to use these devices to control their children to keep them in one place or to make them silent. Level of environmental stimuli is a contributing factor. The study focuses on physiological and psychological effects due to the use of excessive screen time. The study is conducted in relation to sleep deprivation, behaviour changes and possible behaviour outcomes of using screens.

Methodology - The Study included participants with parental consent to participate in the study. The sample was a convenient random sample of male children from three urban schools covering kindergarten, middle School and senior school, ages between 05-18 years with a total of 600 children. The initial assessment for children from ages 12-18 was done using the outcome Questionnaire 45 to assess the current mental status and focused interviews were conducted. For children below the age of 12years were assessed individually through play and paper and pencil activities. Data was collected through parents and teachers regarding their behaviour. The same was cross checked with the participants. The use of smart devices, frequency of use and the level of addiction was assessed. The aggression scale developed by Pamela Orpinas and Ralph Frankowski was used to measure aggression and the Trait-State Anxiety Inventory was used to measure the level of anxiety. Data analysis was done using SPSS 22 and Ethical clearance was taken by the Ethics Review Committee of University of Peradeniya.

Results and Discussion - The study results show that Parents have a tendency to use smart devices with children in kindergarten to control their children and make them silent. The study found to have a high level of virtual friendships and relationships compared to mutual social relationships, poor social interaction even with parents and siblings, high level of virtual living was found among middle school and senior school children. Social aggression was a common observation among the sample. They showed a positive correlation with addiction to video games/extended screen time and antisocial behaviour traits. The tendency for violent acts including both verbal and physical aggression was found. The study found moderate evidence of positive association between duration of screen time and severity of symptoms of anxiety (0.55) p0.5. Children below 12 years showed only aggressive behaviour when devises were removed from them. The screen time used by them is higher compared to children over 12 years. The study is limited to a small sample which makes it a barrier to generalize to wider population. In the same manner the sample consisted only students belonging upper middle class society.

Conclusion - . The study concludes that emotional negligence of parents and addiction to mobile games and smart devices have an impact on social isolation of teenagers and on aggressive behaviour. There was little social interaction even with parents and siblings. They showed a positive correlation with addiction to video games/extended screen time and antisocial behaviour traits. The tendency for violent acts including both verbal and physical aggression was found. The study found moderate evidence of positive association between duration of screen time and severity of symptoms of anxiety. Children with long duration of screen time showed, disturbed and restless in sleep and jittery. Moderate evidence was found with screen time including television, computer, video and mobile phone were associated with poor sleep outcomes including delayed bedtimes, shortened total sleep time, sleep-onset-

latency and daytime tiredness. Screens are the modern method of communication and it is a requirement to understand the need of it as well as the pros and cons of using them. Though the technological advances have made certain screens vivid, still the physiological function of humans are in a phase of evolution to this. Hence there is a common responsibility to develop strategies to build up children in a safer and a supportive environment along with limited and guided exposure to screens in order to help with physiological and psychological wellbeing as they grow.

Figure i: Screen time use of Children below 12 years n - 147

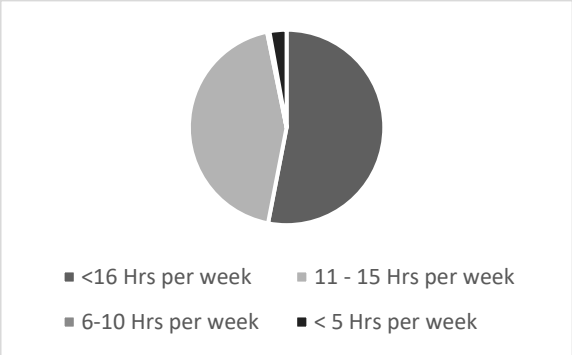

Figure ii: Screen time use of Children above 12 years n – 453

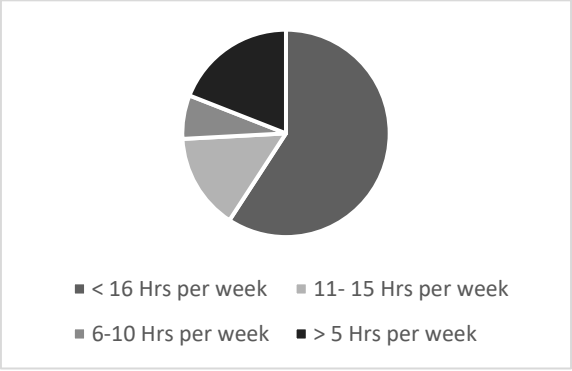

Table i: Types of smart devises used

Type of Smart devise	No of Uses
Television	600
Mobile Phones	580
Tabs	84
Computers	558
Multiple Devises	435

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Knowledge on disaster preparedness and associated work related factors among allied health professionals at Teaching hospital, Jaffna

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Abstract—Time to time as Sri Lankans, we have faced major natural hazards. Though disasters create a heavy physical and psychological burden for the members of the healthcare team, their preparedness to meet the disaster is utmost important as they are in the frontline of disaster management. The purpose of this study was to assess the level of knowledge on disaster preparedness and associated work related among allied health professionals at Teaching Hospital, Jaffna. A descriptive cross-sectional study was done with 300 allied health professionals recruited using stratified random sampling method. A multi sectional self-administered questionnaire was used to collect data. Correlation analysis and independent sample t-test and ANOVA were performed to identify associated factors. The mean age of participants was 34.5(SD±8.031) years. More than half of the participants were Nurses (n=209, 69.7%). The following work related factors were statistically significant on knowledge of disaster preparedness among allied health professionals. Travelling distance from residence was positively correlated with knowledge on disaster preparedness r (300) =0.123, p=0.033. Educational status, occupation and professional experiences were statistically significant associated factors for knowledge on disaster preparedness (p<0.001). There is a huge gap between the knowledge level on disaster and current needs of disaster preparedness among allied health professionals. They had limited opportunities for training. Specially nurses had that kind of practices than other allied health professionals. Therefore, training should be provided focusing on the specific gaps identified. Disaster preparedness should be rehearsed possibly through training and simulation exercises because training and education in disaster preparedness are considered as back bone.

Keywords— Disaster preparedness, Knowledge, Associated work related factors

INTRODUCTION

Globally hospitals have been involved in both internal and external disasters. These two types of disasters are independent but not mutually exclusive. Internal disasters are integrated to the hospital and occur more frequently than external disasters. External disasters affect the community as well as the hospital (Sakhare et al., 2016). Communities may need to be rebuilt physically, mentally, economically and socially with the strike of disasters (eg pandemic, epidemic outbreak). Especially in disasters that involve a large number of people such as pandemic or epidemic outbreak, all hospitals will be expected to play a major part in the response. With no or insufficient emergency plans, the hospital resources may be overwhelmed.

As one of the key steps in disaster management is preparedness. All health care professionals need to be familiar with effective actions in the case of disastrous events and in turn must receive proper disaster preparedness education, including continuing education courses in disaster management, regular drills within the communities that they serve as well as

integration of disaster courses content in the undergraduate curricula. Disaster preparedness and response units are functioning under the Ministry of Health, even though there is a gap. Although the government has made some improvement mainly for infrastructure resiliency, inadequate disaster preparedness remains at many regional hospitals. Despite the critical role of hospitals in saving lives of disaster victims, very limited research has been assessed in the disaster preparedness at hospitals in Sri Lanka (Munasinghe, N.L. 2019).

Disaster has direct and indirect health impact. Direct impacts are death, trauma, lacerations, fractures, amputations, etc. Indirect impacts are pandemic, epidemic diseases, malnutrition, mental health & psychosocial problems. Other than that, impacts on health workforce, health information management, medical products, vaccines & technologies, health financing, leadership & governance and health service delivery are also felt. Therefore, disaster preparedness is important. Assessing knowledge and associated factors on knowledge and training needs of allied health professionals on disaster preparedness and response would be helpful to know the key mechanisms of first responders to a disaster.

The general objective was to assess the level of knowledge on disaster preparedness and associated work related factors on knowledge on disaster preparedness among allied health professionals at Teaching Hospital Jaffna. The specific objectives were to assess the knowledge on disaster preparedness among allied health professionals and to determine the associated work related factors on knowledge on disaster preparedness.

METHODOLOGY

Hospital based descriptive cross-sectional study was done. Study was conducted from July 2019 to December 2019. The study was conducted among allied health professionals who are working at the Teaching Hospital, Jaffna as permanent staff members. Those who were on long term leave (such as maternity/ vacation etc) at study period were excluded from the study.

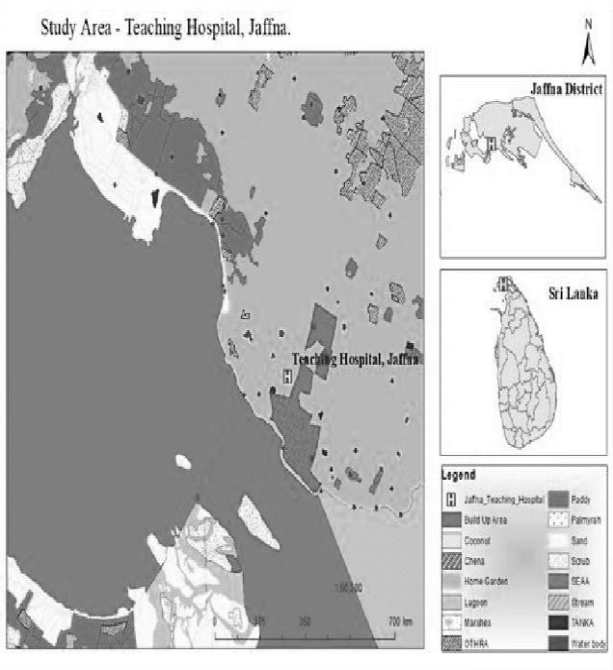

Figure 1. Location of study area

The sample size was calculated by following formula $N=z^2p\ (1-p)\ /d^2$, $(1.96)^2\times0.30(1-0.30)/0.05^2$. Rahman et al (2018) carried out a study in Bangaladesh on Knowledge and awareness on disaster management among medical professionals of a selected public and private medical college hospital. They found 30% of health professional had knowledge. Here, assumption 30% of health professional had knowledge. p=0.30 (Proportion value) Anticipated prevalence of knowledge of allied health professionals. About 10% of non-respondent rate was expected. So, actual sample size was 356. Stratified random sampling technique was used to select the participants to the study.

The study was conducted among allied health professionals who are working at Teaching Hospital, Jaffna as permanent staff members. Among them Matrons, In-charge Nurses,

Nursing officers, Midwives, Pharmacist, Medical laboratory technicians, Radiotherapist, Radiographer, Physiotherapist, Occupational therapist, Nutritionist, Ophthalmic technologist, Public health inspector, Speech therapist, Cardiographer and EEG technician were included.

The study instrument was a multi sectional self-administered questionnaire. It was prepared by using the information gathered from the literature and also discussed with expert advisories. The self-administered questionnaire was prepared in English and translated into Tamil and Sinhala. Questionnaire was included two sections such as A and B. Section A contained socio demographic and work related factors. Section B contained knowledge on disaster preparedness. In that Section B 1 part contained five main questions in which each had five statements. In Section B 2 part were contained eight written short answer structured questions. Validity of study instrument was done by face validity and it was done by pilot study among ten allied health professionals who are working at Point Pedro Base Hospital. The study purpose was explained to the allied health professionals and informed written consent was obtained from them at a convenient time without disturbing their duty. Then self-administered questionnaires were given to be filled by them. They were closely monitored during the time that they were filling the questionnaire to minimize discussions as this was a knowledge assessment.

Data was analyzed by using SPSS 21 Statistical software (Statistical Package for Social Science). Correlations, t-test and one way anova tests were performed. Multivariate analysis was done. It was used to identify the associated factors. Research proposal was ethically approved by the Postgraduate Institute of Science, University of Peradeniya.

RESULTS AND DISCUSSION

This descriptive cross sectional study was conducted with 300 allied health professionals who are working at the Teaching Hospital, Jaffna. Out of 356 approached participants, only 300 participants responded to the study. The respondent rate was 84.3%. The mean age of participants was 34.5 (SD± 8.031) years. Majority of participants were female (n=219,73.0%).Majority of them have diploma qualification (n=248,82.6%). More than half of the participants were Nurses (n=209, 69.7%), Pharmacists (n=12,4.0%), Midwives (n=25,8.3%), Medical Laboratory technician (n=21,7.0%) Physiotherapist (n=14,4.7%), In-charge nurses (n=4, 1.3%), Radiotherapist (n=2,0.7%), Matron (n=2, 0.7%), Public health inspector (n=2,0.7%), Cardiographer (n=5,1.7%), Occupational therapist (n=1,0.3%), Nutritionist (n=1,0.3%), Speech therapist (n=1,0.3%) and Electroencephalogram technician (n=1,0.3%). More than half of them were married (n=207,69.0%). Majority of them (75.7%) were Hindus (n=227,75.6%). Only (n=20) 6.7% of them were over 50 years old. The mean age of participants was 34.54 (SD ± 8.031) years. Majority of them had diploma qualification (n=248,82.6%). Only (n=47)15.7% of them were graduated. Two participants (0.7%) were postgraduated.

According to the above Figure 2 the least mark that was scored by allied health professionals was 18.0. Among four of them were scored a total mark (100.0). The mean of score of knowledge was 68.49 (SD±15.18). The median of knowledge score was 70.0. Mode of knowledge score was 72.0. Among (n=37)12.3%of them were got less than fifty mark. The correct answer for emergency colour code was given by (n=31) 10.3% of them. Triage color code for victims

whose injuries demand urgent medical attention, after resuscitation, or as soon as practicable (n=126, 42.0%) and about the victims who had died (n=130, 43.3%) was known to nearly half of them. Only twenty five of them (8.3) participated in the disaster drill.

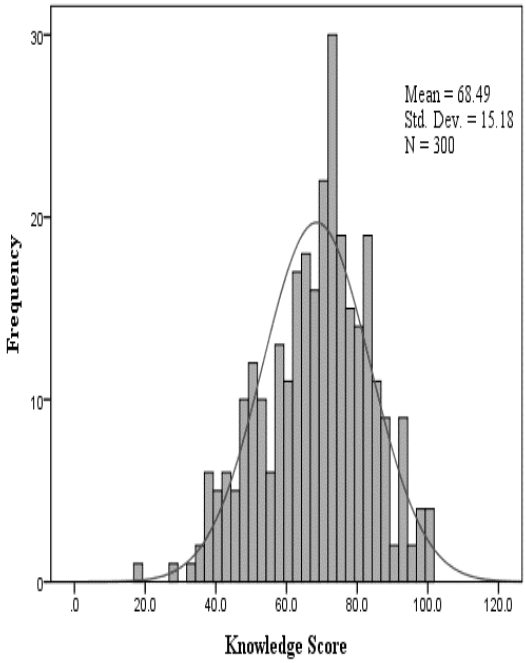

Figure 2.Distribution of allied health professionals' knowledge on disaster preparedness

As shown in Table 1travelling distance from residence to hospital positively and significantly correlated with the knowledge on disaster preparedness among allied health professionals (r (300) =0.123, p=0.033).

Independent sample t-test was used to identify work related factors associated with knowledge on disaster preparedness. It was done as an independent sample test. Here age was categorized as ≤30 years old as one and > 30 years old as two. Likewise professional experiences were categorized as <1-5 years as one and > 5 years as two, current unit experiences were categorized as ≤ 5 years as one and > 5 years as two and travelling distance from residence was categorized as ≤ 5 Km as one and > 5 Km as two. Other factors were categorized as following sex as male and female, marital status as single or married but no one responded with the reply whether they were divorced or not. Religion was categorized as Hindu and others (Christian R.C, non R.C, Islam and Buddhist). Educational status was categorized as certificate course and diploma as one and graduate and postgraduate as another. Occupation was categorized as In-charge nurses and Nurses in one category and others (Midwives, Pharmacist, Radiotherapist, Physiotherapist, Medical laboratory technician, Matron, Cardiographer, Occupational therapist, Public health inspector, Nutritionist, Speech therapist, Electroencephalogram technician), Working unit of in-charge nurses, nurses and midwives were categorized as wards and special units (Emergency unit, Coronary Cardiac Unit, Laboratory, Haemo dialysis unit, Highly dependent unit, Blood bank, Antenatal clinic, Endoscopy unit, Operation theatre, Dental unit, Sexually transmitted diseases clinic, Infection control unit and Medical intensive care unit), Travelling mode to walk was categorized as walk, bicycle and motor cycle as one and others (Three wheeler, car and bus). Work related factors were categorized as Yes and No.

According to that a statistically significant difference in knowledge on disaster preparedness based on the educational status, occupation, professional experience, following disaster related courses during their study period. Certificate course and diploma obtained a less mean (SD)

knowledge score (67.0+14.9) than graduate and postgraduate (75.9+14.6) conditions; t (298) = -3.827, p=0.000. In-charge nurses and nurses obtained a higher mean (SD) knowledge score (70.2+15.4), than other categories (such as (64.2+13.9) conditions; t (298) =3.184, p=0.002. Professional experiences ≤ 5 years obtained a less mean (SD) knowledge score (70.6+14.4), than >5 years (66.6+15.6) conditions; t (298) =2.296,

p=0.022. Disaster related courses included in their study period obtained a higher mean (SD) knowledge score (77.8+16.9), than not included (67.5+14.7) conditions; t (298) = -3.453, p=0.001.

One-way anova test was done for certain work related factors among them significant factors were shown in below Table 2. Among those the highest educational qualification was significant F (3,296) =4.934, p=0.002. Occupation was significant F (13,286) =1.779, p=0.046. Working unit of in charge nurses, nurses and midwives F (18,281) =3.147, p= 0.000. Professional experiences were significant F (36,263) =1.569, p=0.025.

For analyzing purposes knowledge was categorized as average and good according to the score of the questionnaire. Score below or equal to 70.00 was considered as average knowledge and a score above 70.01 was considered as good knowledge. It was considered that according to this categorization more than half of the allied health professionals had average knowledge (n=200,66.7%). It was used for multivariate analysis. It was done as significant factors with knowledge which were found during correlation, t test and anova test analysis. Here, control of other variables educational status and occupation were statistically significant respectively p=0.000 and p=0.002.

Table 1.Correlation of socio demographic factors and work related factors with knowledge

Variables	Mean	Standard deviation	Knowledge	
			Pearson Correlation	Sig.(2tailed)
Age	34.5	8.031	- .013	0.828
Professional experiences	8.7	7.5389	-.022	0.700
Current unit experiences	4.6	4.5238	-.093	0.106
Travelling distance from residence	11.8	9.7556	0.123	0.033

Table 2. One way anova test for socio demographic and work related factors with knowledge

Variable	Degree of freedom (df)		F test	Significance
	Between group	Within group		
Religion	4	295	0.811	0.519
Highest educational qualification	3	296	4.934	0.002
Occupation	13	286	1.779	0.046
Working unit of in charge nurses, nurses and midwives	18	281	3.147	0.000
Working unit of others	2	297	2.270	0.105
Professional experiences	36	263	1.569	**0.025**
Current unit experiences	30	269	1.095	0.341
Travelling distance from residence	34	265	1.008	0.462
Travelling mode	3	296	0.645	0.587

CONCLUSION

A huge gap between the knowledge level on disaster and current needs of disaster preparedness among allied health professionals was found in this study. Multivariate analysis was done as significant factors with knowledge which were found during correlation, t test and anova test analysis. Here, control of other variables educational status and occupation were statistically significant respectively p=0.000 and p=0.002. Limited understanding about the concept of disaster and disaster preparedness was found among a considerable number of professionals. This study found that more than half (n=163, 54.3%) of them had average knowledge.Therefore, training should be provided focusing on the specific gaps identified. All staff members need to know about disaster preparedness and that they

should know their function during a disaster. Disaster preparedness should be rehearsed possibly through training and simulation exercises because training and education in disaster preparedness are considered as backbone.

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The relationship between static foot posture and chronic bilateral knee osteoarthritis among the patients attending Department of Rheumatology and Rehabilitation (General), National hospital, Sri Lanka

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Abstract. Knee osteoarthritis is one of the most common types of arthritis presented in Sri Lanka that deteriorates the quality of life and physical performances of affected individuals. In chronic bilateral knee osteoarthritis, there is a higher possibility to develop deviated foot and ankle characteristics as a result of alterations in the mechanical alignment of lower limbs. Therefore, the main purpose of this study was to evaluate the relationship between static foot posture and chronic bilateral knee osteoarthritis. A descriptive cross-sectional study was conducted under consecutive sampling method including 155 patients within the age group of 40–80, who were clinically diagnosed as bilateral knee osteoarthritis and fulfilled the inclusion criteria at Department of Rheumatology and Rehabilitation (General), National hospital of Sri Lanka. The foot posture was evaluated using two foot measures, Foot Posture Index (FPI) and Staheli Arch Index (SAI). The study included 135 females and 20 males with the mean age of 59.19±8.649 years old. According to the FPI and SAI, altered foot postures were exhibited by 52.3% and 67.7% of the participants respectively. Significant positive correlations (P<0.01) were emphasized between chronicity of the condition and each of the foot posture changes. Furthermore, pronation (51.3%) and flatfeet (57.7%) are common among patients who were ≥60 years. There is a significant difference (P<0.01) between foot postural changes of males and foot postural changes of females which were evaluated using FPI while a significant difference was not denoted (P>0.05) for foot posture changes which were evaluated using SAI. Altered foot postures are common among chronic bilateral knee osteoarthritis patients in Sri Lanka. Therefore, it is recommended that assessment of foot posture in knee osteoarthritis patients is an essential component in clinical practice in Sri Lanka.

Keywords: Chronic Bilateral Knee Osteoarthritis, Foot posture index, Staheli Arch Index

Introduction

Osteoarthritis (OA) is a wear and tear type degenerative disease involving the cartilage and many of its surrounding tissues (Goldring & Goldring, 2006). Knee osteoarthritis (OA) is considered as a common disease which manifests physical, functional, psychological and social burdens in the affected individual. Knee is the most vulnerable joint for osteoarthritis (Blagojevic et al, 2010).

In musculoskeletal conditions of lower limb like chronic knee osteoarthritis, as a result of the alterations in the mechanical alignment, there is a higher possibility to develop abnormal ankle and foot characteristics.

Among these abnormalities, alterations in the foot posture are considerable.

The foot consists of forefoot, midfoot and rear foot which forms a complex system with ankle. The foot typically consists of three arches; medial longitudinal arch, lateral longitudinal arch and a transverse arch. Foot arches perform static and dynamic weight bearing functions (Norkin & Levangie, 2005).

The movements occurring in the foot are as follows.

- Ankle joint - Dorsiflexion, plantarflexion in the sagittal plane
- Subtalar joint - Inversion, eversion in the frontal plane

Abduction, adduction in the transverse plane

Furthermore, these movements occur together as complex combined movements, known as supination and pronation. Pronation is a combined movement of eversion, abduction and dorsiflexion. Supination is a combined movement of inversion, adduction and plantar flexion.

In the optimal erect posture, the ankle joint is in the neutral position, or midway between dorsiflexion and plantar flexion, without any pronation or supination (Norkin & Levangie, 2005).

Flat feet or pes planus is a postural deformity in which the arches of the foot collapse, with the entire sole of the foot coming into complete or near complete contact with the ground (Pranati, Yuvraj Babu & Ganesh, 2017).

Pes Cavus is the increase in the height of the medial longitudinal arch of the foot and it does not become flat on the ground when the person is in the weight bearing position (Troiano, Nante & Citarelli, 2017).

Staheli plantar arch index (SAI) is one of the simple, easy, inexpensive and reproducible, quantitative measurements to determine flat feet. The foot print is obtained using the Harris mat, and the SAI is calculated from the foot print. Staheli Index refers to the ratio between the minimal distance in the mid foot region and the maximal distance in the hind foot region (Plumarom, Imjaijitt & Chaiphrom, 2014).

Foot Posture Index (FPI) is a clinical tool which has been designed to evaluate the foot posture with a quick and reliable manner. FPI was originally designed with 8 components (FPI-8) based on observations of postural variations of rear foot, mid foot and fore foot. But due to several mismatching and limited reliability, FPI was redesigned and modified with 6 components. Each component was scored from -2 to +2 evaluating the total FPI score as -12 to +12 (Aquino et al., 2018). FPI 6 has manifested metric properties and has a validity of a unidimensional measure of foot posture. (Keenan et al, 2007).

A chronic disease is one lasting 3 months or more according to the definition of United States National center for health statistics (MedicineNet, 2020).

Majority of the patients with knee osteoarthritis experience variety of complications in addition to the symptoms related to the affected knee joint. Therefore, the purpose of this study was to evaluate the relationship between static foot posture with regards to Chronicity, Age and Gender and determine the prevalence of foot posture change among chronic bilateral knee osteoarthritis patients.

Materials and Methodology

A descriptive cross-sectional study was conducted under consecutive sampling method including 155 patients. The study included male and female patients aged between 40-80 years who have been diagnosed with bilateral knee osteoarthritis at Department of Rheumatology and Rehabilitation (General), National hospital of Sri Lanka. The patients who have bilateral knee osteoarthritis for more than three

months were included in the study. Subjective assessment including socio-demographic data and the history of the condition of the participants was obtained using an interview-administered assessment form. The foot posture was evaluated using Foot Posture Index (FPI) and Staheli Arch Index (SAI). Data were statistically analyzed using SPSS software version 23.0.

The latest approved FPI-6 is consisted of six components; each component is scored between (-2) to (+2). The overall posture of the foot was obtained from the total of the measures. The 6 criterions were observed and examined in both feet. The criterions include Talar head palpation, supra and infra lateral malleolar curvature, inversion and eversion of the calcaneus, budging in the region of the TNJ (Talo navicular joint), congruence of the medial longitudinal arch and abduction and adduction of the forefoot on the rear foot.

Normal values for FPI (Al-Bayati, Benlidayi & Gokcen, 2018)

- 0 to +5 indicates neutral foot posture
- ≥ +6 indicates pronated foot posture
- < 0 indicates supinated foot posture

Staheli plantar arch index was calculated by using foot print method (Figure 1). The foot print was obtained using the Harris mat (Cisneros, Fonseca & Abreu, 2010).

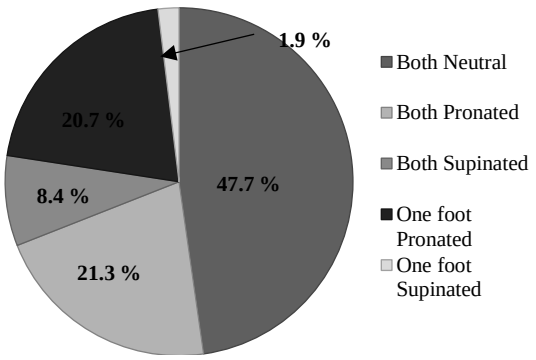

Figure1: Calculation of Staheli plantar arch index (Son et al., 2017)

Calculation of the Staheli plantar arch index

Measurement of the width of the central region (cm) of the foot print was considered as A and the width of the heel region (cm) was considered as B. The Staheli plantar arch index was evaluated by dividing the A value by B value.

SPAI =A/B

Normal values for Staheli plantar arch index (Son et al, 2017)

- High arch < 0.5
- Normal arch (0.5 – 0.89)
- Low and flat arch ≥ 0.9

Results

The study included 135(87.1%) females and 20(12.9%) males with the mean age of 59.19±8.649 years old. Mean values for FPI, SAI and chronicity (months) are shown in the table 1 below.

Table 1: Mean values for Foot posture index, Staheli arch index and Chronicity

Characteristics	Mean ± SD	
	Right	Left
FPI	3.79 ±*3.05*	3.61 ±*3.09*
SAI	0.79 ±*0.29*	0.78 ±*0.30*
Chronicity	64.26 ±*34.31*	64.12 ±*39.26*

According to the FPI and SAI, altered foot postures were exhibited by 52.3% and 67.7% of the participants respectively. Distribution of the foot postural changes according to FPI and SAI is shown figure 2 and 3.

Significant positive correlations (P<0.01) were emphasized between chronicity of the disease and each foot postural change including pronation, supination, flatfeet and high arch. Pearson correlation test was used to analyze the above mentioned correlations. Pronation (51.3%) and flatfeet (57.7%) are common among patients who were ≥60 years. There is a significant difference

(P<0.01) between foot postural changes of males and foot postural changes of females which were evaluated using FPI while a significant difference was not denoted (P>0.05) for foot posture changes which were evaluated using SAI according to the Chi Square statistics.

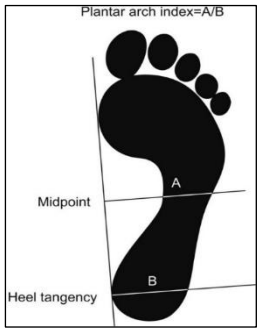

Figure 2: Distribution of the prevalence of foot posture changes according to FPI

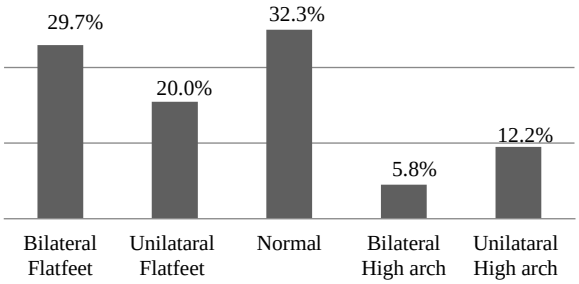

Figure 3: Distribution of the prevalence of foot posture changes according to SAI

Discussion

The musculoskeletal conditions such as knee osteoarthritis influence the mechanical alignment and dynamic function of the adjacent structures in the whole lower limb. According to the FPI findings of the study, 52.3% of altered foot postures were exhibited at least in one foot in the participants. Previous studies which have been conducted related to this objective have obtained different conclusions. A study conducted by Balci et al (2012) has indicated that people with osteoarthritis manifest a pronated foot type. Though more altered foot postures were exhibited through the above studies, a study done by Al-Bayati, Benlidayi and Gokcen, (2018) has shown the percentages of neutral, supinated and pronated foot postures as 68.60%, 22.6% and 8.66% respectively which is not in agreement with results of the current study.

The study evaluated the prevalence of flat feet, normal arch and high arch among the recruited group of patients. In accordance with the results, 49.7% of knee OA patients exhibited flat feet at least in one foot. Similar findings regarding the prevalence of flat feet can be found in other publications. A study which has been conducted in Japan by Iijima et al (2017) has determined a percentage of 49.5% of knee OA patients who exhibited flat feet at least in one foot.

The study evaluated the relationship between the presence of foot postural changes including supinated, pronated, flatfeet and high arch foot postures with regards to chronicity of knee OA. The results of this study determined significant positive correlations (P<0.01) between each foot postural change and chronicity.

The study evaluated foot postural changes with regards to the age of the participants. The percentage of participants who exhibit altered foot postures at least in one foot was comparatively high among the patients who were ≥ 60 years. When considering the gender, there is a significant difference (P<0.01) in foot postural changes between males and females according to FPI while there is no significant difference (P>0.05) for foot postural changes between males and females according to SAI.

In summary, altered foot postures are exhibited commonly in chronic bilateral knee osteoarthritis patients. According to the point of view of the researchers, those altered foot postures may have occurred due to a compensatory change in the lower limb alignment as the result of the degenerative changes that occur in the knee joint. Foot pronation and supination might be linked to

the affected compartment of the knee joint. However, this fact was not proven by the current study as it did not accommodate the evaluation of radiological evidences. A previous study conducted by Surlakar et al (2017) has described the mechanism of the occurrence of foot pronation and supination.

The pronation of the subtalar joint may be a compensatory movement for the increased load on the medial compartment of knee joint. Increased load on medial compartment can arise due to the rise in adduction moment arm which occurs in medial compartment knee OA. Therefore, foot pronation is a restorative mechanism which is presented as a response to wear and tear cartilage damage in medial knee OA. This compensatory pronation lessens the adduction moment arm of knee by transferring pressure laterally and decreasing the additional load on the medial compartment.

The supination of the subtalar joint may be a compensatory movement for the lateral tibial torsion caused by developed abduction moment of knee joint. This compensatory supination lowers the additional load on lateral compartment of knee joint. Furthermore, several studies have emphasized the possible advantages of footwear modifications and foot orthoses in decreasing the load on the knee joint. Therefore, evaluation of the foot postural changes of patients with knee OA may facilitate the health care professionals' knowledge on the possible role of the footwear modifications and foot orthoses on proper alignment and function of the lower limb (Surlakar et al, 2017). The following literature has emphasized the application of separate wedged insoles considering the affected compartment of the knee joint. For medial knee OA, lateral wedges are suggested and for lateral knee OA, medial wedges are suggested (Hinman & Bennell, 2009). In medial knee OA, there is a rise in adduction moment (Rodrigues et al, 2008). The knee adduction moment (KAM) is identified as a known risk factor for the progression of knee OA. The use of lateral wedged insoles (LWI) has potential benefits on correcting the KAM, thus correcting the bio-mechanical alignment of the lower limb (Shaw et al, 2017; Rodrigues et al, 2008). In lateral knee OA, frontal loading of knee can be decreased by medial wedges inserted to shoes or amalgamated with ankle orthoses (Hinman & Bennell, 2009).

In summary, when considering the above factors, it is recommended to include a routine foot assessment when assessing knee OA patients in Sri Lankan clinical setting. Foot wear and orthotic modifications are recommended to be implemented as an additional management strategy to correct the altered lower limb alignment and to improve the functionality of chronic bilateral knee OA patients.

Conclusion

The study concluded that significant positive correlations were emphasized between chronicity of the condition and each foot posture changes. Patients who were ≥60 years were more prone to exhibit pronation and flatfeet. When considering the gender, there is a significant difference in foot postural changes between males and females according to FPI, while there is no significant difference according to SAI. Additionally, altered foot postures are common among chronic bilateral knee osteoarthritis patients in Sri Lanka. Therefore, it is recommended that assessment of foot posture in knee osteoarthritis patients is an essential component in clinical practice in Sri Lanka in order to minimize further complications and introduce corrective orthotic and footwear modifications as an additional management strategy.

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Knowledge and practice of pre-hospital care after a road traffic injury among three-wheel drivers and associated factors in selected police areas in Colombo district.

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Abstract- Globally, the number of road traffic deaths remains unacceptably high. However, effective pre-hospital services can minimize many crash consequences. Usually, basic pre-hospital care is delivered by a lay first responder, mostly another driver. The aim of this study is to describe the knowledge and practice of pre-hospital care after a road traffic injury among three-wheel drivers and associated factors in selected police areas in Colombo district, Sri Lanka. A community based descriptive cross-sectional study was carried out in Kollupitiya, Bambalapitiya, and Kirulapona police areas. A sample of 384 three-wheel drivers registered in above police areas were recruited using simple random sampling method. Structured pre-tested interviewer administered questionnaire was used for data collection. Descriptive analysis was used to determine level of knowledge and practices regarding pre-hospital care. To identify the associated factors for knowledge and practice chi-square test was used. SPSS version 25 was used for data entry and analysis. Ethical approval was obtained from Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura. Only 31.5% of the drivers had first aid training. Even though majority (52.9%) of the drivers had good knowledge, 65.2% had poor practice towards pre-hospital care. Advanced age and having a first aid training were significantly associated with the good knowledge ($p<0.05$). Drivers with a previous first aid training within last ten years, having less hires per day and having good knowledge were significantly associated with better first aid practice. Although knowledge regarding pre-hospital care was adequate, practice of pre-hospital care was inadequate.

Key words: Pre hospital care, Knowledge, Practice, Road traffic accidents

Extended Abstract

Introduction

Injury, an increasingly significant public health issue worldwide, accounts for up to 16% of the global burden of disease. Approximately 1.35 million people die each year as a result of road traffic crashes. Between 20 and 50 million more people suffer non-fatal injuries, with many incurring a disability as a result of their injury (WHO, 2018). Trauma is a leading cause of hospitalization in Sri Lanka and accounts for almost 600,000 patients per year in Government Hospitals. Most moderate to severe trauma results from Road Traffic Crashes (Wimalaratne et al., 2017). Prevention and control of RTIs require multi-sectoral integrated actions aiming at limiting the occurrence of crashes, providing best possible care in the event of a crash and

suitable rehabilitation services for the injured person. However, it is often possible to minimize crash consequences by providing effective pre-hospital services promptly. Prehospital services are a continuum of activities at the crash site and till the injured person is adequately managed by hospital staff (Mpombo and Mwanakasale, 2018). There are ample medical evidences to recommend a "golden hour" for road traffic accident victims. If the necessary care is given immediately for casualties within this time, there is a greater chance of survival. In many communities, the most basic level of prehospital trauma care is provided by laypeople known as "first responders" (Teshale and Alemu, 2017). In most low and middle-income countries including Sri Lanka first responders are usually a relative, driver of a private vehicle, police officers, and other motorist (bus drivers and taxi drivers) who are usually untrained (Mpombo and Mwanakasale, 2018). Frequently the first person on the scene is more likely to be another driver and have more chance to be the first responder. So, by encouraging local people including drivers to learn and practice the elements of pre hospital care system, we can create a group of first responders. Thus, we can develop an effective pre hospital care system which can save many lives and reduce many disabilities. So, this study was conducted aiming to describe the knowledge and practice of pre hospital care after a road traffic injury among three-wheel drivers and associated factors in selected police areas in Colombo district, Sri Lanka.

Methodology

A community based descriptive cross-sectional study was carried out in Kollupitiya, Bambalapitiya, and Kirulapona police areas in Sri Lanka. In the Colombo Municipal Council administrative area, Colombo district, there are three DIG areas (Deputy Inspector General of Police). They are Colombo North, Colombo south and Colombo Central DIG areas. 22 police areas are included in these 3 DIG areas and there are 7 police areas in the Colombo south DIG area. From that, 3 police areas namely Kirulapone, Bambalapitiya, Kollupitiya in Colombo South DIG areas were selected to this study. A sample of 384 three-wheel drivers registered in above police areas were recruited using simple random sampling method after obtaining a sample framework of registered three-wheel drivers from united three-wheel drivers' associations in each police area. Proportion of drivers to be taken from each police area were calculated according to probability proportionate to size, so that final sample of 422 is obtained with 10% non-response rate. A structured pre-tested interviewer administered questionnaire was used for data collection. The questionnaire was pre tested among 15 three-wheel drivers in Wellawatta police area. Content and face validity done by an expert in the field of trauma. Descriptive analysis was used to determine level of knowledge and practices regarding pre hospital care. Chi-square test was used to identify the associated factors for knowledge and practice of pre hospital care. SPSS version 25 was used for data entry and analysis. Ethical approval was obtained from Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura. All the relevant information about the study was explained and the approval was obtained from the police stations in Kirulapone, Bambalapitiya, Kollupitiya.

Results and Discussions

A total of 384 three-wheel drivers responded to the study which resulted in a response rate of 90.1% where 151 (39.3%), 121 (31.5%), and 112 (29.2%) respondents participated to the study from Kollupitiya, Kirulapona and Bambalapitiya police divisions respectively. The mean age of the three-wheel drivers was 40.98 (SD ± 11.01) with a range of 21 to 71

years and all the participants were males. Mean years of driving experience was 11.05 (± 8.67) years ranging from 1year to 39 years. All the respondents in the study were full

time three-wheel drivers. Majority had education level up to ordinary level (O/L) (n=212, 55.2%).

Table 1: Frequency distribution of the first aid training status of the participants

Characteristics	Number (%)
First aid training	
Yes	121 (31.5%)
No	263 (68.5%)
Years since last training (N=121)	
1-5	52 (43%)
6-10	27 (22.3%)
11-15	12 (9.9%)
16-20	12 (9.9%)
>20	18 (14.9%)

Table 2: Overall distribution of knowledge regarding pre-hospital care after a road traffic accident

Characteristics	Number (%)
Good knowledge	203 (52.9%)
Poor knowledge	181 (47.1%)

Knowledge was analyzed based on 11 main knowledge questions which includes 46 sub questions. For each correct answer "1" mark was given and "0" mark for incorrect and don't know responses. The mean knowledge score of study participants was 28.02 (SD±8.43). Those who scored above mean was categorized as having good knowledge and those who scored below mean was categorized as having poor knowledge. Above table 2 shows that the majority (>50%) of the respondents had good overall knowledge regarding pre-hospital care after road traffic accidents.

Majority 248 (64.6%) had good knowledge to identify signs of air way problem. The similar results were observed in the Olubenga-Bello, et al (2012) and around 70% of the participants identified noisy breathing and fast breathing as respiratory problems in both studies. On the contrary, a study conducted in India with 252 commercial drivers stated that only 16.3% were aware of signs of airway problems (Awasthi et al., 2019).

Table 3: Overall distribution of knowledge regarding important aspects of pre hospital care.

Characteristics	Good knowledge (%)	Poor knowledge (%)
Signs of airway problems	248 (64.6%)	136 (35.4%)
Management of an unresponsive patient who is not breathing	167 (43.5%)	217 (56.5%)
Management of a patient who is breathing yet unresponsive	149 (38.8%)	235 (61.2%)
Bleeding	73 (45.1%)	211 (54.9%)
Spinal cord injury	92 (50%)	192 (50%)
Fracture immobilization	309 (80.5%)	79 (19.5%)
Factors to consider when transporting the patient to a hospital.	149 (38.8%)	235 (61.2%)

This observed difference in result might be due to only few of the drivers (1.2%) in the Indian study have obtained first aid training.

Less than 50% of the subjects had good knowledge regarding management of an unresponsive patient who is not breathing and management of a patient who is breathing yet unresponsive. Only one third of the respondents (n=149, 38.8%) knew that cardio-pulmonary resuscitation (CPR) should be given when the patient is unconscious and not breathing. Less than 50% of the subjects had good knowledge regarding management of a patient with bleeding, factors to consider when transporting the patient to a hospital. Emergency telephone number was known by only 41.1% of the subjects in present study and this was observed even lesser among children care givers in the study of Gunawardhana and Goonewardena (2017), which was 21.5%. This might be due to the three-wheel drivers being spending more time in the roads and often see emergency ambulance.

In current study, 333 (86.7%) has a witnessed road traffic accident within the past one year, out of that majority (n=249, 74.8%) has attended to a road traffic victim. Practices regarding pre-hospital was determined using 9 statements which states actions taken during a RTA. The correct action taken was given "1" mark and "0" was given if the action was not taken. Those who scored above the mean was labeled as having a good practice and those who scored below that was classified as having poor practice. Majority 217 (65.2%) had poor practice while only 116 (34.8%) had good practice towards pre- hospital care after RTA.

Table 4: Frequency distribution regarding actions taken during a RTA (N=249)

Characteristics	Actions taken (%)	Actions not taken (%)
Called for help	124 (49.8%)	125 (50.2%)
Called an ambulance	67 (26.9%)	182 (73.1%)
Moved patient from accident site to a safer place	132 (53%)	117 (47%)
Making sure that patients' airway is clear	25 (10%)	224 (90%)
Making sure that patient is breathing properly	31 (12.4%)	218 (87.6%)
Stop bleeding	41 (16.5%)	208 (83.5%)
Splinting fractures	17 (6.8%)	232 (93.2%)
Safe positioning while shifting patient to the hospital	61 (24.5%)	188 (75.5%)
Transport patient to the hospital	172 (69.1%)	77 (30.9%)

In the present study, only 26.9% had called an ambulance. On the contrary, 41.5% of the respondents of the study Pallavisarji, Gururaj and Girish (2013) had called an ambulance in a RTA. In Sri Lanka, 1990 Suwaseriya ambulance service covers the entire country to expand the country's pre-hospital emergency care service (LBO, 2019). Nonetheless, in the present study, it is observed that only a small percentage of three-wheel drivers had called an ambulance as mentioned above. This might be due to 58.9% of the subjects not knowing the ambulance number. Majority 132 (53%) had moved patients from accident site to a safer place but only 25 (10%) had made sure that patients' airway is clear and only 31 (12.4%) has checked whether patient is breathing properly. Even though first aid knowledge about the fracture immobilization was the highest (80.5%), only 17 (6.8%) of the participants had been concerned regarding stabilizing a fracture. Even though majority (n=172, 69.1%) has taken RTA victim to a hospital, only 61 (24.5%) had ensured safe positioning while taking the patient to a hospital. Regarding the type of first aid provided, in this study, only 16.5% took actions to control bleeding which was much less than Gunawardhana and Goonewardena (2017) study in Sri Lanka and this might be due to it is being conducted among care givers of children where they are more considerate towards their own child's situation.

Majority (59.5% and 53.6%) in the present study have stated that lack of confidence due to inadequate knowledge and legal complications that follow later were the major reasons for not attending to a RTA victim respectively. Lack of first aid box was stated by only 14.3% of the drivers as a reason. In contrast, Pallavisarji, Gururaj and Girish (2013) stated that lack of confidence due to inadequate knowledge and legal complications have been a reason for only 29.8% first responders in that study. However, lack of first aid box has been the main reason for the majority of drivers (74.3%) in the study conducted by Teshale and Alemu (2017) in Ethiopia. In the present study only 1.3% of the respondents had a first aid box in their vehicle and significantly high availability of first aid kits (84.3%,) was seen in the study by Gunawardhana and Goonewardena (2017). In the current study, only 34.8% had good practice towards pre hospital care after a RTA. So, it is observed that practice towards pre hospital care was generally poor in this study.

Majority of the respondents who were above 45 years of age, 107 (60.8%) had better knowledge than who were below 45 years of age and it was statistically significant (X2 =8.202, p=0.004 and OR=1.809, CI=1.204-

2.719). The majority of the respondents who had first aid training had better knowledge (n=105, 86.1%) than who did not have a first aid training 98 (37.4%). This observed difference was highly significant (X2 =79.101, P<0.001, OR=10.336, CI=5.844-18.281). Even though drivers who had a higher educational level (A/L to degree) had a better knowledge (57.6%) than the drivers with lower educational level (primary to O/L), there was no significant association between educational status and the knowledge. In contrast, study of Gunawardhana and Goonewardena (2017) which was conducted in Sri Lanka among care givers of children stated that first aid knowledge was significantly associated with the education level.

The majority of the respondents who had first aid training (n=45, 42.5%) had better practice than who did not have a first aid training 69 (30.4%). This observed difference was statistically significant (X2 =4.665, p= 0.03, OR=1.689, CI=1.048- 2.724). This finding was supported by the study conducted by Teshale and Alemu (2017) in Ethiopia where delivering first aid was five times more likely among trained drivers than those who were not. Those who had the training within last ten years had a better first aid practice (n=35, 52.2%) than those who had the training before 10 years (n=10, 27.0%). This observed difference was statistically significant (X2 = 6.172, p= 0.013, OR=2.953, CI=1.238- 7.046). It seems like, even though they had a training, with time, they reduce their confidence in performing pre- hospital care. Those who have more hires per day (n=86, 29.7%) were less likely to provide pre hospital care for a RTA victim than who drive less hires per day (n=28, 65.1%). This observed difference was highly significant (X2 =20.915, p=0.000, OR=4.428, CI=2.253– 8.704). Furthermore, respondents who had good knowledge (n=77, 43.0%) showed to have a better practice than those who had poor knowledge (n=37, 24.0%). This observed difference was statistically significant (X2=13.260, p<0.001, OR=2.387, CI=1.487-3.833).

Conclusions

Less than one third of the respondents in the study, had attended to some form of first aid training. More than half of the respondents in the study had good knowledge regarding pre hospital care after a RTA. The knowledge has been less in the areas such as managing an unconscious patient, controlling a bleeding and regarding the factors to be considered while transporting a patient to a hospital safely. The study identified inadequate knowledge and legal complications that follows later as factors that would prevent three-wheel drivers from providing first aid to an RTA victim. Even though knowledge regarding pre-hospital care among three-wheel drivers was adequate, overall practice of pre-hospital care was inadequate. After witnessing a RTA, transporting the RTA victim was the main action taken by majority of the participants. Three-wheel drivers' knowledge regarding pre hospital care was significantly associated with being at an age of more than 45 years and having a training (p<0.05) while factors such as ethnicity, driving experience, level of education, marital status, and number of trips per day had no significant association with it (p>0.05). Having a previous first aid training, training within last ten years, having less hires per day (<10) and good knowledge regarding pre hospital care had significant association with good practice of pre hospital care after a RTA (p<0.05). Factors such as Age, ethnicity, marital status, driving experience, level of education had no significant association with it (p>0.05). Hence it is recommended that first aid training should be given on a regular basis and be made mandatory before issuing a driving license to all three-wheel drivers. Also, increasing the publicity of existing pre

hospital care number and other important emergency numbers within the population, establishing clear regulations and legislation addressing the issues of a first aid providers taking actions at the scene are recommended.

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Development of Neem Oil and Virgin Coconut Oil Based Cream Formulations with Methanolic Extract of *Leucas zeylanica* and *Ophiorrhiza mungos* leaves

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Ultraviolet radiations (UV) cause numerous skin diseases when exposed in excess. *Ophiorrhiza mungos* (OM) and *Leucas zeylanica* (LZ) have identified as plants with high Sun Protection Factor (SPF) values. Neem oil and Virgin Coconut Oil (VCO) are natural oils that have been used in Ayurvedic medicine for several indications. The objective of the study was to evaluate the SPF activity and carry out stability studies in Neem oil and VCO based cream formulations consisted with methanolic extracts of OM and LZ. The Methanolic extracts were incorporated in to selected ratios of VCO and Neem oil bases. Samples were subjected to secondary homogenization. Most stable ratios of the emulsions were identified as 33% VCO: 35% water: 32% $T_{80,}$ and 29% Neem oil: 42% water: 29% $T_{80.}$ Cream formulations were prepared based on above identified ratios. All creams were thermodynamically and kinetically stable more than 120 days at room temperature (28± 2 ^{0}C). The SPF values of creams were above 30 and they showed higher SPF values compared to the pure leaf extracts of OM and LZ. Neem oil based creams had the highest SPF values which is greater than 38. The creams were o/w type and in the acceptable pH range for topical application. Due to the consistency of the creams, they could retain on the skin for longer period. All creams composed with other standard sunscreen characteristics which increase the market value of the product.

Keywords. Sun Protection Factor, Stability evaluation, Characteristics**Introduction**

Ultraviolet (UV) radiation cause sunburns, wrinkles, premature aging and skin cancers (Dutra *et al*., 2004). It is considered that sunscreen agents with the Sun Protection Factor (SPF) value of 15 or greater are suitable for the use against the harmful effects of solar radiation (Ratnasooriya *et al*., 2014). The public prefer to use herbal creams as alternative photo protective agents, because some synthetic ingredients such as Amino Benzoic acid can cause photo sensitivity reactions. This study was done using *Ophiorrhiza mungos* (OM) and *Leucas zeylanica* (LZ) which were previously identified as potential agents with photo protective effect SPF values as 39.2 (+/- 0.92) and 39.8 (+/- 0.35) respectively (Napagoda *et al*., 2016).

For this study, two natural oils, Virgin Coconut Oil (VCO) and Neem oil were selected (Sanjeewani and Sakeena, 2013 and De Silva *et al*., 2018). Tween 80® (Polyoxyethylene sorbitan monooleate - T_{80}), molecular formula $C_{64}H_{124}O_{26}$, was used as the surfactant. The objective of the study was to evaluate SPF activity and to formulate stable cream formulation(s) using Neem oil

Table 01 - Ratios of Oil: water: surfactant used to prepare emulsions for preliminary study

Plant type		Oil		Surfactant (T_{80})	Water
OM	LZ	VCO	Neem oil		
I	I'		3.0	3.0	4.0
J	J'		3.1	3.0	3.9
K	K'		2.9	2.9	4.2
L	L'		3.2	3.0	3.8
S	S'	3.2		3.2	3.6
T	T'	3.3		3.2	3.5
U	U'	3.3		3.1	3.6
V	V'	3.4		3.2	3.4

and VCO based emulsions with methanolic extracts of OM and LZ.

Methodology

Preparation of leaf extracts

Two hundred grams of air dried and grinded plant leaves were extracted by maceration with 800 mL of 99% (v/v) methanol in 1000 mL amber colour bottles for 03 days while occasionally stirring. Resulted solutions were filtered and concentrated by using a rotary evaporator (HAHNSHIN Scientific-Model No: HS-2005V, Sr no V-00449) at 65 ^{0}C and 145 rpm. Concentrated extracts were further evaporated using a water bath at 65 ^{0}C for 02 hours to get solid extracts. The solid extracts were labelled and stored at 04± 2 ^{0}C for further use.

2.2 Determination of SPF values of the leaf extracts

Two sets of dilution series of the leaf extracts were prepared (2.0 mg/ mL, 1.0 mg/ mL, 0.5 mg/mL, 0.125 mg/mL and 0.625 mg/mL) using 99% v/v methanol as the diluent. The absorbance of UV radiation by each extract were tested using UV spectrophotometer (Spectrum instruments-SP-UV-5000DB) in the range from 290 to 320 nm, at 05 minutes intervals. Then the SPF values were calculated using Mansur equation (Mansur *et al.*, 1986).

2.3 Development of secondary emulsions with leaf extracts

Selected ratios were tested as in table 01. Secondary homogenized emulsions were prepared by using a high shear homogenizer (IKA® T25 digital ULTRA-TURRAX®) at 10000 rpm for 05 minutes at RT.

Stability evaluation of secondary emulsions

Creaming index of each secondary emulsion was observed after 24 hours. Long term stability of the emulsions were observed in 7th, 14th, 30th, 60th, 75th and 90th days at RT, 04± 2 ^{0}C and 40± 2 °C.

Five grams of most stable secondary emulsions were centrifuged (VS – 600N 2007) at 1200 rpm for 05 minutes at RT and observed for 30 days for the evaluation of accelerated stability.

Characterization studies of secondary emulsions

pH values were measured using pH meter (Trans Instrument BP 3001) at RT on initial day and 75th day.

SPF evaluation was done only for most stable secondary emulsions as mentioned in 2.2. Viscosities of the most stable secondary emulsions were measured by using BROOKFEILD Viscometer (Model No, LVDV-II+).

Development of topical creams

Each cream was made using the most stable emulsions. Steric acid (10g), Glycerine (10g), Glycerolmonostearic – GMS (4.5g), Triethanolamine – TEA (0.5g) and Methyl paraben (0.1g) were used as excipients.

Dried leaf extract was incorporated to obtain the 0.1% w/w per cream formulation.

Characterization and evaluation of stability of cream formulations

The SPF, pH and viscosity were determined as per in section 2.5. Microscopic analysis was done using an optical microscope at 40 X 10 magnification using methylene blue as the staining dye. The stabilities of cream formulations were tested at different temperatures (RT, 04 ± 2 ºC and 40 ± 2 °C). The long-term stability evaluations were done on 3rd, 14th, 30th, 60th, 75th 90th and 120th days. For the accelerated stability studies were done as per in 2.4 and observed phase separation for 30 days at RT.

3.0 Results and Discussion

3.1 SPF of the leaf extracts

The SPF values of methanolic extracts of OM and LZ leaves in 1mg/mL concentration were 39.78 and 39.73 respectively and in 0.5 mg/mL concentrations were 25.03 and 17.42 respectively. It was shown that both methanoloic extracts of LZ leaves and whole plant has almost similar SPF values.

3.2 Stability of secondary emulsions

Initially no phase separation was observed in the secondary emulsions. Therefore, the creaming indices were zero. Emulsions, T, T', V and V' were stable in RT, 04± 2 ºC and 40± 2 °C for 90 days. K and K' were stable for 90 days in RT, 4± 2 ºC but it was only stable for 75 days in 40± 2 °C. The instability characteristics initially appeared in the emulsions that stored at 40± 2 ^{0}C. It could be due to the effect of high temperature on the constituents of the emulsions (Suryati *et al.*, 2015). Among the secondary emulsions that were subjected to centrifugation, V, K, V', and K' were stable only for 14 days at RT. However, T, T' were stable for 30 days at RT.When the emulsions are under the high speed centrifugation force, they tend to undergo phase separation faster than in the normal conditions (Badolato *et al.,* 2008). Based on the stability studies, the most stable ratios were T/T' and K/K'.

3.3 Characterization studies of the secondary emulsions

The initial pH values of all emulsions were in the range of 6.47 to 6.89 at RT and in 75th day they were between 6.21 – 6.82 at all temperatures. Thus they were in the acceptable pH range for topical application (Lambers *et al.*, 2006). The viscosities of T, T', K and K' were 990K cP, 989K cP, 1010K cP and 1020K cP respectively.

3.4 Stability of creams

All the creams that consisted with both OM and LZ were stable more than 120 days in RT and 04± 2 ^{0}C and however it was stable at 40± 2 ^{0}C. Creams usually are thermodynamically unstable and temperature differences could have been affected the stability and other properties of its emulsifying agents (Anisa and Nour, 2010). However creams that were subjected to accelerated study were stable more than 120 days at RT.

3.5 Characterization of the creams

All the pH values of creams were between 6.06 – 6.76. Thus they were in the acceptable pH range for skin (Lambers *et al.*, 2006). The viscosities of creams prepared from T, T', K and K' were 1020K cP, 1030K cP, 1050K cP and 1060K cP. All creams had high consistency. The microscopic analysis proved that all the creams were in o/w type. All creams had lower SPF values than their relevant emulsions as mentioned table 02

3.6 SPF values of pure secondary emulsions, medicated secondary emulsions and creams

Table 02 - Comparison of SPF in the concentration of 0.5g/ mL

Sample label	SPF		
	Emulsion bases	Emulsions with leaf extract	Creams
T	38.4780	38.1456	31.5151
K	32.1400	40.0080	39.8341
T'	38.4780	38.4560	36.5787
K'	32.1400	40.0080	38.6668

All emulsions and all creams had higher SPF values than their own leaf extracts. All these results could be due to the alteration of the activity of constituents presented in the crude plant and also due to the alteration of intermolecular interactions, rheology and penetration properties (Hamid *et al*., 2015 and Suryati *et al.*, 2015).

In this study maceration was used as the extraction technique because it was the most effective method for thermo liable compounds (Zhang *et al*., 2017). Increasing the temperature of extracts can alter their chemical properties Therefore, methanol is more appropriate in using as a solvent (Zhang *et al*., 2017). However the risk of exposure to methanol was minimized by using the rotatory evaporator until the pure dry extract was obtained. It was found that, the stable ratios for each emulsion consisted of the two separate leaf extracts used in this study were the same. This could be due to the presence of similar types of compounds in both plants (Radhika *et al*., 2018 and Madhavan, 2013).

In cream formulation GMS was used as a stabilizer, emollient and plasticizer. Steric acid was used as an emulsifier and solubilizing agent. Methyl paraben was used as an antibacterial agent. TEA was used as an emulsifying agent to produce stable o/w formulations and as a pH adjuster. Further, Glycerine was used due to its humectant and emollient properties (Raymond *et al*., 1986).

4.0 Conclusion

As the conclusion of the study, two different stable ratios of medicated emulsions has found as 33% VCO: 35% water: 32% T_{80} and 29% Neem oil: 42% water: 29% T_{80}. Creams that were prepared according to these ratios were proven thermodynamically stable more than 120 days at RT and 04 ± 2 ^{0}C, kinetically stable at RT more than 120 days. All final cream formulations had higher SPF values than methanolic extracts of OM and LZ leaves. The SPF values of each cream was above 30. Hence all the creams can be used as effective sunscreen agents.

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Knowledge Regarding Weight Management Through Lifestyle Modification Among Overweight And Obese Type 2 Diabetes Mellitus Patients

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Introduction

Diabetes mellitus is a leading cause of morbidity and mortality worldwide, with an estimated 80% of the affected population living in developing countries like Sri Lanka (Hu, 2011). Prevalence of diabetes in Sri Lanka, which was around 2.0 % in the early nineties, has increased by about five-fold during the last two decades. It is estimated that over 2 million people are suffering from diabetes (Katulanda et al., 2010).

Overweight and obesity are becoming more prevalent in developing countries due to change in lifestyle. One in five adults in Sri Lanka has either diabetes or pre-diabetes. Weight maintenance within the target body mass index (BMI) helps to prevent many diseases especially diabetes. The relationship between the metabolic control and development of chronic complications of diabetes is an important aspect of patient management. The causes of type 2 diabetes are multi-factorial. Diet and physical activity are important

modifiable risk factors that play a central role in the incidence, severity and management of diabetes.

Overweight and obesity are the major risk factors for type 2 diabetic patients. Weight reduction is an important goal for overweight or obese type 2 diabetes, because it improves glycemic control. Moderate weight reduction (5% of body weight) can improve insulin action, decrease fasting blood glucose concentrations, and reduce the need for diabetes medications. Moreover, improvement in fasting blood glucose is directly related to the relative amount of weight reduction. According to the study result on May 2009 to November2013 at Diabetic Center, Teaching Hospital Jaffna, more than half of the population were overweight (20.5%) and obesity (33.8%) (Sujanitha et al., 2015). Therefore, there is important to necessary for accessing knowledge regarding weight management for the type 2 diabetic patients. Objective of the study is assessing the level of knowledge regarding overweight, obesity and weight management through lifestyle modification among overweight and obese type 2 Diabetes mellitus patients and to assess the relation between socio demographic factors associated on knowledge.

Methodology

It was an institutional based cross-sectional study conducted in Diabetic Center at Teaching Hospital Jaffna. Above age of 18 patients and patients diagnosed as type 2 diabetes mellitus above 6 months of period were recruited for this study. Estimated sample size was 414. Overweight and obese patients were identified among all type 2 diabetes mellitus patients in annual review. An interviewer administered semi structures questionnaire used to collect data. Questionnaire contains clinic details, socio demographic and economic related questions and questions to assess knowledge regarding

overweight, obesity and weight management through lifestyle modification. Overweight and obese patients were identified among all type 2 diabetes mellitus patients. Every overweight and obese patient was included in this study. In the morning and evening data was collected. Purpose of the study was explained and written consent was obtained before administering the questionnaire. Each interviewer administered questionnaire spent nearly twenty to thirty minutes to fill. Data was collected with the interview administrated questionnaire during the waiting time for the physician. Totally data was collected from four hundred fourteen patients in 29 days during week days.

Data was analyzed by using SPSS 22 (statistical Package for Social Sciences). Eighteen questions were used to assess knowledge regarding weight management through life style modification. Each correct response was scored with one mark while incorrect or don't know response were received zero mark. Total thirty-four marks were given for the section. The score less than fifty was considered as poor knowledge and the score above fifty was considered as good knowledge. Chi squared statistical test was used to identify the factors influence on knowledge related to weight management through life style modification. The data was analyzed based on research problems and objectives. Results presented as tables and diagram. All the data of the patients which collected for research purpose was confidentially kept in personal file and was not exposing to none other than researchers. All the data used to analysis was confidentially kept on personal computer with password protection. At the end of the research all data obtained from the patients was submitted to Unit of Allied Health Sciences, Faculty of Medicine, University of Jaffna.

Results and discussion

The study was done among414 overweight and obese type 2 Diabetes mellitus patients attended Diabetic Center at Teaching Hospital Jaffna. The response rate was 100%.28% of the participants were overweight and 72% of the participants were obese. Nearly three quartiles (74.6%) of participants were female. Mean age of participants was 56.1 (SD-10.6) years. Age range of the participants was 27 to 82 years. More than three fourth (78.3%) of participants were married. Most of them were nuclear family (72.5%). Majority of the participants were Sri Lankan Tamil (98.8%). Most of them were hindus (73.4%). Ordinary level was the highest level of education for nearly one third (33.3%) of participants. Nearly three quartiles (75.6%) of participants were unemployed. Nearly two fifth of monthly family income less than 20,000 (43.2%) and 20,000-40000 (43.7%) SLRs respectively.

Majority of participants (98.3%) knew the important to maintain ideal body weight for the healthy living. Nearly 63% of participants knew weight should be appropriate for their height. Nearly one third (34.1%) of participants incorrectly said weight was appropriate for their age. Only 3.1% participants knew the method of calculation of the BMI. Only 2.4% participants knew healthy BMI range of Sri Lankan adult was 18.5 22.9 km/m^2 .Only 0.2% participants knew that referred range of BMI for overweight was 23-24.9 kg/m^2.While only 1.0% of the participants knew the referred range of BMI for obesity (≥25kg/m^2). Only 13.8% knew their correct BMI category.

A similar study was done in Bangladesh; it revealed majority of respondents (99.0%) did not have any idea about meaning of obesity, more than half of the population (59.0%) could not give the answer about ideal body built (Saleh *et al.*,2012). Another study was done in Ghana; it revealed 72.0% had adequate knowledge on the general understanding of obesity, for ideal body

weight 56.6% of them had inadequate knowledge (Obirikorang et al., 2015).

Nearly 61.6% participants correctly answered that increasing waist circumference can increase the risk of diabetic mellitus. Only 8.0% male participants knew ideal waist circumference for male. Only 3.2% female participants knew ideal waist circumference for female.

Nearly three fourth participants (77.8%) correctly answered about overweight and obesity has an impact on diabetic mellitus. Most of the participants knew that excess calorie intake (77.8%), Physical Inactivity (99.8%), family history (88.4%) were the causes of overweight and obesity. However, the participants knew that hypothyroidism (51.7%), steroids (12.1%), oral contraceptive pills (20.8%) were the causes of overweight and obesity. Another study was done in Ghana; higher proportion (76.9%) of the participants responded that poor diet was a common cause of obesity followed by physical inactivity (67.1%), family history of obesity (56.6%) (Obirikorang et al., 2015).

Majority of the participants stated that following proper diet (100%), doing regular exercises were the healthy ways to maintain ideal body built. However, nearly 90% of the participants knew that to take weight reduction medications (85.3%), skip breakfast (95.2%), fasting (94.4%) were not the healthy ways to maintain ideal body built. A similar study was done in Ghana; among 471 participants 86.7% knew that adjusting to dietary modification is the best mode of managing obesity while 68.6% and 28.7% of them knew that doing regular physical activity and health check-up, respectively, could help manage obesity(Obirikorang et al.,2015).

Nearly 64.7% the participants knew that they should be allocated half portion of their plate for vegetables while 85.7% of the participants stated that quarter portion in the plate should be allocate for the starchy food items. However, 91.8% of the participants stated that quarter portion should be allocate for the protein foods.

Most of the participants (96.4) knew that overweight and obese persons should be taken reduce amount of cereals, yams, rice and wheat flour preparations rather than normal adult. Most of the participants knew that overweight and obese persons also can be take recommended amount of vegetables (98.8%), fruits (89.6%) like healthy adult. Nearly half (54.3%) of the participants knew that overweight and obese persons can be taken recommended amount of fish, pulses, meats, eggs like normal healthy adult. Nearly 70 % of the participants knew that overweight and obese persons should be taken reduce amount of milk and dairy products (70.8%), nuts and oil items (87.0%) rather than normal adult.

A study was done in Bangladesh; it revealed that majority of the respondents stated that fast foods (77%), soft drinks (84%) and mayonnaise (33%) were not bad for weight management. On the other hand, most of the respondents (97%) said fiber rich food is good for health. Majority of them gave correct answer about red meat (93%), egg yolk (89%), butter, cheese and cream (91%) (Saleh *et al.*,2012).

Nearly one quartile (25.6%) of the participants said that thirty minutes was a minimal duration to perform an exercise in a day for an overweight person. However Only 5.8% of the participants knew that five consecutive days in a week was a minimal frequency to perform an exercise in a week for an overweight person. Nearly one fifth (18.4%) of participants knew that sixty minutes was a minimal duration to perform an exercise in a day for an obese person. However more than one third (37.2%) of the participants correctly answered that seven days was a minimal frequency to perform an exercise in a week for an obese person

Most of the participants (81.2%) had good knowledge and nearly one fifth (18.8%) of the participants had poor knowledge.

Conclusion and Recommendation

The present study shows that nearly four fifth of the participants had good knowledge regarding

weight management through lifestyle modification. Only 2.4% of the participants knew healthy

BMI rage for the Sri Lankan. Only 13.8% of the participants knew whether they were obese or

overweight. Most of the participants stated that excess calorie intake, physical inactivity, family

history are the causes for overweight and obesity. Majority of the participants knew about

healthy ways to maintain ideal body built, portion and amount of food items while few of them

knew about frequency and duration of the exercise. According to their BMI health education should be done by health care professionals regarding ideal body built, importance of maintain target weight and weight management through life style modification. Further studies should be done to assess their practice pattern.

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Development of a herbal soap using selected medicinal plants and evaluation of its antimicrobial activity

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Abstract: Soaps are used as a modality for topical application of medicinal plants used in the treatment of skin infections. In herbal soaps, natural bioactive constituents with a variety of therapeutic activities are incorporated into basic soap medium. Natural herbs are the main ingredients of herbal soap which are safer and beneficial than the commercial soaps. Antimicrobial activity of leaf extracts of *Azadirachta indica, Cassia fistula* and flower extract of *Nelumbo nucifera* has been evaluated individually and in combination by a previous study. This study aims to formulate a novel herbal soap using the above combined extract and to investigate its antimicrobial activity. Further, this study evaluates the physicochemical characteristics of the soap. The combined extract used in the formulation of soap was prepared by incorporating aqueous extracts of *A. indica, N.nucifera* and ethanol extract of *C.fistula* at a ratio of 4:1:1 according to the previous study. Soap was formulated by including the combined extract with other ingredients into the melted glycerin soap base. The antimicrobial activity of formulated soap was tested by agar well diffusion method against *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Candida albicans* and compared with standard drugs. Test was done in triplicate. Formulated soap exhibited antimicrobial activity against tested organisms with a highest activity against *S aureus*. Physiochemical parameters of soap were evaluated by determining the colour, pH, % free alkali and % of alcohol insoluble matter of the soap. pH at 28 ºC was 9.11 and % of alcohol insoluble matter was 24.6% which were within the accepted range. Further studies are pursued to evaluate the safety and efficacy of the formulated herbal soap.

Keywords: Antimicrobial activity, herbal soap, *Azadirachta indica*, *Cassia fistula*, *Nelumbo nucifera*

Introduction

Depending on the recent discoveries done on medicinal plants, the use of herbal medicines has been enormously increased in worldwide. The demand for herbal products is increasing as they are generally safer, cost-effective, and has fewer adverse effects compared to synthetic products. Soaps are used as a modality for topical application of medicinal plants used in the treatment of skin infections (Kareru, P.G., Keriko, J.M., Kenji, G.M., Thiong'o, G.T., Gahanna, A.N. and Makira, H.N., 2010).Natural bioactive constituents with a variety of therapeutic activities are incorporated into basic soap medium in preparation of soap (Wijetunge, W.M.A.N.K. and Perera, B.G.K., 2015). Soaps that are

available in the market are formulated by incorporating one or more plant extracts and claimed for the antifungal or antibacterial property.

Azadirachta indica, Cassia fistula and Nelumbo nucifera are medicinal plants that are frequently found in Sri Lanka.C. fistula which belongs to the family of Fabacae possesses antioxidant, antitumor, antimicrobial and anti-inflammatory activities. Antimicrobial activity was detected in bark, leaves and flowers of C. fistula (Ali, M.A., Sayeed, M.A., Bhuiyan, M.S.A., Sohel, F.I. and Yeasmin, M.S., 2004)

A. indica belongs to the family of Meliaceae, is often known as neem. The plant has been demonstrated anti-bacterial anti-fungal, antiviral, anti-oxidant, anti-malarial activities etc. (Biswas, K., Chattopadhyay, I., Banerjee, R.K. and Bandyopadhyay, U, 2002).

N.nucifera is an aquatic plant in which its flower has shown hypoglycemic, antioxidant, anti-microbial and antihypertensive abilities. Different chemical compounds with different therapeutic activities were isolated from flowers of N.nucifera (Gunawardana, S.L.A. and Jayasuriya, W.J.A.B.N., 2019).

Although the antimicrobial activity of leaf extracts of A. indica and C.fistula and flower extract of N. nucifera has been investigated individually, a herbal soap has not been developed using a combined extract of said plants. Antimicrobial activity of the combined extract of leaf extracts of A.indica, C.fistula and flower extract of N.nucifera has evaluated in our previous study (unpublished data). Hence, the present study aims to formulate a novel herbal soap using the above combined extract and to investigate the antimicrobial activity of the formulated soap. Furthermore to evaluate the physicochemical characteristics of the soap.

Methodology

Plant Collection and Authentication.

Fresh leaves of A. indica,C. fistula and white flowers of N. nucifera were collected from Southern and Western Provinces, Sri Lanka. Plants were authenticated at the National Herbarium, Botanical Gardens, Peradeniya, Sri Lanka. The collected plant parts (leaves and flowers) were washed, air-dried and powdered to a coarse powder and stored in air-tight bottles.

Preparation of the extracts

- Preparation of hot ethanol leaf extract of C. fistula

Prepared sample of C. fistula was added to a round-bottomed flask containing 150 ml of ethanol and boiled for 4 hours. Then the extract was filtered using Whatmaan 0.45 µm filter paper and the filtrate was concentrated using a rotary evaporator. Stored at 4°C.

- Preparation of hot aqueous extracts of leaves of A. indica and flowers of N. nucifera

Sample of each plant was added to round-bottomed flasks separately containing 150 ml of distilled water and boiled for 4 hours. Then the extracts were filtered using Whatmaan 0.45µm filter paper and the filtrate was concentrated using a rotary evaporator and freeze-dried. Extracts were stored at 4 °C.

Preparation of the combined extract

According to the previous study the ratio of the effective combined extract was aqueous extract of A. indica (4): aqueous extract of N.nucifera (1): ethanol extract of C.fistula (1). Hence 1000 mg/ml of aqueous extract of A. indica, 250 mg/ml of aqueous extract of N.nucifera and 250 mg/ml of ethanol extract of C.fistula were combined.

Test microorganisms

Isolates of Candida albicans, Staphylococcus aureus ATCC 25923 and Pseudomonas aeruginosa ATCC 27853 were obtained from the Department of Microbiology, Faculty of Medical Sciences University of Sri Jayewardenepura.

Formulation of a herbal soap using the combined extract

Herbal Soap was formulated by incorporating the combined extract with other ingredients into the melted glycerin soap base. Volatile oil of N. nucifera was added. Then the mixture was stirred for 30 minutes and the melted mixture was poured into molds for solidification

Determination of the antimicrobial activity of the formulated herbal soap

Different concentrations of formulated soap were prepared by dissolving it in 1% DMSO. Then the antimicrobial activity of each solution was tested by agar well diffusion method against S. aureus, P. aeruginosa and C. albicans. Gentamycin and clotrimazole were used as the positive control for bacteria and fungi respectively. Bacterial cultures and fungal cultures were incubated at 37 ℃ for 24 hours and 48 hours respectively. Antimicrobial activity was determined by measuring the zone of inhibition around the well against each microorganism (Afsar and Khanam, 2016).

Evaluation of physicochemical parameters of the formulated herbal soap

Physiochemical parameters of formulated soap were evaluated by determining the physical characteristics such as colour, odor, etc. pH, Foam height, foam retention time, % of alcohol insoluble matter and moisture matter.

Results and Discussion

Antimicrobial activity of the prepared herbal soap was investigated using the agar well diffusion method. Table 1 represents the diameter of the zone of inhibition for S. aureus, P. aeruginosa and C. albicans at different concentrations of herbal soap.

Table: 1: Diameter of the zone of inhibition for S. aureus, P. aeruginosa and C. albicans at different concentrations of herbal soap

Concentration(mg/ml)	Diameter of zone of inhibition (mm)		
	S. aureus	*P.aeruginosa*	*C.albicans*
1000	28±1	25±1	25±1
500	24±1	23±1	25±1
250	22±1	20±1	20±1
125	20±1	19±1	19±1
62.5	18±1	17±1	18±1
31.25	15±1	15±1	15±1
Positive control	31±1	30±1	26±1
Negative control	ND	ND	ND

ND- not detected

According to the results shown in Table 1, herbal soap showed antibacterial and antifungal activity as the combined extract. When consider the antimicrobial activity of individual plant extracts evaluated by our previous study, the herbal soap demonstrate comparatively better activity than individual plant extracts.

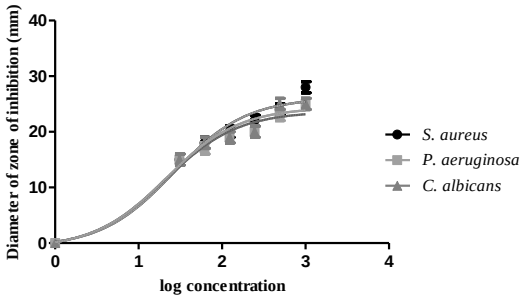

Figure 1: Dose-response curve for formulated soap against S.aureus, P .aeruginosa and C.albicans

Dose-response curve for formulated soap against S.aureus, P .aeruginosa and C.albicans is shown in Figure 1. According to the Figure 1, a dose dependent antimicrobial activity was observed (R =0.9735, 0.9766, 0.9693) for each microorganism.

Physical parameters including colour, odor, appearance and chemical parameters including pH, % free alkali, foam height, foam retention and alcohol insoluble matter of formulated soap was evaluated. The results obtained shown in the table 2.

Table: 2 physicochemical parameters of formulated herbal soap

Color	Odor	Appearance	pH	% free alkali	Foam height(cm)	Foam retention(min)	Alcohol insoluble matter (%)	Moisture/Volatile Matter (%)
Dark brown	Fragrant	Good	9.11	1.6	9.5	7	24.6	15.85

Antimicrobial soap was formulated considering its microbiological, physical and chemical properties. The selected herbal extracts used as active ingredients and several additives have been incorporated into the glycerin soap base which has been used as the vehicle for the formulation. Herbal soaps in 50 g in weight were produced by adding plant extracts, distilled water, stearic acid and natural volatile oil of N. nucifera into the glycerin soap base. The cleansing property of soap provided by natural oils, alkali and water containing in soap base.

Distilled water was selected as the solvent for preparing plant extracts. Stearic acid functions as a hardening agent when developing solid dosage forms and it also acts as a softener that produces cool sensation. As a fragrance enhancer, volatile oil of N. nucifera was added into the formulation. No synthetic bleaching or coloring agents were added to the formulation. As the main aim of the study, the antimicrobial activity of formulated soap was determined against some common skin pathogens. Six concentrations of soap were prepared by serial dilution method. DMSO has been used as a solvent to dissolve and make different concentrations of soap.

C albicans has shown slight inhibition only for N. nucifera aqueous extract. But there were markedly increased inhibition against C. abicans for the soap formulation. The reason behind the above results may be the synergistic activity of a combination of plant extracts used in the formulation of soap or the total sum of effects when compared to individual extracts.

Appearance, color and odor were observed as physical properties of the final product. The dark brown color of the soap arises due to the plant extractions. Fragrant odor was the result of adding the natural volatile oil of N. nucifera.

The pH of the soap at 28˚C temperature was 9.11. According to the SLS 1220 standard (Sri Lanka accreditation board for conformity assessment), the pH of the soap should be in the range of 4-10. Hence, the pH of the formulated soap was in an acceptable range and safe to use. The increased pH of the soap produces a significant increase in microbial growth.

One of the parameters used to detect the purity of the soap is matter insoluble in alcohol (MIA). MIA value of the formulated soap obtained as 24%. This parameter used to determine the non-soap ingredients known as builders or fillers such as sodium carbonate, sodium silicate and minor compounds such as whitening agents, bleachers in the final product. Higher the MIA value indicates that it contains a high level of impurities which may cause the level of impurities of alkali used for the soap. % MIA range is between 36- 77%

Conclusion

Antimicrobial activity of the formulated herbal soap using the combined extract of A.indica, C.fistula and N.nucifera was considerably higher when compared to the individual plant extracts against S.aureus,

P.aeruginosa and C.albicans. Therefore this study concludes that the synergism between the constituents or total sum of effects of the combination may cause enhanced growth inhibition of tested microorganisms. Further the value of pH, % free alkali, alcohol insoluble matter and moisture content of the formulated soap were within the accepted range. Clinical trials are recommended to evaluate the safety and efficacy of the formulated soap in future studies.

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Knowledge On Usage Of Thyroxin Tablet Among Primary Hypothyroidism Patients Attending Endocrinology Clinic At Teaching Hospital Jaffna

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Abstract: Hypothyroidism is a common condition in Sri Lanka as it is world-wide. Most of the people were getting treatment for hypothyroidism in Jaffna. By having good knowledge on usage of thyroxin medicine, can be improving the quality of life. The aim of the study was to evaluate knowledge on usage of thyroxin tablet and assess relationship between sociodemographic factors and knowledge among primary hypothyroidism patients. A descriptive cross-sectional study was conducted in 2019, used interviewer administered questionnaire, include whole population who had primary hypothyroidism and SPSS 25 and chi square test were performed to found out the relationship. Among the participants' majority were females (88.5%), in between age of eighteen to thirty and mean age was 37.5 years. Most of the participants (97.7%) knew thyroxin should be taken as once daily, 94.1% knew that thyroxin should take in early morning at empty stomach, 62% knew thyroxin should store in brown colour container. Only 19% knew that thyroxin can cause side effects, 40% was knew that consult the doctor when notice any side effects following ingestion of thyroxin however only 19% was knew that should consult the doctor if missed tablet more than 3 days. Nearly two third of the participants (64.9%) had poor knowledge. Factors were assessed and no relationship identified. To improve the patients' knowledge, increase the availability of articles in newspapers, internet and books in their own mother tongue and small session can be carried out during clinics.

Keywords: knowledge, hypothyroidism, Teaching Hospital Jaffna

Introduction

Hypothyroidism is defined as a condition in which the production of the thyroid hormones thyroxin (T4) and triiodothyronine (T3) by the thyroid gland is inadequate to meet peripheral tissue demand. Thyroid failure caused by a disease of the thyroid gland is termed primary hypothyroidism. Primary hypothyroidism is by far the most common cause of hypothyroidism, and occurs as a result of Hashimoto‟s thyroiditis, thyroidectomy and radiotherapy to the neck, radioiodine thyroid ablation or medications.

Decreased levels of circulating free thyroxin and free triiodothyronine (fT4 and fT3) stimulate the production of thyroid stimulating hormone (TSH) in the pituitary gland to restore sufficient thyroid hormone production. An elevated serum TSH level is the main and most sensitive laboratory abnormality to occur in primary hypothyroidism, followed by reductions in serum levels of fT4 and fT3. Synthetic levothyroxine is the treatment of choice for primary hypothyroidism (Mandel, Brent, & Larsen, 2016).

Primary hypothyroidism results from under secretion of thyroid hormone and secondary hypothyroidism is caused by lack of TSH

production from the pituitary. The most common cause for hypothyroidism in Sri Lanka is autoimmune thyroid disease (Hashimoto‟s thyroiditis). Clinical suspicion of hypothyroidism, Strong family history of hypothyroidism, Newborns of mothers with thyroid diseases, Past history of neck irradiation, Radioactive iodine or thyroid surgery, patients on drugs such as lithium or amiodarone, children with Down syndrome, Patients with other autoimmune diseases these are the indication for screening hypothyroidism (Somasundaram, Wijeyaratne, Fernando, & Siribaddana, 2012). Thyroxin is stable in dry air, but unstable in the presence of light, heat and humidity. In some cases overseas, thyroxin tablets have been unstable even at room temperature, and storage temperatures of 8°C to 15°C were necessary to maintain potency. Therefore very essential that thyroxin tablets should be kept in their original container and stored out of sunlight in a cool dry place (Roberts, Pharmacist, Hospital, & Park, 2004).

Thyroxin is variably absorbed from the gut following oral administration. It has a bioavailability of 40–80%. Absorption may decrease with age. The extent of thyroxin absorption is increased in the fasting state and is influenced by the content of the gastrointestinal tract. Some substances bind the thyroxin, making it unavailable for diffusion across the gut wall. Concurrent administration with iron salts, antacids, calcium carbonate (including milk), sucralfate, cholestyramine and soy-based formulas may therefore decrease absorption of thyroxin (Roberts et al., 2004). For patients, particularly children, who cannot swallow tablets, the tablets may be crushed in 10–20 mL of water, breast milk or non-soybean formula. The resulting mixture should be used immediately and any remainder discarded. Breast milk contains only 20–30% of the calcium concentration of cow's milk, making the likelihood of decreased thyroxin bioavailability less likely. Nonetheless, if breast milk is used to deliver the thyroxin, it should be used consistently, in order to minimize any variation in absorption (Roberts et al., 2004).

Methodology

It was a hospital based descriptive cross-sectional study conducted in Endocrinology clinic at Teaching Hospital Jaffna among the primary hypothyroidism patients from August 2018 to July 2019 with sample size of 380. Researcher visited on that clinic days and take whole population for the data collection. Total 305 participants data was collected in 25 clinics by used interviewer administered questionnaire. The questionnaire was designed as section A and B. Section A included socio demographic factors of study participants include age, gender, civil status, educational level, employment, working hours and distance. Section B contain questions to assess the knowledge of patient regarding name of the medicine, dosage, frequency, time, storage, side effects, interaction, overdose and consultation of medicine usage. Each correct answer carried one marks and total maximum obtained score was fourteen marks then it converted into percentage. The scoring of knowledge was categorized into two categories which were poor (less than 75%) and good (more than 75%). The collected data was analysed by SPSS 25 (statistical Package for Social Sciences). Data was calculated as mean, standard deviation, percentage, average and the result was presented as table and diagram. Chi square statistical test was performed to find out relationship.

Results and discussion

In this study mean age of participants was 37.45 (SD=14.59). Age range of the participants was 9 to 68 years old. More than half of them (64.3%) were greater than 30 years old. Most of the participants (88.5%) were female. Most of the participants is Married (70.8%), 39.7% were studied up to

O/L and 0.7% were not get any education. Most of the participants (84.3%) were not working. Among the Employees, 81.3% were working for 6-10 hours. Majority (90.5%) of the participants were coming to clinic with in 25km of distance. A study done in India by Sethi et al., revealed that mean age of respondents was 43.0 (±13.6) years and 72.4% were women. Most participants were undergraduates (44.2%) and graduates (39.6%) (Sethi et al., 2016). In this present study, mean age was less, female participants were high and only 3.6% were graduates.

Among them 94.1% knew the name of the drug and correctly name it. 90.8% knew their dosage of the drug. Only 43.5% of the participants were using 75-100 µg, 35.9% was using 25-50 µg. A study was done in UK by Dew et al in 2017 revealed that only 7.4% were using 25-50 µg at the same time 33.3% were using 75-100 µg (Dew et al., 2017). In this present study both frequencies was increased because of high number of participants and geographical variations. Thyroxine is the treatment of choice for hypothyroidism. It has a seven day half-life, allowing daily dosing (Chakera et al., 2011). Most of the participants (97.7%) knew thyroxin should be taken as once daily. Hypothyroid patients are advised to take thyroxine on an empty stomach half an hour before breakfast to prevent impairment of absorption by food (Chakera et al., 2011). Most of the participants (94.1%) knew that thyroxin should take in early morning at empty stomach and 1.0% told that it can be taken after dinner. A small nonrandomized study involving eleven hypothyroid patients on a stable dose of morning thyroxine found a decrease in mean TSH and an increase in free thyroid hormone levels when the timing of levothyroxine dosage was changed to bedtime (Chakera et al., 2011).

Most of the participants (62.0%) knew that thyroxin should store in brown color container and 14.8% were told in brown color blister pack. Nearly 17.4% were told that it should be store in plastic bottle and only 5.2% were told in paper covering. It may be due to insufficient knowledge among the participants. It can be corrected by giving proper storage methods by pharmacists when they give to the thyroxin medicine. Most of the participants (83.0%) were known that thyroxin should store away from the light. More than half of the participants (53.8%) were known thyroxin dosage may vary with age, weight and other medical condition. A randomized controlled trial has shown that, in patients with no significant comorbidities, initiation of levothyroxine at a full dose based on body weight (1.6 µg/kg/day) is safe and effective (Chakera et al., 2011). It is important to know about thyroxin dosage vary with medical condition because people have more attention to take care in their health in special situations. But in this present study nearly 46.2% were giving wrong answer. Most of the participants (79.7%) knew that thyroxin should not be taken with any other drugs. When the patients had good knowledge about drug interaction only they can get good compliance.

Only 19.0% were known that thyroxin can cause side effects, but Most of the participants (74.8%) told thyroxin not cause any side effects. Health education and posters can be provide in clinic setup can correct the knowledge about side effects. Most of the participants (83.6%) were known that discontinuation must done after consulting with doctor. However some participants told that discontinuation can be done without consulting doctor once the symptoms were settled. Majority (73.1%) were known that it is important to tell the pharmacist/ doctor regarding thyroxin usage when taking medicine for other medical conditions.

Only 40.0% was knew that consult the doctor when notice any side effects following ingestion of thyroxin, at the same time 48.9% were told that it is not important to consult the doctor. Nearly 46.2% were told consult the doctor if take overdose of thyroxin. Only 19.0% was knew that should consult the doctor if missed tablet more than 3 days and more than half of the participants

(59.0%) did not knew that. Thyroxin level should be maintained in normal level, it is important to know about missed dose to improve compliance of the patients. It can be corrected by providing health education.

Most of the participants (64.9%) have poor knowledge and only (35.1%) have good knowledge. Similar study done in India by Sethi et al. on 2016 concluded that most participants (66.6%) had a low level of knowledge (Sethi et al., 2016). In this present study more than half of the participants follow clinic for 1-5 years (52.1%). A study was done in UK in 2017 by Dew et al, revealed that only 22.3% were following clinic less than 5 years (Dew et al., 2017). This variation may be due to the geographical variation. Most of the participants (99.3%) took thyroxin at empty stomach. Majority (85.9%) took thyroxin 30 minutes before breakfast. Similar results was observed in a study done in India by Sethi et al, in 2016 concluded that 92.6% were taking thyroxin 30 minutes before breakfast on empty stomach (Sethi et al., 2016).

Table 1: knowledge on thyroxin medicine usage Frequency

Knowledge on thyroxin medicine usage	Frequency	Percentage (%)
Poor knowledge	198	64.9
Good knowledge	107	35.1

Conclusion

The results of the study suggest that interventions should be carried out to increase level of knowledge among primary hypothyroidism patients in endocrinology clinic at THJ. Based on the findings small sessions should be carried out by health professionals, increase the availability of articles in newspapers, internet and books in their own mother tongue. This study may serve as base for future studies. There is a need to be conducting further research by using lager population, which would be more representative of primary hypothyroidism patients.

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Knowledge On Diet Among The Ischemic Heart Disease Patients Attending Cardiology Clinic At Teaching Hospital Jaffna

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Abstract - Ischemic Heart Disease (IHD) is major cause of death in worldwide. In Sri Lanka, cardiovascular diseases cover 40% of Non-communicable diseases. IHD was ranked as leading cause for the hospital deaths since year 2013 and 14.2% of total deaths in 2017. Un-healthy dietary pattern is one of the modifiable risk factor for IHD. The aim of the study is to evaluate the knowledge on diet and assess influence of sociodemographic factors on knowledge. A descriptive cross sectional study was conducted in 2019, used an interviewer administered questionnaire among 414 IHD patients. Data was analysed using SPSS 25 and chi square test was performed to find out the relationship. Majority were male (70.3%), mean age was 66.2. Among them 68.4% were having dyslipidemia. Nearly two third (67.6%) of the participants knew that un-healthy dietary pattern can cause IHD. Majority of them knew that margarine (92.3%), fried foods (76.8%) and fast foods (74.2%) can increase blood cholesterol level. However, majority of them didn't aware that Olive oil (78.5%) and Oats (59.7%) are good to consume and white bread (56%) is bad. Majority of them aware that vegetables (72%), fruits (52.2%) and legumes (51.7%) were good to take in high amount, however 64.3% of them didn't know cereal also good to take. Only 28.3% had good knowledge on diet. Family history and highest educational level ($p<0.05$) showed significant relationship with knowledge. Conducting nutritional awareness programme for IHD may help to increase the level of knowledge.

Keywords: Knowledge, Diet, Ischemic Heart disease, Teaching Hospital Jaffna

Introduction

Cardio vascular diseases take the lives of 17.9 million people every year, 31% of all global deaths. Ischemic Heart Disease (IHD) is the single largest cause of death worldwide. Highest IHD mortality rates are in Eastern Europe and central Asian countries. Greater than 85% of heart diseases occur in low and middle income countries (WHO 2018).

In Sri Lanka Cardiovascular diseases are responsible for 40% of those NCDs (Annual Health Bulletin 2017). Out of these cardiovascular diseases, Ischemic Heart Disease (IHD) has been ranked as the first leading cause for hospital deaths. It is responsible for 14.2% of total deaths in 2017. The rank as first in hospital deaths remain from year 2013. Specific death rates due to IHD are high among in the males and age between 50-69 years in 2017. Total hospital discharges in Sri Lanka due to IHD represents 56% of male and 44% of female (Annual Health Statistic 2017).

Ischemic Heart Disease (IHD) is caused by the narrowing or blockage of the arteries and vessels that provide oxygen and nutrients to the heart. Manifestations of IHD are Stable / unstable angina, Myocardial infarction,

Sudden death, Heart failure (Nutrition Division 2014).

The risk factor for IHD includes unhealthy diet, tobacco smoking, and lack of physical activity and harmful use of alcohol. Co-morbid risk factors are high blood cholesterol and Triglyceride levels, high blood pressure, diabetes mellitus, overweight and obesity. Other risk factors include poverty and low educational status, advancing age, gender and psychological factors (global atlas 2011).

According to these risk factors unhealthy diet, tobacco smoking, lack of physical activity and harmful use of alcohol are major risk factors that can be prevented. Life style modification and behavioral changes will help to slow the progression of disease condition. Healthy diet pattern can be easily followed by anyone with proper medication compliance. It will improve life expectancy and provide good outcome of the disease condition.

Methodology

It was an institutional based descriptive cross sectional study was conducted from August 2018 to July 2019. Around six hundred and fifty patients were attending Cardiology clinic per month for Ischemic Heart Disease at Teaching Hospital Jaffna. Patient's age was greater than 18 years old, Patients who attending Cardiology clinic more than 6 months are included for this study. Actual sample size was 414. Systematic random sampling was used to collect data. IHD patients were identified among Cardiology clinic patients and name list was prepared with clinical number. An interviewer administered semi structured questionnaire was used to collect data. Study instrument was designed with section I for socio demographic data. Section II for knowledge on diet. Interviewer administered questionnaire was conducted during the waiting time for the physician and medical clinic pharmacy with help of batch mates. Data was analysed by using SPSS 25 statistical software. Each correct response was scored with one mark while incorrect or don't know response were received zero mark. Predetermined cut off was used to assess the knowledge level. The score less than fifty was considered as poor knowledge, fifty to seventy five considered as average knowledge and the score above seventy five was considered as good knowledge. Chi square statistical test was used to identify the factors influence on knowledge.

Results and discussion

Mean age of participants was 66.16 years. Age range of the participants was 36 to 86 years old; more than half of them (56%) were greater than 65 years old. Majority (70.3%) were male. According to the literatures male was the highly affected by IHD than females. Females have hormonal protective effect until their menopause than males. Around 70% were married, majority were Sri Lankan Tamil (98.6%) and Hindus (86%). Grade 6-10 was the highest level of education for nearly one third of the participants (31.9%). More than half of them were employed (56.3%). Most of the participants (44.9%) were earning Sri Lankan Rupees greater than 10000 for a month. Nearly three fourth of the participants (77.5%) were had no family history of IHD. Most of the participants (37.2%) were living with their wife/husband and children.

Most of them (72.7%) were following clinic for 1-10 years of duration. Nearly 35% of the participants were added as new admission within one year. Nearly 18.6% were not having co-morbidities while 1.4% having all four co-morbid diseases and nearly one third (35.7%) were having any two comorbid disease condition. Dyslipidemia (68.4%) was found as the most common comorbid disease condition among the participants. Others were having Hypertension (43.5%) and Diabetes (39.6%). A study was done in Bangladesh among cardiovascular disease participants nearly 29.3% were having Diabetes and

Hypertension were 32.4% of the participants who were in the age between 41-60 years (Abu-Sayeef et al., 2013). According to the annual health statistics of Sri Lanka mentioned that the most affected age group with diabetes and hypertension were 50-69 years. Nearly 98% of the present study participants were above the age of 50 years. Therefore the co-morbidity in the participants was higher than Bangladesh study. More than half of the participants (56.5%) got information regarding diet from Consultant Cardiologist and 35% of the participants were getting information from general practitioner. Participants who were getting information from books (6.3%) and newspaper (18.6%) were very low. It may be non-availability of articles in books or newspaper in their mother tongue. Only 5.3% were getting information from awareness program. More than half of the participants (67.6%) gave correct answer as unhealthy dietary pattern can cause IHD while 22.0% participants were giving wrong answer as unhealthy diet pattern not cause IHD. Nearly three fourth of the participants (79%) knew that diet influence on blood cholesterol level.

The unhealthy food habit is another influencing factor on the causation of IHD among the participants. It increases the risk of IHD even when they are on treatment. A study was done by Sivajeneni et al, at cardiology clinic at THJ in 2014; concluded that 69% of participants followed an unhealthy dietary habit (Sivajeneni et al., 2014). Another study was done in 2013 in Bangladesh found that 47% were believed unhealthy diet did not cause IHD (Abu-Sayeef et al., 2013). However in the present study, majority were known unhealthy diet can cause IHD. Majority of the participants (84.8%) knew that repeatedly heating oil for frying was not good for patients with IHD. Repeatedly heating oil can generate Trans fatty acid, it should be limited in patients with IHD. Only 8.2% of the participants did not know about repeatedly heating oil.

Majority of the participants knew that margarine (92.3%), butter (93.4%), cheese (92.3%), egg yolk (76.6%), shell fish (71.5%), fried foods (76.8%) and fast foods (74.2%) can increase blood cholesterol level. A study was done in 2013 in Bangladesh, 78% of participants avoid fatty foods that can prevent IHD (Abu-Sayeef et al., 2013). Another study was conducted in 1993 in England by Arthur V et al. found that 38.9% of participants knew margarines and butter can increase blood cholesterol level (Arthur V et al., 1993). In the present study most of the participants knew that. At the same time participants knew fatty fish (85%), garlic (78.7%) and spinach (78.5%) were not increase the blood cholesterol level. Garlic has been qualified with favorable cardiovascular effects. Most of the participants didn't know about almonds (75.6%). Most of the participants knew red rice (94.9%), parboiled rice (86%), whole wheat flour (64.5%), kurakkan (85.5%) and millet (83.6%) can be taken by IHD patients. Majority (74.4%) were known to limit white rice. More than half of the participants didn't know about white bread (56%) and Oats (59.7%).

More than half of the participants (59.7%) knew that sunflower oil can use in cooking. About 66.2% of participants responded as coconut was not used in cooking. Even though, coconut oil was rich in saturated fatty acids in comparison with sunflower oil (Maniyal et al., 2016). Pehowich stated that coconut oil is good for the heart because it has median chain fatty acids, which increases the High Density Lipoprotein (Pehowich, Gomes & Barnes, 2000). About 45.2% of the participants didn't know about vegetable oil. Most of the participants (82.4%) knew Gingelly oil can use. more than three fourth of participants (78.5%) didnt know about Olive oil.Majority of the participants knew that vegetables (72%), fruits (52.2%) and legumes (51.7%) were

taken as high amount. Lower coronary mortality has been observed with high levels of vegetables and fruit consumption in Finland (Knekt P et al., 1996). A study done in Italy in 2014 revealed that only half of the participants knew increase intake of fruits and vegetables among IHD patients (Lusia et al., 2014). However in the present study majority were answered correctly as increase intake of fruits and vegetables.

About 64.3% of the participants didn't know about cereal can be taken as high amount. Rastogi et.al, observed an inverse association between cereal intake and IHD risk. Only 35.5% of population knew about fish can be taken as moderate amount. Majority of the participants knew about meat (74.9%), egg (70.8%) and milk and milk products (66.9%) were taken as low amount. Moderate intake of low fat dairy products, eggs, fish, and chicken were allowed, while red meat is avoided. There was an epidemiologic data suggested an association between dairy product consumption and reduced IHD (Sigal et al., 2013). The Lyon Diet Heart Study promoted that diet with higher intakes of fruit and vegetables, moderate intake of fish, and less meat and butter had 50-70% of lower the risk of recurrence heart disease (Krish-etherton et al., 2000). Fung et al., also concluded that traditional Mediterranean dietary pattern was protective against cardio vascular disease (Fung et al., 2009).

According to the responses given by the participants total score percentage was calculated and reflected in a chart. Minimum value was 34.29 while maximum was 91.43 with overall mean percentage was 67.46 (SD=12.42).

Table 1: Distribution of knowledge on diet among study participants (n=414)

Knowledge on diet among IHD patients	Frequency *n*=414	Percentage (%)
Poor knowledge	35	8.5
Average knowledge	262	63.3
Good knowledge	117	28.3

Table 1 shows that participants' level of knowledge was classified into poor, average and good according to the pre determine cut off value. Majority of the participants (63.3%) had average knowledge, 8.5% had poor knowledge and 28.3% have good knowledge. Similar study was done in Galle by Perera ACH and Samarawickrama MB, found that 58.7% have poor knowledge on diet (Perera ACH and Samarawickrama MB, 2015). Another study was done at THJ in 2014 mentioned that most of the participants (68.6%) did not have enough knowledge regarding proper food habits for IHD (Sivajeneni et.al., 2014). In the present study most of the population has average knowledge on diet.

Conclusion

The present study shows that more than half of the population (63.3%) had average knowledge about diet. Only 28.3% of the participants had good knowledge. Most of the participants knew that unhealthy dietary pattern can cause IHD and diet influence on blood cholesterol level. Majority were known about food items that can increase blood cholesterol level. Statistically significant relationship was found between knowledge on diet and highest educational qualifications, family history and living with socio demographic characteristics.

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Assessment of the Awareness in Management of Chemotherapy Related Adverse Effects Experienced by Cancer Patients at Apeksha Hospital, Maharagama, Sri Lanka

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Abstract: Cancer accounts for majority of the disease related deaths all over the world. Although cancer can be treated with chemotherapy successfully, the burden of chemotherapy related side effects makes a negative impact about the treatment in patients. The study was carried out in the purpose of assessment of awareness in management of chemotherapy related adverse effects experienced by the cancer patients at Apeksha Hospital, Maharagama, Sri Lanka. Moreover, it focused on the patients' knowledge on the disease and the treatment schedule and the most frequently experienced side effects by the patients. This is a single centre descriptive cross-sectional study. The study population of 155 cancer patients with multiple carcinomas, attending medical oncology clinics at Apeksha Hospital was selected randomly. An interviewer administered questionnaire was used to gather information. Collected data was analysed by SPSS Version 23 software. The diagnosis of the disease was known by almost all the participants. The names of the chemotherapy medicines receiving were fully known by only one fifth of the total population. Most commonly experienced adverse effect among the population was fatigue. Drinking adequate amount of fluid had been the most frequently followed instruction in order to minimize the adverse effects. Discussions with healthcare professionals were chosen as the most effective way of having information. Discomfort due to chemotherapy related adverse effects may cause delay or early termination of treatments and increase unnecessary hospital admissions. A thorough counselling in managing the adverse effects accounts a better quality of life to the patient.

Keywords: Cancer, Chemotherapy, Side effects

Introduction

The occurrence of caner has been notable in recent times. Though chemotherapy treats cancer specifically, patients experience adverse effects during active treatment, immediate after treatment or later. Due to inappropriate management of adverse effects their treatments may be delayed or terminated earlier. Patients undergoing chemotherapy treatments often receive information about common adverse effects related to chemotherapy from their health care professionals in Si Lanka. Though they receive relevant and adequate information, the patients are still conversant in management of chemotherapy related adverse effects. The study was carried out in the purpose of assessment of awareness in management of chemotherapy related adverse effects experienced by the cancer patients at Apeksha Hospital, Maharagama, Sri Lanka. Moreover, it focused on the most common cancer type, the patients' knowledge

on the disease and the treatment schedule, the most common side effects experienced by the patients and informational need of the patients in minimizing adverse effects.

Methodology

This is a single centre descriptive cross-sectional study. The study population was 155 cancer patients with multiple carcinomas, attending medical oncology clinics at Apeksha Hospital, Maharagama, Sri Lanka. Every 5th patient who fulfilled inclusion criteria was included to the study and all the patients were notified that inclusion for this survey is entirely voluntary. The privacy and confidentiality of all participants were protected throughout the study. An interviewer administered questionnaire was used to gather information. Collected data was analysed by SPSS Version 23 software. Data processing was done by categorizing data, coding, summarizing and verification by computer. Production and interpretation of frequencies, tables and graphs were used to describe the findings.

Results and Discussion

Of 155 participants majority were females. Nearly half of the participants belonged to the age group of 53-70 years. Among the total population, most of them had studied up to A/L and were non-occupied. Results of the study revealed, the most common cancer types of females were breast, womb colo-rectal, ovarian, and cervical cancers, while blood, neck, colo-rectal and lung cancers were common in males. The diagnosis of the disease was known by almost all the participants and the stage of cancer and treatment schedule was known by majority (90.1%) of the participants. It seemed that most of the patients dedicated to have their treatment cycles regularly. Names of the chemotherapy medicines receiving were fully known by only one fifth of the total population. This may be due to patient's unfamiliarity with the names of chemotherapy agents, the difficulty in pronouncing and remembering them. Most commonly experienced side effect among the population was fatigue (71%). Alopecia, nausea and vomiting were also reported by more than half of the total population. Reduction in White Blood Cells, constipation, stomatitis, fever, skin problems, dysuria were among the significantly occurring side effects experienced by the patients. Gum bleeding, back pain, breathing difficulties, weakness in teeth, burning sensation, delay menstruation, discoloration of skin, discoloration of nails, dry skin, headache, leg pain, sleeplessness had been reported by less than 10% of participants in each. Of respondents, majority (85.2%) knew that drinking adequate amount of fluid can remove harmful agents from the body. About 70% respondents knew that having more fresh vegetables and fruits gain more benefits while having chemotherapy. More than half of respondents had known to have frequent small meals to avoid emesis as well as to increase appetite. To prevent acquiring of infections, more than 60% of respondents were aware to avoid public places after having chemotherapy treatments. Nearly half of respondents knew that wearing a mask was essential to prevent inhalation of harmful agents in order to prevent from infections. About 20% of participants knew that dry skin conditions can be managed by applying moisturizing creams. Among participants 17.4% of respondents were knowledgeable to avoid constipation conditions by eating high fiber foods with adequate fluid, however 20.6% participants were used to treat constipation when it became unmanageable. Patients had a satisfactory knowledge and adherence regarding management of more frequently experienced side effects such as nausea, vomiting, anorexia, constipation, skin problems and in taking precautionary actions to avoid secondary side effects such as infections which occur as a result of immunity suppression in chemotherapy. Adverse effects management methods were followed only for

a limited number of side effects by the patients including methods to relieve nausea, vomiting, diarrhoea and protection from infections. Although the most common side effect was fatigue, none of the respondents had followed any management method to minimize it. It was observed that, there is a gap between patients' actual need and information provided by the health care professionals.

Conclusion

Due to inappropriate management of adverse effects, patients' treatments may be delayed or terminated earlier which may increase morbidity and mortality, increase unnecessary hospital admissions and decrease cure rate. As discomforts due to chemotherapy related side effects negatively influence the cancer patients, they demanded more information on side effects and management methods to cope with the side effects successfully. As participants perceived more information, it is suggested to arrange more interactive counselling sessions for patients by healthcare professionals. A thorough counselling in management methods of the side effects may account a better quality of life to the cancer patient.

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Association of socio demographic and educational factors on knowledge and attitudes on the role of community pharmacist in healthcare system among the science students of University of Jaffna

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Abstract – Community pharmacists are expanding their services from dispensing practice to various health services to the public. Understanding their role in healthcare system is essential to get their satisfactory services. Study was conducted among university students since they are involving in community education and they have leading role in disseminating knowledge to other people-. The objective of the study was to assess the knowledge and attitudes towards the role of community pharmacist among the science students of University of Jaffna and influence of socio demographic and educational factors. It was an institutional based descriptive cross-sectional study. A self- administered, pretested and validated questionnaire was used to collect the data. SPSS version 23 statistical software was used to analyse the data. Descriptive statistics was used to describe the data and Chi Squared test was performed to determine the level of association. Among the total of 701 participants, 563 participants were responded with the respondent rate of 80.3 %. The mean age of participants was 24.61±0.9 years and 53.8 % (n=303) of participants were males. Of 40.3% (n=227) participants had good knowledge and 42.3% (n=238) of participants had positive attitudes. Age (p=0.004), gender (p=0.036), place of resident (p=0.012) and course of study (p=0.000) had statistically significant association with knowledge. The course of study (p=0.003) had statistically significant association with attitudes. Study revealed that more than half of the participants had poor knowledge and negative attitudes towards roles of community pharmacist. Awareness programmes should be conducted regarding role of community pharmacists on health care system.

Keywords: community pharmacist, Knowledge, attitudes, health care system

Introduction

Pharmacy services throughout the world play a broad range of activities in provision of health services provided to the general public. In recent years, pharmacy profession has extended its role of product-oriented to consumer oriented with an emphasis on the provision of consumer care services. The consumer's opinion of the benefits of pharmaceutical care is based on the ability of the pharmacist to help them. More frequent interaction with the consumers increases the opportunities to improve outcomes of therapy (Jin *et al.*, 2014) . (Dalgleish *et al.*, 2007).

The pharmaceutical care process assumes the establishment of a meaningful therapeutic relationship between the patient and the pharmacist based on care,

trust, effective communication, and collaboration to promote health, prevent disease, and ensure safe and effective medication therapy. (Awad, Al-Rasheedi and Lemay, 2017) (Helper and Strand, 1990), (Practices, 2003). . (Petkova and Dimitrova, 2003).

Problems in pharmacist consultation can occur when patients and pharmacists have different expectations about the pharmacist's role and pharmacy services. Therefore, the advancement of community pharmacy practice needs understanding of patients' knowledge and attitude of the pharmacist's role as well as of their utilization and views of community pharmacy services. Knowledge and attitude about public utilization and views about community pharmacy service can assist pharmacists in enhancing the quality of their service and improving customer satisfaction. (El Hajj, Salem and Mansoor, 2011). The objective of the study is to assess the knowledge and attitudes towards the role of community pharmacist among the science students of University of Jaffna and influence of socio demographic and educational factors.

Methodology

It is a descriptive institutional based cross-sectional study design. This study was conducted from July 2018 to April 2019 among Undergraduate science students of third & fourth years in the Faculty of Science, University of Jaffna. There are 793 male and 697 female students with the total of 1480 students studying in three different courses such as Physical science, Bio science and computer science respectively 950, 370 and 160 students. These students represent different districts in Sri Lanka. Among them, 701 students represent third year and fourth year.

Study instrument

A self-administered, validated, and pretested questionnaire was used to collect data. A structured questionnaire was designed as sections A, B and C. Section A was designed to collect the socio demographic factors (Age, Gender, Ethnicity, marital status, place of resident) and educational factors (Course of study, Year of study) of students. Section B and Section C are designed to collect knowledge and attitude of students on role of community pharmacist in health care system. The knowledge section contains 18 statements to assess knowledge components related to community pharmacist: working place, dispensing the Over the Counter Medication and prescription only medication, advice need to be given when dispensing medication and other responsibilities. Section C contain 10 statements to collect the data regarding attitude of students on the role of community pharmacist.

Data analysis

The data were entered in the computer and transferred to SPSS 22 (statistical Package for Social Sciences version 22) and were analysed based on research specific objectives. Descriptive statistics were presented as mean, proportion, and percentage and were presented in tables. Data was analysed to assess the knowledge and attitudes among the science students and assess the influence of socio demographic and educational factors on them using chi-square test.

Each correct response on knowledge was scored with one mark while incorrect response was received zero mark. Total of eighteen marks was given for section B. The mean value was taken as cut off value. The score from 10 to 18 considered as good knowledge and score from 0 to 9 considered as poor knowledge. Student's attitudes towards role of community pharmacist was

assessed using 10 statements and answers obtained from students. All statements of attitudes scale were rated on five-point Likert scale: strongly disagree, disagree, undecided, agree, and strongly agree and scores were given 1,2,3,4, and 5 respectively. Total maximum score is 50. The mean value was taken as cut-off value for student's attitudes towards role of community pharmacist. If the total score is 0 to 30 considered as negative attitudes, and if the total score is 31 to 50 considered as positive attitudes.

Ethical considerations

Ethical clearance was obtained from Ethical Review Committee, Faculty of Medicine, University of Jaffna. Purpose of the study was explained and the informed written consent was obtained from the participants prior to data collection.

Results and discussion

This present study was conducted among 563 students. The respondent rate was 80.3 %. More than half of the students (53.8%) were males and nearly half of the students (50.6%) were under age group of 20-24 years and the mean age of participants was 24.61±0.9 years. Majority of the students (97.5%) were unmarried and most of the students (48.3%) were Sinhalese. Around equal number of students came from urban/city as well as village. Majority of the students (67.7%) were following Physical science and more than half of the students (55.1%) were from 3rd year. A similar study was carried out in Pakistan. In their study, majority of participants were female (62.1%), unmarried (99.2%) and the mean age was 23.93 ±1.3 years (Khaliq *et al.*, 2018).

In this study 59.7% of participants had poor knowledge regarding roles of community pharmacist. 38.2% of students were aware that community pharmacist cannot dispense antibiotics without prescription in this study. Same awareness was observed in the study carried in Taiwan, where 48% of students were aware that (Hsiao *et al.*, 2006). In the present study 69.8% and 75.7% of students were aware regarding advice about side effects and direction of usage of medication that should be given by community pharmacist when dispensing medication respectively. A study was carried out in United States about "increasing client's knowledge of community pharmacist roles". Their results revealed that 60% and 51% of participants were aware regarding advices about side effects and direction of usage of medication which should be given by community pharmacist respectively. (Chewning and Schommer, 1996).

40.3% of participants in the present study were aware that community pharmacist are dispensers. In contrast a study was conducted in South Carolina where they have compared the knowledge between Pharmacy students and Non-Pharmacy students (dental medicine, graduate studies, medicine, nursing and health professions). 95% of pharmacy students and 93% of Non-Pharmacy students were aware about community pharmacist are dispensing medication. Also 67% of pharmacy students and 64% of Non-Pharmacy students were aware that community pharmacist should tell about direction of usage of medication (Vrontos, Kuhn and Brittain, 2011).

In this present study 57.7% of participants had fewer positive attitudes towards the roles of community pharmacist. A study conducted among public in Iraq showed that majority of the respondents (79.8%) had negative attitudes towards the roles of community pharmacist (Ibrahim, Al Tukmagi and Wayyes, 2013). A pilot study which was done in Qatar among public revealed that the respondents had positive attitudes towards the roles of community pharmacist(El Hajj, Salem and Mansoor,

2011). Another study carried out in Canada among patients, showed that there was a good level of general understanding of the community pharmacists' roles(Kelly *et al.*, 2014).

The present study shows that socio-demographic factors age (p=0.004), Gender (p=0.036) and Place of resident (p=0.012)} were associated with the knowledge of

students towards the roles of community pharmacist. In contrast a study which was done on Client's knowledge, revealed that there was no significant difference in knowledge among socio-demographic variables age (p=0.60), Gender (p=0.74) (Chewning and Schommer, 1996). Also, the present study showed that there was no significant difference in knowledge among other socio-demographic factors Ethnicity

(p=0.244) and Marital status (p=0.722). When considering educational factors, the present study showed that only course of

study (p=0.000) was influenced on the knowledge of students towards the roles of community pharmacist.

According to table:2, there was no significant difference (p>0.05) in attitudes among socio-demographic variables (Age, Gender, Ethnicity, Marital status and Place of resident) of participants. Similarly a study which was done in Canada on patient's attitudes revealed that there was no significant difference in attitudes among place of resident (Kelly et al., 2014) . Another study conducted in Saudi Arabia on consumer's attitudes revealed that there was no significant difference in attitudes among gender (Bawazir, 2004). When considering the educational factors, the present study showed that only year of study (p=0.003) was influenced on attitudes of students towards roles of community pharmacist. A study which was done in Saudi Arabia on consumer's attitudes revealed that there was no significant difference in attitude on educational level (Bawazir, 2004).

Table 1: Socio Demographic and educational factors association on Knowledge of students

Factors		Level of knowledge on role of community pharmacist				Statistical test
		Good knowledge		Poor knowledge		
		f(n)	P (%)	f(n)	P (%)	
Age (years)	20-24	98	34.4	187	65.6	X^2 = 8.445 Df =1 P value= 0.004
	25-29	129	46.4	149	53.6	
Gender	Male	110	36.3	193	63.7	X^2= 4.398 Df= 1 P value= 0.036
	Female	117	45.0	143	55.0	
Ethnicity	Sri Lankan Tamil	87	38.8	137	61.2	X^2= 2.824 Df= 2 P value= 0.244
	Sinhalese	118	43.4	154	56.6	
	Sri Lankan Moor	22	32.8	45	67.2	
Marital Status	Married	5	35.7	9	64.3	X^2= 0.127 Df= 1 P value= 0.722
	Unmarried	222	40.4	327	59.6	
Place of resident	Urban/ City	97	35.0	180	65.0	X^2= 6.369 Df= 1 P value= 0.012
	Village	130	45.5	156	54.5	
	4th Year	110	43.5	143	56.5	
Course of Study	**Biological Science**	**73**	**54.0**	**61**	**45.5**	**X^2 = 15.396 Df =2 P value= 0.000**
	Physical Science	134	35.2	247	64.8	
	Computer Science	20	19.4	28	58.3	
Year of Study	3rd Year	117	37.7	193	62.3	X^2= 1.905 Df= 1 P value= 0.168
	4th Year	110	43.5	143	56.5	

Table 2: Socio Demographic and educational factors association on attitude of students

Gender	**Male**	**127**	**41.9**	**176**	**58.1**	**X^2= 0.035 Df= 1 P value= 0.852**
	Female	111	42.7	149	57.3	
Ethnicity	Sri Lankan Tamil	90	40.2	134	59.8	X^2= 0.788 Df= 2 P value= 0.674
	Sinhalese	120	44.1	152	55.9	
	Sri Lankan Moor	28	41.8	39	58.2	
Marital Status	Married	5	35.7	9	64.3	X^2= 0.253 Df= 1 P value= 0.615
	Unmarried	233	42.4	316	57.6	
Place of resident	Urban/ City	108	39.0	169	61.0	X^2= 2.410 Df= 1 P value= 0.121
	Village	130	45.5	156	54.5	
Course of Study	Biological Science	55	41.0	79	59.0	X^2 = 4.140 Df =2 P value= 0.126
	Physical Science	169	44.4	212	55.6	
	Computer Science	14	29.2	34	70.8	
Year of Study	3rd Year	114	36.8	196	63.2	X^2= 8.549 Df= 1 P value= 0.003
	4th Year	124	49.0	129	51.0	

Factors		**Level of attitude on role of community pharmacist**				**Statistical test**
		Positive attitude		**Negative attitude**		
		f(n)	P (%)	f(n)	P (%)	
Age (years)	20-24	111	38.9	174	61.1	X^2 = 2.617 Df =1 P value= 0.106
	25-29	127	45.7	151	54.3	
	Female	111	42.7	149	57.3	

Conclusion

According to this study, it shows that more than half of participants have poor knowledge (59.7%) and negative attitudes (57.7%) towards the role of community pharmacists.

Since there were poor knowledge and negative attitudes towards the roles of community pharmacists among university students, educate the students by conducting awareness programs to get the expanded pharmacy services.

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Paper ID: 321

Prevalence And Association Of Overweight With Major Non-Communicable Diseases Among Elderly People Living In Kesbewa Secretariat Division, Colombo, Sri Lanka

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Abstract:-Non-Communicable diseases (NCDs) have become a major global health problem. Cardiovascular diseases, diabetes mellitus, cancer and chronic respiratory diseases are considered as major NCDs. Those conditions commonly can be seen among elderly populations. Therefore this, community based cross sectional study was conducted among 368 participants over the age of 60 years to determine the prevalence of NCDs and its associated anthropometric measurements among elderly living in Kesbewa secretariat division, Colombo district, Sri Lanka. A representative sample was obtained by multi-stage cluster sampling technique. A pre-tested interviewer administered questionnaire was used and body mass index (BMI), waist hip ratio (WHR) were calculated through the anthropometric measurements. Statistical analysis was done by SPSS 23.0. Among the respondents, 60.9% (n=224) were females and mean age was 69.53±6.147. Out of the total sample 58.1% (n=214) of respondents were suffering from major NCDs. The prevalence of cardiovascular diseases, diabetes mellitus (DM), cancer, chronic respiratory diseases were 19.3%, 40.2% 1.6%, and 12% respectively and 42.4% respondents were suffering from at least one NCD. The results suggested that BMI ($P<0.05$) and WHR ($p<0.05$) are significantly associated with major NCDs. The analysis revealed significant association between DM and overweight ($p<0.05$). There was no significant association between other major NCDs with overweight. The prevalence of NCDs are considerably high and higher BMI & WHR are the major study observation of NCDs among elderly. As the factors are considered as modifiable risk factors, actions should be taken to address at community level to reduce the disease burden associated with NCDs.

KEY WORDS- Non-Communicable Diseases, Prevalence, Overweight, elderly

Introduction: The elderly population is rapidly progressing in worldwide due to declining of fertility rates, lower infant mortality and increasing of survival rates as a result of advancements in medical sector. The aging of the population has become a major discussion point in modern economics and is a major concern on the future growth of the world (Perera, 2017). Non- communicable diseases (NCDs) are considered as one of the major problems which can be highlighted with the increasing of elderly population (Third UN High-level Meeting on Non-Communicable Diseases, 2018). Cardio vascular diseases (CVDs), cancer (CA), chronic respiratory diseases (CRDs) and diabetes mellitus (DM) which are known as major NCDs and are leading causes of mortality in the world (STEPS survey Sri Lanka, 2015). Day by day, NCDs are increasing due to modifiable risk factors,

which are tobacco, harmful use of alcohol, unhealthy dietary habits, insufficient physical activity, overweight/ obesity, raised blood pressure, raised blood sugar and raised cholesterol (WHO, 2018). Therefore this study was carried out to determine the prevalence of NCDs and its association with overweight.

Methodology: This, community based cross sectional study was conducted among 368 participants over the age of 60 years. A representative sample was obtained by multi-stage cluster sampling technique. A pre-tested interviewer administered questionnaire was used and body mass index (BMI) and waist hip ratio (WHR) were calculated through the anthropometric measurements. The questionnaire consisted of 3 sections which were socio-demographic data, physiological and/or biological risk factors and anthropometric measurements. According to BMI value, candidates were classified into four groups depending on the classification of Epidemiological unit in Sri Lanka. Data were analyzed using SPSS version 23.0 and both descriptive statistics and inferential statistics (chi square) were used.

Results: Among the total of 368 respondents, majority was females (n = 224, 60.9%). Mean value of the age of the respondents was 69.53±6.147 years. Out of the total sample, 58.2% (n=214) of respondents were suffering from major NCDs. The prevalence of cardiovascular diseases, diabetes mellitus (DM), cancer, chronic respiratory diseases were 19.3%, 40.2% 1.6%, and 12% respectively and 42.4% respondents were suffering from any NCD. Considering the distribution of weight, if someone's BMI value is above or equal to 23, they were categorized as overweight. Respondents falling to overweight and obese (>27.5) categories considering BMI were considered as "at risk". 22.3% of male respondents and 34.0% of female were fallen in to overweight category. The results suggested that BMI ($P<0.05$) and WHR ($p<0.05$) are significantly associated with major NCDs. The analysis revealed significant association between DM and overweight ($p<0.05$). There was no significant association between other major NCDs with overweight. The research results of "Body mass Index and quality of life among elderly" by Kusumaratna and Hidayat, (2016) had revealed that, 30% male and 42% female are in the overweight category when BMI values considered. Similarly, the findings of this research indicates that females were mostly overweight than male respondents. Moreover the previous study of "Association between BMI and chronic NCDs among the elderly chronic diseases, BMI and elderly" (Lam et al., 2015) have also emphasized the significant association between NCDs and the respondents of overweight BMI which was similar to this study.

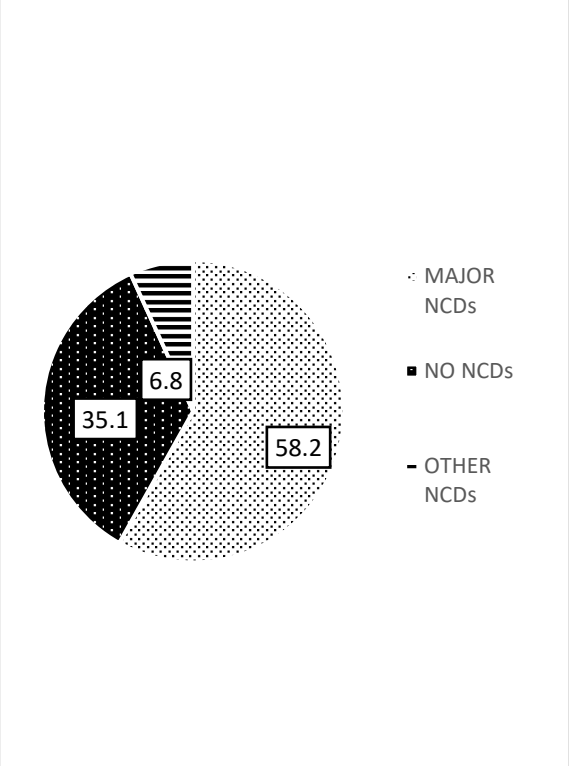

Figure 11 - Reported major NCDs

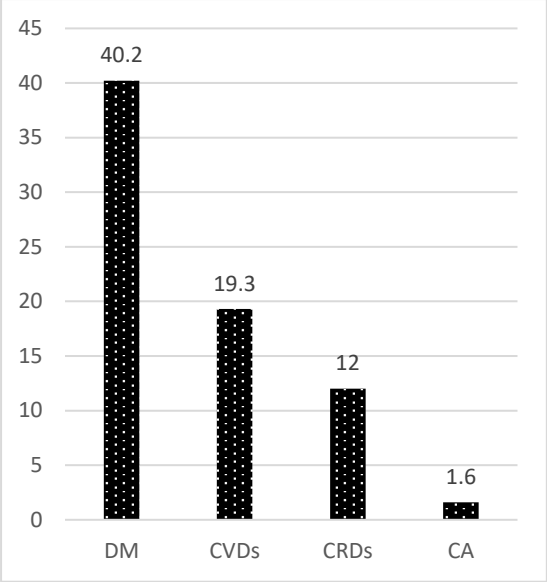

Figure 12 - Major NCDs

Table 9 - Association overweight with Major NCDs

Major NCDs	Frequency	Percentage	P value
CVDs	46	12.5	0.118
DM	93	25.3	0.045
CRDs	27	7.3	0.490
CA	3	0.8	0.745

Conclusion: The prevalence of NCDs are considerably high and higher BMI & WHR are the major study observation of NCDs among elderly. The findings indicate that there is a significant association between diabetic mellitus and overweight while the other major NCDS has no any significant association with overweight BMI. As the factors are considered as modifiable risk factors, actions should be taken to address at community level to reduce the disease burden associated with NCDs.

KEY WORDS- Non-Communicable Diseases, Prevalence, Overweight, elderly

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Paper ID: 342

The association between physical activities and overweight/obesity among adolescent girls in three provincial girls' schools in Piliyandala Educational Zone, Colombo, Sri Lanka.

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Abstract:-Obesity/overweight in adolescents have declared as a risk for non-communicable diseases in late life. The level of physical activity is considered a useful determinant in assessing the risk of overweight/obesity. Thus, this study aimed to determine the association between activity level and overweight/obesity among adolescent girls. A descriptive cross-sectional study was conducted in three selected girls' schools in Piliyandala Educational Zone. A total of 277 participants between 10-19 years, who were willing to maintain a 3-day activity diary were selected by simple random sampling technique. A pre-tested questionnaire was used to obtain demographic data. Results revealed that prevalence of overweight and obesity were 15.2% and 13.7% respectively. About 48.4% were normal weight and 22.7% were underweight. The participants spent <2 hours (49.5%), 2-4 hours (35%),4-6 hours (13%), >6 hours (2.5%) on mobile phone, computer and TV per day while they spent < 2 hours (16.3%), 2-4 hours (32.1%), 4-6 hours (24.2%), >6 hours (27.4%)on education purposes (i.e. tuition /study at home). Around 47.3% participants spent 6-8h/day for sleep. The activity diary showed that 26% of students performed <60 min of exercises 1-3 days/week, while 74 % avoid perform any. In conclusion, risk of obesity/overweight was dominantly seen in the adolescent girls in this study and it was significantly associated with activity level ($p<0.05$). Programmes on activity level modification would be an effective strategy in reducing the prevalence of overweight/obesity in adolescent girls.

Keywords: Obesity, Overweight, Physical activities

Introduction

Increase of overweight (OW) and obesity in adolescents have been identified as a common health problem which cause adverse health outcomes in adulthood, mainly the risk for non-communicable diseases. OW and obesity are defined as abnormal or excessive fat accumulation that may impair health (WHO, 2019).World Health Organization (WHO) defines the adolescents as the age group between 10 to 19 years. According to WHO (2019), the recommended cut off values of anthropometry in girls aged 5-19 years are interpreted as obese (>2SD), over weight (1SD up to 2SD), normal (-2SD up to 1SD), thinness (-3SD up to -2SD) and severe thinness (<-3SD). Adolescents are the rising population of a country, as the hormonal changes with the puberty increases the demand for nutrients. As a result, they are prone to consume more calories for fulfilling their nutritional needs. The American College of Obstetricians and Gynecologists

stated that the prevalence of obesity in female adolescents (12-19 years) continues to increase as they face medical, psychological and reproductive health challenges (ACOG committee opinion, 2017).

The risk factors affecting obesity can be divided as modifiable and non-modifiable risk factors. Among them socio economic status, birth weight, skipping breakfast meal, low fruit and vegetable consumption, high energy intake and level of physical activity were the most probable risk factors affecting obesity in adolescents (Rathnayake, Roopasingam and Wickramasighe, 2014). WHO states that increase of dietary intake and decrease of physical activities may result in obesity in adolescents (WHO, 2018).The journal of Nutritional disorders and therapy of Sri Lanka in 2015, showed that the prevalence of childhood obesity can be reduced by changing dietary practices and maintaining regular physical activity in the early childhood. According to the Annual Health Bulletin Report (2015) by Family Health Bureau (FHB) in Sri Lanka, the life expectancy of Sri Lankan women is 78.6 years and the life expectancy of Sri Lankan men is 72 years. Exploring about prevalence of obesity, OW among adolescent girls will be effective in eradicating the risk factors for non-communicable diseases mainly during child bearing ages of the girls.

Methodology

A descriptive cross-sectional study was conducted from January 2019 to December 2019, to determine the association between physical activities and overweight/obesity among adolescent girls in three selected provincial girls' schools in Piliyandala Educational Zone, Colombo, Sri Lanka.

Three schools were randomly selected from '1 AB' school category named as provincial schools in the Piliyandala Educational Zone.The participants were selected from grades 5, 6, 7, 8, 9, 10, 11, 12 and 13 in each selected school using simple random sampling method. The participants were recruited after obtaining permission from the Zonal Director of Education, Piliyandala Educational Zone, Sri Lanka. The permission for the study was obtained from the principals of selected schools. The lists of students' names were obtained from the school principals of three selected schools. The permission of the class teacher was obtained and the consent from parent/ guardian of the participants was obtained prior to the recruitment. Method of the study was explained to all the participants. The participants were free to ask any question from the investigators at any time during the study. Privacy and confidentiality of the participants were ensured throughout the study, mainly during obtaining anthropometric measurements.

A pilot study was conducted in a selected school in Kurunegala district, Mayurapada Central College, Narammala, Sri Lanka with 45 girls who fulfil similar inclusion and exclusion criteria. A self-administered questionnaire and a 3 day activity diary was used as study instruments. Minor changes were in cooperated to the study instruments according to the results of the pilot study. The data was analysed using SPSS 23.0. version. Crosstab was done to assess the association between risk factors. Level of significance was set as 0.05.The ethical clearance was obtained from the Ethical Review Committee of Faculty of Medicine, General Sir John Kotelawala Defence University (KDU), Sri Lanka.

Results and Discussion

According to the findings, majority of the adolescent girls were Sinhalese 99.6% (n=276) and only 0.4% (n=1) were Muslims. Majority 97%, (n=269) of the participants were Buddhists and 2.2% (n=6) were

Catholics, 0.4% (n=1) were Christians and 0.4 % (n=1) were Islamic respectively. The mean BMI of the participants was 19.94 Kgm^{-2}. Among the participants, 15.2% (n=42) were overweight and 13.7% (n=38) were obese. About 48.4% (n=134) were normal weight and 22.7% (n=63) were underweight (Figure 01). Similar to the findings of the present study another study conducted among adolescent girls in a National School in Batticoloa district showed that the prevalence of obesity and OW were 5.5% and 9.4% among the girls respectively (Karuppiah and Markandu, 2018). Hettiarachchi et al., 2018 revealed that 10.8% of the population was OW or obesity among 14-15 year-old adolescent school children in the Colombo Educational Zone. Further they showed that there was an equal distribution of OW and obesity among males and females (Hettiarachchi et al., 2018).

A native cross-sectional descriptive study among a sample of 1728 students signifying all schools in Colombo educational zone, which was selected using multi stage cluster sampling method, reported that prevalence of OW and obesity among adolescents was 10% and 3.9% (Katulanda et al., 2010). A systematic review and meta-analysis study in Asian countries conducted to estimate the prevalence of OW and obesity in children and adolescents through quantitative data synthesis using 47 studies revealed that the overall prevalence of obesity was 5.8% in Asian children and 8.6% in adolescents. At all they have concluded relevant health authorities should precede actions to prevent obesity and the rate of obesity (Mazidi et al., 2018).

Another descriptive study conducted in a district school of Bangladesh as a part of "Diabetics Awareness and screening program", a surveillance program of Bangladesh Institute of Research and Rehabilitation of Diabetes, endocrine and metabolic disorders at a tertiary hospital among 501 of study participants stated that the prevalence of OW, obesity and central obesity were 23%, 14% and 26% among girls respectively while 14% girls in normal body mass index (BMI) were centrally obese, 46% girls in OW and 54% girls in obese were centrally obese (Zabeen et al., 2015).

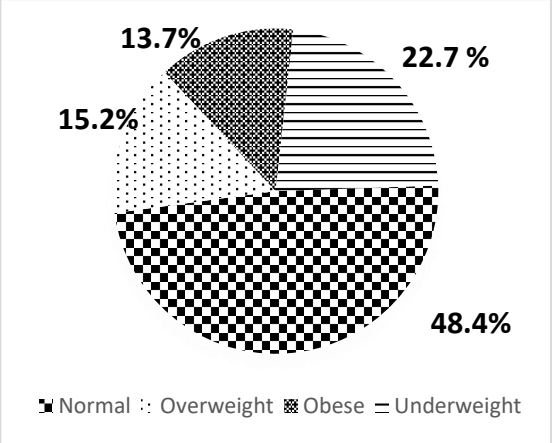

Figure 1 - Prevalence of obesity and OW among participants

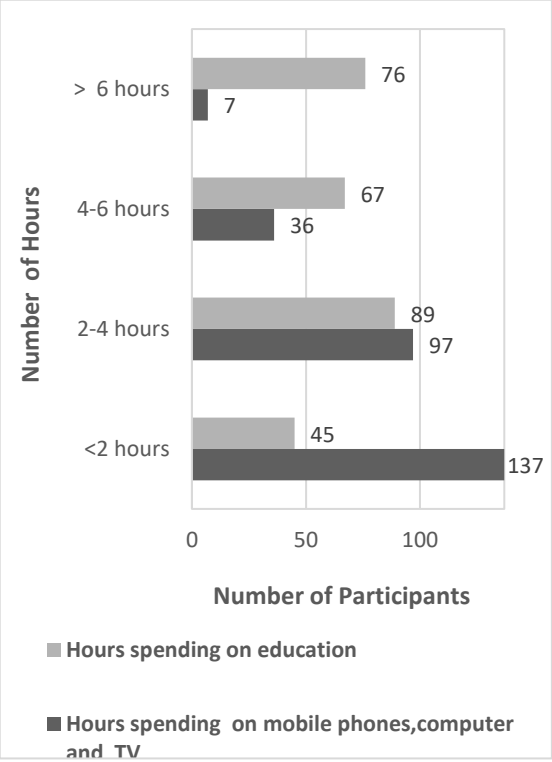

Figure 2 - Hours spending on mobile phones, computer and TV and Education

According to the findings of the activity diary**,** the participants spent <2 hours (49.5%, n=137), 2-4 hours (35%, n=97), 4-6 hours (13%, n=36), >6 hours (2.5%, n=7) on mobile phones, computer and TV per day (Figure 02). As stated by the WHO obesity report in 2017, usage of computer continuously or for 2 hours has been increased from the year 2002 up to 2014 of the girls in the countries of the European continent (Inchley et al, 2017). According to the results obtained, there was a significant association between hours spending on mobile phones, computer, television and their BMI ($p<0.05$). A recent study conducted in India also showed that reduce in physical activity, eating fast foods, watching television, are highly associated with obesity and OW in adolescents (Parimalavalli et al., 2014). The activity diary showed that 26% (n=05) of the students performed <60 min of exercises 1-3 days/week, while 74 % (n=72) avoid perform any.

When the hours spending on sleep was assessed, 47.3% (n=131) of the adolescents sleep for 6-8 hours per day while 28.5% (n=79) of the adolescents sleep for 8-10 hours, and 12.3% (n=34) of the adolescents sleep for 4-6 hours. About 11.9% (n=33) of the total participants spent >10 hours for sleeping. However, there was no significant association noticed between sleeping hours and BMI ($p>0.05$) in the study participants. A cross sectional study conducted among Korean -American children in United States (n=170) revealed that 60% and 88.8% of the participants met recommended hours of sleep on a weekday and a weekend day respectively. Further, they stated that only screen time was positively associated with BMI ($p<0.03$) (Jang et al., 2018). When number of hours spending on education was assessed, it was observed that 16.3% (n=45) of the adolescents engaged in studies for <2 hours. About 32.1% (n=89) of the adolescents engaged in studies for 2-4 hours while 24.2% (n=67) of the adolescents engaged in studies for 4-6 hours. Only 27.4% (n=76) of the adolescents spent < 6 hours for their studies. According to the results of the present study, it was noticed that there was no significant association between, number of hours spending on academic activities with BMI ($p>0.05$).

Moreover, 74% (n=205) of the total study sample did not perform any exercises and only 26% (n=72) of the adolescents reported performing exercises in the present study. However, there was no significant association seen between regular exercises and BMI ($p>0.05$). WHO (2019) stated that changes in activity level can reduce the risk for obesity and OW. Further, it was observed that many study participants in the present study who are obese or OW, had already initiated at least one type of sport at their school. A trial sequential meta-analysis of randomized controlled exercise intervention trials in adolescents' in United states with 5436 citations screened in 971 boys and girls representing 20 studies were included in the study. The exercise sessions were carried out for 46 minutes per session 3 times per week and continued for 13 weeks. The results showed that decrease of BMI by 3.6% ($p< 0.001$) with regular exercises. They also concluded that exercise is associated with improvement in BMI among OW and obese children and adolescents (Kelley et al., 2015).

Conclusion

The prevalence of OW and obesity among adolescent girls, in the present study was observed and it was associated with the level of activities. The responsible authority should take action to prevent adolescent OW and obesity in Piliyandala Educational Zone, Sri Lanka. Early identification of

childhood obesity, will be effective in reducing adolescent obesity.

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Paper ID: 365

Knowledge And Attitude Regarding Adverse Drug Reaction Reporting And Associated Factors Among State Pharmacist In Northern Province, Srilanka

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Abstract – Adverse drug reaction (ADR) is a significant cause of morbidity and mortality worldwide. Reporting of ADRs is considered to be an important step to achieve a safe drug use. Reporting of ADR becomes a part of professional obligation of a pharmacist, as expanding of the role towards patient care rather than the dispensing. This study was conducted to assess the knowledge, attitude regarding ADR reporting and association of socio-demographic and work-related factors among pharmacists working at Public Sector Hospitals in Northern Province, Sri Lanka. It is a descriptive cross-sectional study which was conducted among 76 pharmacists using validated self-administered questionnaire. Descriptive statistics was used to describe the data. Association of socio-demographic and work-related factors on knowledge and attitude was determined by chi-square test and fisher's extract test. Data were analyzed by using SPSS version 23. The response rate of the study was 88.2% (n=67). The mean age of participants was 35.8 ± 9.3 years and most of them were females (71.6%, n=48). Predetermined cut-off value was used as 70 % to determine the level of knowledge and attitude regarding ADR reporting with help of supervisors. Among participants, 65.2% (n=44) of participants had good knowledge about ADRs and 67.2% (n=45) had positive attitude towards ADR reporting. Extra working hours had statistically significant influence on knowledge on ADR (p=0.048) and working experience showed significant influence on the attitude toward ADR reporting (p=0.03). This study revealed that majority of pharmacists had good level of knowledge and positive attitude towards ADR reporting.

Keywords: Adverse drug reaction (ADR), Adverse drug reaction reporting, Pharmacist

Introduction

Adverse drug reaction (ADRs) is a significant cause of morbidity and mortality worldwide. World Health Organization (WHO) has provided the definition of adverse drug reactions as "an ADR is any noxious, unintended and undesired effect of a drug, which occurs at doses used in human prophylaxis, diagnosis, or therapy"(Ahmad *et al.*, 2013). ADRs are associated with prolonged length of hospital stay, increased economic burden and increased death; many studies have reported that ADRs were responsible for large number of hospital admissions. Thus reporting of ADRs is considered to be an important step in maintaining and achieving medication safety. All sectors of the healthcare system would need to be involved in the ADR reporting process. Wherever treatments are being started, there should be an alertness to observe and report unwanted adverse events (both expected and

unexpected)(WHO, 2002). Reporting of ADR becomes a part of professional obligation of a pharmacist, as expanding of the role towards patient care rather than the dispensing of medication. These roles include reporting ADRs, improving patient health, and economic outcomes(Hepler and Strand, 1990; Manley and Carroll, 2002). Since pharmacists directly involve with patients, they are expected to play an important role in providing drug information and reporting of ADRs. Having good knowledge and positive attitude towards ADR reporting could promote spontaneous ADR reporting not only by pharmacist themselves but, also by patients through providing appropriate drug information.

The thalidomide tragedy in the mid twentieth century triggered a chain of activities, which established monitoring schemes based on reporting of suspected ADRs(WHO, 2004a). Most countries developed their national pharmacovigilance system after the thalidomide disaster in 1960s(Reddy *et al.*, 2014). Most developed countries and many developing countries follow spontaneous reporting systems (SRS s) e.g. UK Yellow card scheme for reporting for suspected adverse drug reactions(Herdeiro, Figueiras and Pol, 2006). The SRS receives ADR reports from medical practitioners and other health care professionals, such as pharmacists and nurses(Hazell and Shakir, 2006). The main function of the SRS is detection of signals of new, rare or serious ADRs. ADR spontaneous reporting systems are the basic components for the comprehensive post-marketing surveillance of drug induced risks(Pal *et al.*, 2013). Recently Sri Lanka was being a full-time member of the WHO collaboration center for the ADR monitoring and reporting. Mainly, the major drawback in spontaneous voluntary system used in Sri Lanka is under reporting of suspected drug related problems(Munasinghe, 2002). It is highly depending on attitude and knowledge regarding reporting of ADR. Therefore, the objective of this study was to assess the knowledge and attitude among pharmacist, working in Northern Province, Sri Lanka and association of socio-demographic and work-related factors.

Methodology

The study was an Institutional based descriptive cross-sectional study among the state pharmacist in Northern Province, Sri Lanka. A self-administered questionnaire was used to collect data which included four sections (A, B, C, D). A and B designed to collect the information about socio-demographic and work related factors respectively. Section C and D designed to assess knowledge and attitude regarding ADR reporting respectively. Questionnaire was designed through literature review of the published journals and WHO guideline(WHO, 2004b; Ahmad *et al.*, 2013; Khan, 2013; Suyagh, Farah and Abu Farha, 2015). Questionnaire was validated by circulating it among 3 experts such as senior pharmacist, consultant physician and pharmacologist. Data collection was done after getting the ethical clearance from Ethical Review Committee, Faculty of Medicine, University of Jaffna. Permission for data collection was obtained from Provincial/ Regional Director of Health Services, Director of hospitals and chief pharmacists accordingly. The data collection was conducted over two months. Descriptive statistics was used to describe the data. Association of socio-demographic and work-related factors on knowledge and attitude was determined by chi-square test and fisher's extract test. Data were analyzed by using SPSS version 23 (Statistical package for social sciences version 23).

Results

Socio-demographic factors of participants

Out of the 76 pharmacists, 67 of them were responded with response rate of 88.2%. In this study 71.6% of participants were female and 28.4% were male. The average age of the participants was 35.5 years. 88.1% of them were Sri Lankan Tamil.

Work-related factors of participants

In this study few of them were qualified as B. Pharm or Bsc In pharmacy (10.4%, n=7). Working experience of participants ranged from 5 months to 28 years with the average of 8.4 years. Only 17.9% (n= 12) of participants had participated service training program regarding ADR reporting and 14.9% (n= 10) of them had participated in seminars regarding ADR reporting.

Knowledge level of participants

Among the participants 35.8% (n=24) were able to correctly define the ADR while 11.9% (n=8) of them were unable to define at all. More than half of participants had good knowledge on Incidents which could be reported. However 61.2% (n=41) of participants failed to give correct answer for the location of National pharmacovigilance center. In this study all the participants had awareness of ADR reporting system in Sri Lanka and 97% of them had awareness on availability of structured form for reporting of ADRs. Almost all of participants (n=65, 97%) had good knowledge regarding the information which they need to include while reporting an ADR. Nearly two third of participants (n=44, 65.7%) were stated that the conformation of ADR with particular drug is necessary before reporting. 83.6% (n=56) participants were aware of ADR reporting system in Sri Lanka.

Attitude level of participants

More than half of participants (n=37, 55.2%) had positive attitude towards reporting ADR with their routine duties, while one third of participant (33.3%, n=23) stated, that is time consuming and highly affects their routine duties. Majority of them were not believed that fear of legal liability (n=44, 65.6%) and lack of confidence in discussing ADR with a prescriber (n=36, 53.7%) as a reason them to discourage reporting. Only 16.4% (n=11) were stated that the, ADR reporting is neglected because pharmacists were overloaded with duties due to large number of patients at the clinics. About one tenth of participants (9%) had negative attitudes towards ADR reporting as they feel their reports would not be considered as valuable.

Discussion

Adverse drug reaction reporting plays a major role in pharmacovigilance process, which introduced by World Health Organization in order to assess, detect and prevent unwanted health outcomes related to drugs and other medicine related items. In the present study 38.8% of participants knew the location of National pharmacovigilance center. It was almost similar to the study done in India, in which 30% of them knew the location of pharmacovigilance center(Ahmad *et al.*, 2013). In accordance with the findings of this study all of the participants (100.0%) had awareness of ADR reporting system in Sri Lanka. In contrast, two studies conducted in Kuwait and Saudi Arabia reported very low level of awareness regarding availability of ADR reporting system, where only 7% and 10% of participants were aware of the existence of reporting system respectively(Khan, 2013; Alsaleh *et al.*, 2017). When considering all dimensions of attitude, the present study has found that 67.2% of participants had positive attitude towards ADR reporting. There 65.6% of them were disagreed to the fear of legal liability as a discouraging factor for ADR reporting. But different figures had been reported in studies from Northern China and

Jordan, 93.3% and 59.6% respectively(Su, Ji and Bs, 2010a; Suyagh, Farah and Abu Farha, 2015). Only 16.4% of participants were accepted the work load as factor which leads to consider ADR reporting negligence. This finding is higher with the study done in Saudi Arabia, in which only 6.3% of participants mentioned that they are not report ADR due to their workload(Mauhmoud, Alswaida and Alshammari, 2014). In the present study, few participants (9%) stated that pharmacist will do ADR reporting if there is a reward. Almost Similar figure had been reported in Northern china, in which only 6.9% of pharmacist were suggested fee for ADR reporting(Su, Ji and Bs, 2010b). In the present study majority of participants (89.6%) were diploma holders. In contrast, different situation exist in countries like Saudi Arabia, Norway and Jordan, where 100.0%, 65.7%, 77.9% of the participants were degree holders respectively (Granas et al., 2007; Khan, 2013; Suyagh, Farah and Abu Farha, 2015). This study shows the low involvement of training programs regarding ADR reporting (17.9%) which is lower than the value from a study from neighboring country India, in which 30% of participants were trained for ADR reporting (Ahmad *et al.*, 2013). In this study 14.9% of participants had participated in seminars/ workshops regarding ADR. It is higher than the study conduct in Jordan, in which only 8.2% had participated a workshop regarding ADR reporting (Suyagh, Farah and Abu Farha, 2015). When considering the influence of work-related factors on knowledge, working experience of the participants had not showed statistically significant association with knowledge on ADR reporting (p value= 0.095). Similar figure has been reported in an Ethiopian study(Necho Mulatu, 2014). In contrast same study found a statistically significant association between participation of training program with the knowledge on ADR reporting (p value < 0.05), whereas present study participant's knowledge was not influenced by the participation of service training program regarding ADRs (p value= 0.207). Working experience of participants was influenced on the level of attitude towards ADR reporting among participants (p value= 0.03). Younger participants who recently joined to the pharmacy profession showed a positive attitude when compare with more experienced participants. It may due to the expansion of the scope of pharmacist. Younger participants may realize their responsibility in clinical side as well as patient care. In study conducted in Northern China showed significant association between working experience with attitudes as similar to present study(Su, Ji and Bs, 2010b). However, participation of training programs was not influenced with attitude (p value= 0.162). It is not accordance with the study conducted in Northern China, it revealed a positive influence on attitude with the participation of training programs (p value= 0.03)(Su, Ji and Bs, 2010b).

Conclusion

The finding of the study revealed that, majority (65.7%) of participants had good knowledge on adverse drug reaction reporting (ADR) and 67.2% of participants had positive attitude towards the adverse drug reaction (ADR) reporting. There is correlation between attitudes towards ADR reporting with the work experience, participants who engaged recently to the profession have positive attitude than more experienced participants. Conducting in – service training programs, workshops and seminars will improve pharmacy professional's knowledge and attitude regarding ADR reporting which will subsequently improve the patient safety.

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Effectiveness of an awareness programme on burn prevention and first aid among grade 10 students of type 1 and 2 schools in Kesbewa Divisional area, Piliyandala educational zone, Colombo District, Sri Lanka

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Abstract - Burns are one of the most common household injuries, especially among children. Burn education is a must for reduce the levels of morbidity and mortality rate due to burns. This study was based on one group pretest posttest design and it was carried out to determine the effectiveness of an awareness programme on burn prevention and first aid among grade 10 students of type 1 and 2 schools in Kesbewa area. Stratified random sampling and cluster sampling were used to select schools and participants of the study. A self-administered pretested questionnaire was administered to 321 school children of grade 10, in order to obtain the socio-demographic data and to assess the previous knowledge on burn prevention and first aid. An awareness programme was developed and conducted to all the participants of the study on key factors regarding burn prevention and first aid for burns. Students answered the same self-administered questionnaire after seven days of awareness programme. There were 188 (59%) males and 133 (41%) females. According to the paired sample t test results, the average knowledge score of burn prevention before the awareness programme was 79.25 and after the awareness programme it was 91.43. Mean difference of marks was 12.18. Similarly, the mean difference between pre and post-test scores on first aid was 23.09. The average mark of the students after the awareness programme is significantly different from the average mark before the awareness programme ($p < 0.05$). This study demonstrated that the awareness programme on burn prevention and first aid was effective for improving knowledge of grade 10 students in Kesbewa area. It is suggested to use this awareness programme further as an effective strategy to increase the awareness of school children on burn prevention and first aid for burns.

Key words - Burns, Prevention of burns, First aid, Awareness programme

Introduction

A burn is defined as an injury to the skin or other organic tissue caused by thermal trauma. It occurs when some or all the cells in the skin or other tissues are destroyed by hot liquids, hot solids or flames. Injuries to the skin or other organic tissues due to radiation, radioactivity, electricity, friction or contact with chemicals are also considered as burns (WHO, 2018). Children are naturally curious. They encounter objects that can cause severe injuries. Playing with fire or touching hot objects can result in burns. This is a debilitating condition accompanied by intense pain and often by long term illness that creates suffering not only for the child but for the wider family and community. The rate of child deaths from burns is currently over

seven times higher in low and middle-income countries than in high-income countries (WHO, 2018). Children are at high risk for death from burns, with a global rate of 3.9 deaths per 100,000 populations (WHO, 2008). Majority of burns occur in low and middle-income countries due to lack of knowledge regarding prevention strategies and lack of improvements in the care of people affected by burns. Sri Lanka has a high incidence of burn-related injuries annually due to a combination of adverse social, economic and cultural factors. The management of burn injuries remains a formidable public health problem (Lau, 2006). Burns are the fifth most common cause of non-fatal childhood injuries in Sri Lanka (Kumarapeli, 2010). Burn education is a must to reduce the levels of morbidity and mortality rate due to burns. The aim of the study was to determine the effectiveness of an awareness programme on burn prevention and first aid for burns among grade 10 students of type 1 and 2 schools in Kesbewa area.

Methodology

The study was based on one group pretest posttest design and it was conducted in six selected schools. The sample size was 321, assuming a prevalence knowledge regarding burn prevention and first aid for burns of 50% among participants, for a precision of 0.05 and a confidence level of 95%. Stratified random sampling and cluster sampling methods used to select schools and participants of the study. The previous knowledge on burn prevention and first aid methods were assessed initially using a pre-tested self-administered questionnaire which consisted of 4 parts. Part I was about the socio-demographic details of students, Part II comprised of past personal burn injuries and sources of getting knowledge, Part III consisted of 26 knowledge questions on burn prevention and Part IV consisted of 13 questions on burn first aid methods. The awareness programme, which was a PowerPoint presentation regarding the burns, burn causes, burn types according to depth, knowledge on burn prevention and first aid was conducted by the investigators on the same day of pre- test. Following a week of awareness programme, the post-test was conducted. Descriptive frequencies were used to describe the student's knowledge of burn prevention and first aid treatment. Paired sample t tests were conducted to determine the effectiveness of the programme. Ethical clearance was obtained from the Ethical Review Committee of the Faculty of Medicine, General Sir John Kotelawala Defence University, Rathmalana. Parents of the participant were given an information sheet and a consent form to ensure voluntary participation of their child. Assent forms were administered to the students to ensure voluntary participation.

Results and Discussion

A total of 321 grade 10 students were participated in this study. There were 188 (58.6%) boys and 133 (41.4%) girls. Out of 321 students, 197 (61%) have faced burn injury previously and 19 (6%) of them were admitted to the hospital for further treatments. Furthermore, 114 (36%) participants were in the opinion of “washing the burn area under clean running water” is the first action taken after the burn injury. 86 (27%) participants were applied various applicants like butter, toothpaste, aloe vera and egg etc to the burn area. Considering the causes associated with the reported burn injuries, more than 75% of burns were due to the contact of hot liquid and hot objects whereas, chemical and corrosive agents were the least common cause of burns. (Figure 1).

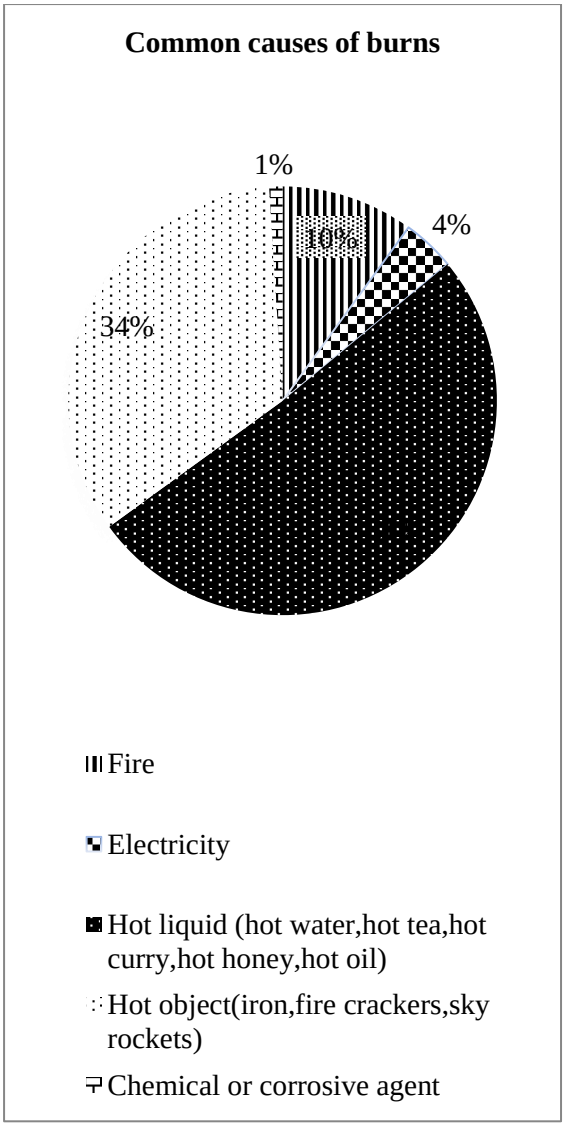

Figure 1 - Common causes of burns

The knowledge on burn prevention was assessed by Part III of the questionnaire and it revealed that more than 80% of the students knew that they should not touch the iron, kettles and heaters just after use, handle hot liquid after ensuring the little siblings are not around before the awareness programme and even after the awareness programme it was further increased. Regarding the first aid on burns, 237 (73.8%) students had knowledge regarding stop, drop and roll when their clothes catch fire before the awareness programme, and it was increased up to 293 (91.3%) students after the awareness programme in our study. More than 50% students did not know to apply clean running water if burn was happened before the awareness programme and 92% students were accepted it after the awareness programme. This finding is in keeping with data from a burn prevention programme carried out in Jamshedphur, India, where a sustained education programme found an increase in the use of water to cool burns from 37.8% of the study population in 1993 to 75% in 1996. The students were more likely to use raw eggs, toothpaste or herbs to burn wounds before awareness programme, but it was reduced less than 5% after the awareness programme. Sunder and Bharat, 1998 have shown that 122 (38.01%) students were more frequent to accept toothpaste as an applicant to burn wounds before the awareness programme and it was reduced 16 (4.98%) students after the awareness programme. A study done in Zaria regarding burn prevention and first aid knowledge among adolescents found that 22% of the participants had previous knowledge on burn prevention and first aid and the sources of knowledge in those who had previous information were school (43.2%), family members (20%), television (7.46%) and radio (6.57%) (Ibrahim, Asuku and Dahiru, 2014) whereas in the current study, 209 (65%) students have heard about burn prevention and first aid and the sources of getting knowledge were family members 36.8%, school 29.3%, mass media 6.9% and friends 3.7%.

As per the study design students 'knowledge was tested by 26 questions on burn prevention and 13 questions on first aid before the awareness programme as the pre-test. The post test conducted seven days after the awareness programme. The total knowledge score calculated by adding burn prevention score and first aid score together. The results are shown in Table 1.

Table 1 - Knowledge scores on burn prevention and first aid before and after the awareness programme

Variable	N	Pre-test		Post-test		t	Sig.(2-tailed)
		Mean	Standard Deviation	Mean	Standard Deviation		
Burn Prevention Knowledge	321	79.25	16.42	91.43	10.43	-15.421	0.001
First Aid Knowledge	321	56.94	19.88	80.02	15.89	-22.214	0.001
Total Knowledge Score	321	72.02	15.32	87.66	10.98	-21.570	0.001

According to the results the average knowledge score of burn prevention before the awareness programme was 79.25 and after the awareness programme it was 91.43. Mean difference of marks was 12.18. Similarly, the mean difference between pre and post-test scores on first aid was 23.09, which is again showing that the knowledge has improved. Since, all the dependent variables were in ratio scale and according to the normality tests, they were normally distributed, several paired sample t-tests conducted to examine the differences between the pre and post measured variables.

The study, due to the means of the pretest and posttest, and the direction of the t-value, we concluded that there was a statistically significant improvement in total marks regarding burn prevention and first aid following the awareness programme from 72.02+15.32 to 87.67+10.98 ($p < 0.05$), an improvement of 15.65+13.00 with positive correlation.

A similar study shows that, culturally sensitive burn prevention teaching tool, consisting of a magnetic storyboard, was used to teach burn safety to Amish children. The teacher told stories and arranged the magnets on the storyboard to show burn hazards and the children were challenged to rearrange the pieces for a safer situation. The mean pretest score was 62 and the mean posttest score was 83. This pilot study evaluated that the burn prevention teaching tool was effective for improving knowledge among Amish children (Rieman and Kagan, 2012). Another study in a two-county community among school children was developed two burn and fire prevention games. Before playing each game, the participants completed a multiple choice pretest and a similar posttest was administered after gaming to determine mastery and retention of knowledge. 67% of the surveys rated the child's interest in the games as excellent, whereas 33% rated it as good and results concluded that burn and fire prevention games were a successful strategy for burn and fire education among school children (Mondozzi and Harper, 2001).

Conclusion

This study demonstrates that knowledge deficits exist in burn prevention and first aid knowledge among grade 10 students in Kesbewa educational zone. The use of visual media is suggested as an effective maneuver to increase awareness. By using visual media we can intervene to change and teach life saving strategies regarding burn prevention and first aid. By assessing the development of interactive burn safety awareness programme, the students can help reduce injuries themselves and their siblings. Considering the current study, there is significant room for improvement of burn prevention and first aid knowledge among grade 10 school children.

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Knowledge and Awareness regarding Human Papilloma Virus (HPV) infection and vaccination among adolescents aged 14 – 16 years in selected mixed Government Schools in Kesbewa Educational Division, Sri Lanka.

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Abstract:-Human Papilloma Virus (HPV) is the most prevalent sexually transmitted infection worldwide. It causes cervical cancer which is the second most common cancer type among Sri Lankan women. HPV vaccine has been introduced for early adolescents in preventing HPV. Adequate knowledge and awareness regarding HPV and vaccine is effective in successful prevention. The objective of this study was to assess the knowledge and awareness regarding HPV infection and vaccination among adolescents aged 14-16 years studied in selected mixed government schools in Kesbewa Educational Division, Sri Lanka. A descriptive cross-sectional study was conducted among randomly selected 450 male and female adolescents aged 14-16 years studied in selected mixed government schools in Kesbewa Educational Division using a pre tested self-administered questionnaire. Results portrayed that, only 139(30.89%) participants had heard of HPV infection before the study. Among them 113(81.3%) had overall poor knowledge regarding HPV infection. The mean knowledge score was 6.01±4.332 with the range of 0-18. Out of all participants, only 137(30.4%) had heard of HPV vaccine before the study and 117(85.4%) of them had overall poor awareness on HPV vaccination. The mean awareness score was 3.12±2.997 with the range of 0-11. Adolescents' knowledge and awareness on HPV infection and vaccination was statistically significant with parents' occupation (p=0.000 95%CI). The study concluded that the majority of adolescents had overall poor knowledge and awareness regarding HPV infection and vaccination. It is necessary to implement well-designed, systematic health education interventions to enhance knowledge and awareness regarding HPV infection and vaccination among adolescents.

Key Words: Knowledge, awareness, HPV infection, HPV vaccination, cervical cancer.

Introduction

Human Papilloma Virus (HPV) is the most prevalent sexually transmitted infection worldwide, affecting more than 6.2 million individuals every year (Bosch et al., 2002). It causes cervical cancer which is the second most common cancer type among Sri Lankan women. More than 90% of cervical cancer among women in Asia and more than 99% of cervical cancers among Sri Lankan women are caused by HPV (WHO,2013). It also recognized as the causative agent for other cancer types such as anal, vulva, penile, vaginal and oropharyngeal cancers (Giuliano et al., 2014). This virus is transmitted via sexual contact where sexual behavior is the main factor associated with

high rates of acquisition of HPV infection among sexually active women. Furthermore, genital HPV infection is acquired by direct skin contact during sexual intercourse with a person who has either clinical or subclinical infection (Harper et al., 2004). Recognition of the role of HPV in cervical cancer has stimulated a search for preventive vaccines with the hope and an option of controlling of cervical cancer worldwide. Thus, HPV vaccine which is introduced in preventing HPV infection has been introduced in many countries including Sri Lanka for early adolescent population as the risk of invading HPV and other related infections are increasing in that age group (WHO,2017). Therefore, adequate knowledge and awareness of HPV infection, vaccine and the vaccination process are effective for this programme to be a success.

Objectives

To assess knowledge and awareness regarding HPV infection and vaccination among adolescents aged 14-16 years, studying in selected mixed government schools in Kesbewa Educational Division.

Material and Methods

A descriptive cross-sectional study was conducted among 450 male and female adolescents aged 14-16 years studying in selected mixed government schools in Kesbewa Educational Division. Data was collected using a pre-tested self-administered questionnaire from 4th of June to13th of September 2019. Three mixed schools were randomly selected by including one from each school category named as Type 1 AB, Type C and Type 2. Stratified random sampling method was performed to collect a representative sample of adolescents. Adolescents from each school were selected proportionately to the total sample size. Out of them, number of male and female adolescents from each selected school were selected proportionately to the total number of male and female students in the respective grade. A number of representatives from each grade of 9, 10 and 11 were selected proportionately to the total number of students in each grade in the particular school. A single representative from each grade was selected by using a systematic random sampling method with a sampling interval of 3. Data was entered and analyzed using SPSS version 23.

Descriptive statistics (frequency, percentage tables) and Chi square test were used for the analysis. Statistical significance level was considered 95% of Confidence Interval (CI). All socio demographical data, knowledge and awareness on HPV as well as associations of socio demographic factors with HPV infection and vaccination were presented using tables and graphs.

A scoring system was developed to allocate a score for each response of the close ended questionnaire which was developed on the knowledge and awareness on HPV infection and vaccination among adolescents with responses as in order to categorize their knowledge level and awareness level. The total score received to knowledge level and awareness level was calculated separately. Based on the score received for each component, overall categorization was done in two levels of knowledge and awareness using an approved category namely “poor and good” (Bowyer et al., 2012).

Ethical approval was obtained from the Ethics Review Committee (ERC) of the Faculty of Medicine, General Sir John Kotelawala Defence University, Rathmalana. Permission was also obtained from the Zonal Director of Piliyandala Zonal Educational Office and principals of relevant schools through the Zonal Director to conduct the study. Every participants were

given an information sheet with consent form to ensure the voluntary participation.

Results and Discussion

The study sample consisted of 450 adolescents aged 14-16 years from three different schools in Kesbewa Educational Division as 90 (20%) from type 1AB, 90 (20%) from type 2 and 270 (60%) students from type 1C schools. Majority of respondents were male adolescents (60%, n=270) and 33.33% (n=150) of students were enrolled from each grade. All the participants were Sinhalese with a majority of Buddhist (98%, n=441). Majority of parents, were non health care workers (97.1%, n=437). The most common educational level of adolescents' fathers and mothers was up to O/L (54.9%, n=247 and 61.3%, n=276 respectively).

Out of the total respondents (n=450), only 139 (30.89%) had heard of HPV infection prior commencing the study. Among them the majority (81.3%, n=113) had poor overall knowledge regarding HPV infection. The mean knowledge score was (6.01± 4.332) with a range of 0-18. And also, adolescents' knowledge on carcinogenic association of HPV with gender, mode of transmission, consequences related to HPV infection, risk factors and preventive measures was also not at a satisfactory level. Similar studies conducted in Sweden, Hungary and Greece had reported respectively, 5.4%, 35% and 42.8% of adolescents had heard of HPV infection before commencing the study (Hoglund et al., 2009; Marek et al., 2011 and Vaidakis et al., 2017). Contrary to the above findings, Sopracordevole et al. (2012), Gerend and Magloire (2008) and Kasymova, Harrison and Pascal (2019) had reported that the awareness of HPV infection was relatively good among the study participants with the majority of 75%, 78% and 95.3% adolescents had heard of HPV infection prior to the study.

Out of the total study participants (n=450), only 137 (30.4%) had heard of HPV vaccine before conducting the study. Of them 22.7% had obtained awareness through mass media. However, the majority (85.4%, n=117) had poor overall awareness on HPV vaccination. The mean awareness score was (3.12 ± 2.997) with a range of 0-11. They also had an inadequate awareness of HPV vaccination procedure practicing in Sri Lanka. Participants' willingness for receiving education on HPV and receiving vaccination against HPV was also assessed. However, the majority (63.6%, n=286) of adolescents interested in HPV education while the minority (25.8%, n=116) interested in receiving HPV vaccine. Similar studies conducted in Sweden and Italy reported that awareness on HPV vaccine before conducting the study was 1.1% and 42% respectively. (Hoglund et al., 2009; Di Giuseppe et al., 2008). In contrast, Sopracordevole et al. (2012) noted that 94.4 %of girls and 71.3% of boys had heard of HPV vaccine prior to the study and Blodt et al. (2011) also indicated a good awareness of HPV vaccine where 96.5% of females and 78.8% males had heard on HPV vaccine before the study. Accordingly, their main source of information was reported as public media (Gerend and Magloire, 2008), school health promotion campaigns and school health services (Patel et al., 2016; Marek et al., 2011) and health care providers (Kasymova, Harrison and Pascal, 2008).

A statistically significant association was observed between adolescents' knowledge on HPV infection and vaccination with the occupation of the parents (p=0.000, 95% CI). Also, grades in which adolescents studied was significantly associated with their awareness on HPV vaccination (p=0.014, 95% CI). In parallel to the current study, gender of the adolescents was also

statistically significant with knowledge regarding HPV infection. Accordingly, females possess higher knowledge than men (Gerend and Magloire, 2008; Marek et al., 2016; Patel et al., 2009 and Blodt et al., 2011). Furthermore, Kasymova, Harrison and Pascal (2019) had reported that both male and female gender (p=0.005, 95% CI) and race (p=0.004, 95% CI) were statistically significant with knowledge and awareness regarding HPV infection and vaccination. Vaidakis et al. (2017) stated that both gender (p=001, 95% CI) and area of resident (p=0.001, 95% CI) showed a statistically significant with knowledge about HPV infection and vaccination where male adolescents from rural areas were less likely to know about the vaccine than girls and adolescent from urban area.

Conclusion

As per the finding of the current study, only a small proportion of adolescents included in the study had heard of HPV infection and vaccination prior to commencing the study. Of them the majority had overall poor knowledge and awareness of the carcinogenic association of HPV infection with gender, modes of transmission, consequences related to HPV infection, risk factors, high risk sexual behaviors, importance of regular screening, preventive measures, precautions after vaccinations, and current vaccination procedure against HPV infection in Sri Lanka.

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Comparative in vitro bioequivalence evaluation of atenolol tablets available in Sri Lanka

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Abstract: The availability of multiple brands for a single drug places health professionals and patients in a dilemma of drug substitution. Hence, evaluating bioequivalence of different brands compared to respective innovator drug is a timely need. This study was performed to compare the in vitro bioequivalence of commercially available brands of atenolol 50 mg tablets in the Sri Lankan market. Four different brands of atenolol 50 mg tablets (A1 – A4) and the innovator drug (A5) were selected for the study. All the tablets were tested for organoleptic properties, uniformity of weight, thickness and diameter, hardness, friability, assay percentage and dissolution. To evaluate in vitro bioequivalence of the selected drugs, their dissolution profiles were compared with the innovator drug using calculated fit factors (difference and similarity factors) and dissolution efficiencies of respective brands. The results of organoleptic properties of all the tested tablets showed no sign of defects. Tablets' thickness, diameter and hardness complied with the general standards. All the tested tablets complied with the British Pharmacopoeial (BP) standards for uniformity of weight, friability, assay percentage and dissolution. Tablets; A1-A4 had similarity factors above 50 and the difference factors below 15 revealing that their dissolution profiles are similar to the innovator product. According to the dissolution efficiency calculations, only A1, A2, and A3 of the selected brands of atenolol 50 mg tablets were similar with the innovator. Hence, the brands; A1, A2 and A3 could be regarded as bioequivalent thus expected to produce similar therapeutic effects.

Keywords: Bioequivalence, Atenolol, Tablets, in vitro

Introduction

Availability of several brands of a drug places health practitioners and patients in problematic situations like which one to be selected or is it possible to substitute with another brand.(Tamader, Y. E.; Mosbah, A. E. M.; Redab, 2016) New brands of the same drug from multiple sources are coming to the market time to time. Additionally, a number of undesirable clinical responses have also been reported as a result of batch-batch inconsistencies.(Thambavita et al., 2018) So, it is essential to monitor the quality of pharmaceutical products regularly.

Antihypertensive drugs are one of the drug categories that large extent of different brands are available in the market with significant price variations.(Kumar et al., 2015) Therefore, it is essential to compare and evaluate the bioequivalence of such drugs. Based on the wide usage, availability of several brands and price variations, atenolol tablets were selected for this study.

In vivo bioequivalence studies are time consuming, difficult and very expensive. Therefore, in vitro bioequivalence studies are established to check the bioequivalence among generics and brands. According to the Biopharmaceutics Classification System

(BCS), atenolol can be categorized as a class III drug substance.(Guidance for Industry Dissolution Testing of Immediate Release Solid Oral Dosage Forms, 1997) In class III, in vitro – in vivo correlation can be expected only for rapidly dissolving drug substances. Atenolol is regarded as a rapidly dissolving drug, therefore in vitro bioequivalence studies through dissolution profiles can be applied in order to waive in vivo bioequivalence studies.

Materials and Methodology

The five brands of atenolol 50 mg tablets (coded as A1, A2, A3, A4 and A5) were used for the study. A5 was the reference drug.

Following tests were performed for all the tablets,

- visual observations for organoleptic properties
- test for thickness and diameter
- test for uniformity of weight
- hardness test
- friability test
- assay percentages
- dissolution test

Dissolution profiles were compared using fit factors (f1 & f2) and dissolution efficiency (DE) to evaluate in vitro bioequivalence of the selected drugs. Equations for f2, f1 and DE calculations are given below (Equation 1, 2 and 3)

Equation 1

$$f_2 = 50log\left\{\left[1+\frac{1}{n}\sum_{t=1}^{n}(R_t-T_t)^2\right]^{-0.5}\times 100\right\}$$

Equation 2

$$f_1 = \left\{\frac{\sum_{t=1}^{n}|R_t-T_t|}{\sum_{t=1}^{n}R_t}\right\}\times 100$$

Equation 3

$$DE = \frac{\int_{t_1}^{t_2} y.dt}{y_{100}\times(t_2-t_1)}\times 100$$

Results and Discussion

The visual inspection for colour, shape and surface texture of all the atenolol 50 mg tablets showed no sign of defects.

The physicochemical parameters of the tested atenolol 50 mg tablets are listed in Table 1.

Table 1: Evaluated physicochemical parameters of atenolol 50 mg tablets

Tested brands	Mean DE (%) with CIS	DE	CIS
A_1	77.74 (81.44 – 74.04)	-4.95	1.37
A_2	72.90 (75.27 – 70.53)	-0.11	4.88
A_3	76.51 (82.28 – 70.75)	-3.72	4.66
A_4	70.88 (80.80 – 60.96)	1.91	14.45
A_5	72.79 (75.41 – 70.17)	0.0	0

Mean DE is the mean value of dissolution efficiencies calculated for each of the 6 vessels of the dissolution apparatus.

DE = DE of innovator – DE of test brand

CIS = 95% Confidence Intervals

CIS = maximum possible mean DE value of innovator - minimum possible mean

DE value of test brand

This study shows that the price variation of the tablets tested may not be due to the quality of the product. However, the quality of ingredients, excipients and packaging materials in all these tablet formulas may not be the same. Therefore, stability and side effect profiles may vary. Even though some drugs comply with all routine quality control

tests and BP specifications, they may fail in bioequivalence studies.

Conclusion

The conventional quality control tests performed in this study indicated that all the selected brands of atenolol 50 mg tablets are chemically and pharmaceutically equivalent to the innovator brand. However, according to the in vitro bioequivalence studies, only A1, A2 and A3 are similar with its innovator drug; therefore bioequivalent.

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Parental Feeding Styles Of Preschoolers In A Semi-Urban Setting In Kurunegala District

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Abstract: Parental feeding style influences the nutritional status, growth, development, health and survival of preschool children. The objective of this study was to describe the parental feeding styles in selected preschools in a semi-urban setting in Sri Lankan context. A descriptive cross-sectional study was conducted among randomly selected 306 parent-preschooler pairs in selected preschools in Ibbagamuwa Divisional Secretariat in Kurunegala district. Validated, interviewer administered, 27-item, Parental Feeding Style Questionnaire (PFSQ) on a five point Likert scale was used to assess four common feeding styles: Encouragement to Eat (EE), Control over Eating (CE), Emotional Feeding (EF) and Instrumental Feeding (IF). Mean scores were calculated for each scale which had a possible range between 1-5 with higher scores indicating a tendency for a particular feeding style. All data were analyzed using SPSS version 25. The mean age of the parents was 34.86 years (SD=4.93). The majority were mothers (N=250, 81.7%) educated up to Ordinary Level (N=117, 38.2%) with an average monthly income between Rs.30, 000-50,000 (N=133, 43.5%). The mean age was 58.06 months (SD=7.62). Majority were girls (N=164, 53.6%) with normal weight for height (50.0%, N=153). Mean scores for each feeding style were EE: 4.25 (SD=0.55), CE: 3.2 (SD=0.61), EF: 2.76 (SD=0.92) and IF: 2.35 (SD=0.78). Prominent parental feeding styles were Encouragement to Eat and Control over Eating. No gender differences were observed in parental feeding styles.

Keywords: Parental feeding styles, Preschool children, Parental Feeding Style Questionnaire (PFSQ)

Introduction

Feeding is a process that involves interactions between parents and children. It is a key aspect in parenting. Parental feeding practices are specific behavioural strategies that parents use to control what, how much and when their children eat (Gandhi., 2014). Parental feeding practices are mainly categorized into two domains as positive and negative feeding styles. Parental feeding style is a major determinant of child eating behaviours (Nowicka et al., 2020). Future health depends on behaviours adapted during childhood. Preschool period, defined as the age between three to five years (Dias et al., 2020), is regarded as an important stage in the life cycle during which establishment of such behaviours starts. Globally, overweight and obesity among children are on the rise. In addition, those with childhood obesity have an increased risk of diet related non-communicable diseases such as, cardiovascular diseases, cancer and diabetes mellitus during their adult life (Jansen et al., 2012). Sri Lanka is having a very high disease burden due to diet related non-communicable diseases (WHO, 2018). The effect of parental feeding styles on children's eating behaviours is not being adequately explored in the Sri

Lankan context. The objective of the study is to describe the parental feeding styles among preschoolers in Sri Lanka.

Methodology

A descriptive cross-sectional study was conducted among 306 parent child pairs selected using a multi-stage cluster sampling method from 15 preschools in Ibbagamuwa divisional secretariat in Kurunegala district during September to October in 2019. Children aged 3-5 years in each preschool were included into the study. Exclusion criteria included children who were on long term treatment for chronic diseases (recurrent episodes of bronchial asthma, thalassemia, malignancies), identified with learning difficulties and physical disabilities and 0parents with communication barriers (ie. hearing problems, psychiatric conditions and language barriers). An interviewer-administered questionnaire consisting of both open and closed ended questions was used as the data collection instrument to obtain basic data regarding socio-demographic characteristics and parental feeding styles. Four common parental feeding styles assessed by 27-item, validated Parental Feeding Style Questionnaire (PFSQ) included: Instrumental Feeding (4 items) (feeding children in response to their behaviour, using

Food as a reward, e.g., "I reward my child with something to eat when she is well-behaved"), Emotional

feeding (5 items) (feeding children in response to their emotions, offering food to soothe the child's negative emotions, e.g., "I give my child something to eat to make him feel better when he is upset"), Encouragement to eat (8 items) (encouraging children to consume a variety of foods, e.g., "I praise my child if she eats what I give her"), and Control over eating (10 items) (controlling the child's food intake, determining the types and quantities of foods that children should consume, e.g., "I decide how many snacks my child should have") (Lipowska et al., 2018). Each item was scored on a five-point Likert scale (1 for Never and 5 for Always). The mean score with SD was calculated for each scale. Five out of ten items in Control over Eating were reverse scored before calculating the mean. The possible range for mean score on each scale was 1-5. Height and weight were measured according to standard operational protocol of National Health and Nutrition Examination Survey (NHANES., 2017). Children were categorized into 3 weight for height Z score categories based on WHO child growth standards (WHO, n.d.)

Prior to commencement of the study, approval was obtained from the Ethics Review Committee of the Faculty of Medical Sciences, University of Sri Jayewardenepura and from Divisional Secretariat of Ibbagamuwa and relevant preschool teachers. All data were analyzed using SPSS version 25. Descriptive statistics like frequencies, proportions, mean (SD) and box and whiskers plots were used to describe the findings of the study.

Results and Discussion

There were 306 parents and child pairs. Majority of the parents were mothers (N=250, 81.7%). The mean age of the parents was 34.86 (SD + 4.938) and most of them were Sinhalese (N=302, 98.7%), studied up to Ordinary Level (N=117, 38.2%) with an average monthly income between Rs.30, 000-50,000 (N=133, 43.5). The mean age of the preschool children was 58.06 months (SD =7.619). Most of the preschoolers were girls (N=164, 53.6%). Fifty percent of the preschoolers (N = 153) belonged to healthy weight for height. Nearly half (49.0%, N = 150) of the children were in < -2SD.

Distribution of PFSQ mean scores according to the parental feeding style is shown in Table 1. Parental feeding style which recorded the highest score was Encouragement to Eat (M = 4.25, SD=0.554). Based on the PFSQ mean scores, most parents reported a comparatively

high level of Encouragement to Eat (M = 4.25, SD=0.554) and Control over Eating (M = 3.20, SD=0.611), with low levels of Emotional Feeding (M = 2.76, SD=0.915) and Instrumental Feeding (M = 2.35, SD=0.782). Our study findings are compatible with the literature on caregiver feeding practices in Sri Lanka reporting unsatisfactory knowledge, attitudes and practices on responsive feeding (Pallewaththa et al., 2019)

Table 1: Distribution of PFSQ mean scores according to the parental feeding style

Feeding scale*	Number of Items	Mean (*SD*)
Encouragement to Eat (EE)	8	4.25 (0.55)
Control over Eating (CE)	10	3.20 (0.61)
Emotional Feeding (EF)	5	2.76 (0.92)
Instrumental Feeding (IF)	4	2.35 (0.78)

*The possible minimum and maximum mean score for each scale is 1-5

Similar to our study findings, two studies conducted among Hong Kong preschoolers using PFSQ revealed that parents were more likely to exercise Control over Eating and Encouragement to Eat compared to other two feeding styles considered in our study (Tam et al., 2014; Lo et al., 2015). Another study carried out among young children in Netherlands had reported comparable results (Inhulsen et al., 2017). However, in contrast to findings of our study where the highest score was reported by Encouragement to Eat, other studies have reported highest score in Control over Eating (Tam et al., 2014; Lo et al., 2015; Inhulsen et al., 2017). Our study showed Instrumental Feeding as the least common parental feeding style in par with the findings of Tam et al (2014). According to the findings of Lo et al (2015) and Inhulsen et al (2017) Emotional Feeding had the lowest tendency to be implemented.

Distribution of PFSQ scores by parental gender is shown in Figure 1. Accordingly, no remarkable differences in feeding styles could be observed based on gender of the parent.

Figure 2 displays the distribution of PFSQ scores by gender of the preschoolers. Visually obvious differences in parental feeding styles based on gender of the child could not be detected.

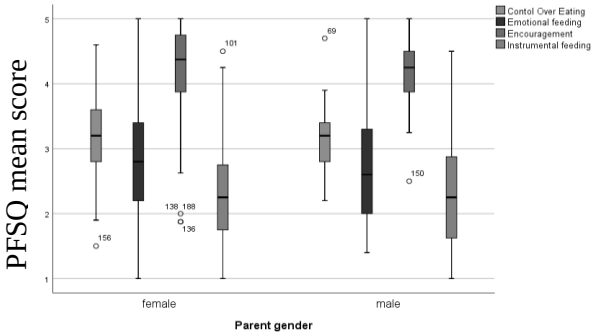

Figure 1: Distribution of PFSQ scores by parental gender

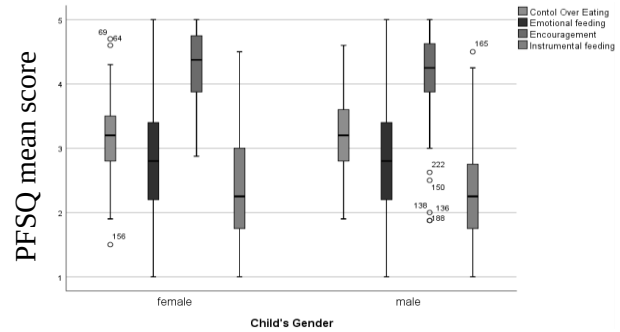

Figure2: Distribution of PFSQ scores by gender of the preschoolers

Conclusion

This study findings revealed existence of comparatively high level of Control over Eating and Encouragement to Eat parental feeding styles among preschool children in Sri Lanka. Gender-based differences in parental feeding styles could not be detected.

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Expectations Of Patients Who Underwent Chemotherapy For Breast Cancers In Apeksha Hospital Maharagama

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Abstract:-Breast cancer is the most common cancer among females all around the world and in Sri Lanka. Patients receiving chemotherapy have reported several side effects and can affect for health status of patients leading many issues. Therefore, the aim of the study was to assess the patient's expectations while having chemotherapy for breast cancers in Apeksha Hospital Maharagama which can be an aid in addressing the above issues as health care workers. It is the fifth leading cause of deaths (627 000,(6.6%) among all cancers. One of the main treatment options is chemotherapy. Total of 207 were selected by simple random sampling. Data were collected through interviewer administered questionnaire and analyzed via SPSS. Mean age was 54, and 91.3% were married. Participants expected further knowledge and support of the health staff during treatments. Television and newspapers were the most important sources of information. 96.1% of participants were expecting to share all the information about their treatment with the family members or care givers. 12.6% of the participants were expected privacy to discuss their health problems. Majority, of 90.8%, were expecting a contact number to get information in an emergency or to solve their problems. Most of the respondents (80.7%) prefer to have further explanations on drugs that they received to take home for the management of side effects of chemotherapy. Out of the total sample ,96.6% of the patients reported that they were expecting to get more explanations regarding side effect management from nursing officers.

Keywords: Expectations, Chemotherapy, Breast cancers

Introduction

Breast cancer is the fifth leading cause of deaths (627000,6.6%) among all cancer types. According to the Global cancer observatory in 2019, the reported number of new cases in 2018 are 24% of all the female cancer types in Sri Lanka. One of the main treatment options for cancer is chemotherapy. It causes number of side effects and regressions for patients. Considering their expectations on chemotherapy treatment we can help to release their regressions and improve effectiveness of chemotherapy. Also, evidence-based practice is more effective than normal health care practice. Expectations are identified by using researches and findings and it is more useful for the betterment of the patient's health and enhancement of palliative care.

Methodology

This study was conducted at Apeksha Hospital Maharagama Sri Lanka. It was a descriptive cross-sectional study. Sample size was 207. They were selected by simple random sampling method. The data were collected using pre-tested interviewer administered questionnaire. The questionnaire consisted of two sections. Section A assessed socio

demographic variables. Section B consists of three parts. It included,

1) Part I - Questions to assess the knowledge on chemotherapy for breast cancer.
2) Part II - Questions to assess the expectation of chemotherapy.
3) Part III - Questions to assess the experiences of chemotherapy treatment.

Data analysis was done using the computer Statistical Package for Social Sciences (SPSS) Version 23. Descriptive statistics were used for data analysis. Chi-square was applied to test the differences between selected variables.

Results

Socio-demographic characteristics. The study sample consisted of 207 participants. Age categories were divided as below. 9 (20-30) 4.35%, 18(31-40) 8.69%, 48(41-50) 23.19%, 57(51-60) 27.54%,61(61-70) 29.47% and 14(71-80) 6.76% mean age was 54.74. Also, out of the study sample, highest number of study participants were belonged to Sinhala ethnic group 186 (89.9%), and 9 (4.3%) were belong to Tamils, and 8 (3.9%) were belong to Muslims and remaining 4 (1.9%) were the others. Considering religious groups, majority of the participants were Buddhist 159 (76.8%), and others 34 (16.4%) were Catholic, Islamic 9 (4.3%) and Hindus were 5 (2.4%) respectively. When we consider the marital status, out of the study participants 189(91.3%) were married females, 13 (6.3%) were single, 4 (1.9%) were widowed and one participant (0.5%) was divorced and regarding the level of education, highest number of study participants have been educated up to O/L and A/L 151 (72.9%), nearly 20% of participants were educated below grade 8, And 16 (7.7%) were graduates.

Knowledge on chemotherapy for breast cancer. Most patients 164 (79.2%) knew that chemotherapy is a type of cancer treatment that uses one or more anti-cancer drugs with the aim to prolong life or to reduce symptoms. 3 (1.4%) told that chemotherapy is exposure to the X-Rays, 8(3.9%) answered that chemotherapy is a relaxation technique, 1(0.5%) told that chemotherapy is a surgical treatment. Also, out of all respondents few 15 (7.2%) knew the names of the drugs given. Most of the patients 192 (92.8%) did not know the names of chemotherapy medications. Regarding knowledge on pre medications, majority (79.2%) knew that pre medications prevent side effects of chemotherapy during their treatment period. According to the study results, 142(68.6%) participants tend to get medical advices immediately when they get high fever. It shows that the others should be advised on the importance of taking medical advice immediately. In conclusion, 122 (58.9%) had a good knowledge on chemotherapy, 66 (31.9%) had average knowledge on chemotherapy and 19 (9.2%) had poor knowledge on chemotherapy.

Experience on chemotherapy. According to final study results, majority of the participants 126 (60.9%) had plenty of time to give their consent before chemotherapy. 17 (8.2%) participants were expected more time to give their consent. 25 (12.1%) of participants had not given enough time to think of chemotherapy treatment. 39 (18.8%) of participants could not be able to memorize it. When we consider the side effects, 52.2% of participants had experienced pain while but 47.8% of participants had not. Weight loss 56% of participants said no and 43% said yes. 57% of participants said that they had experienced nausea and vomiting during treatment period. 68.1% of patients were affected by constipation. Specially 86% of patients have experienced appetite changes and 87% of participants have experienced hair loss during treatment period. And, 194(93.7%) of participants had a chance to have a discussion on their health issues with

the medical staff and only 13 (6.3%) of patients had no such chance. Considering the association of the sources of knowledge on chemotherapy, (23.18%) of patients who were educated by nurses had good knowledge and when considering overall results of knowledge (9.66%) of participants were poor. (31.4%) of participants were average. (58.93%) of participants were good.

Expectations of patients receiving chemotherapy for breast cancer. When consider the patient's expectations on having knowledge on chemotherapy, majority (58%) of them prefer to receive knowledge from consultant oncology surgeon. 26% participants prefer get knowledge from medical officers and 12% out of total prefer nursing officers to get information from and while 3% prefer information from family and friends and out of all 1% prefer to gain knowledge from pharmacist.

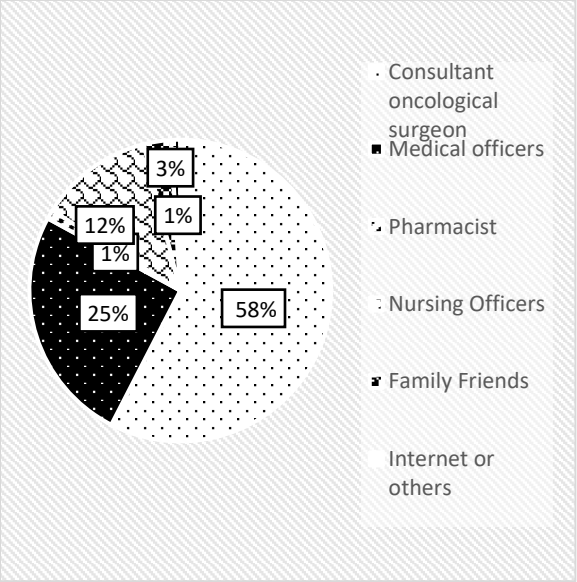

Figure 13 - The distribution of personnel that they expect to receive information about chemotherapy.

Out of study participants 188 (90.8%) were expecting a contact number of staff member to get information from when an emergency at home or to share their problems and 19 (9.2%) were not expecting a contact number. Considering receiving further information on chemotherapy, 57% of patients expect to get information from health care personnel. 27% of participants willing to get information from Pamphlets. 10% of participant would like to refer cancer related websites. Others prefer emails and telephone calls to get information.

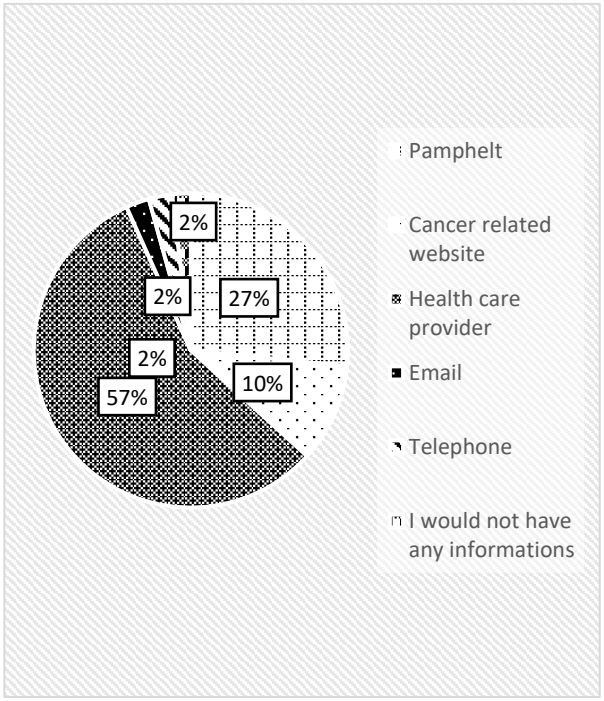

Figure 14 - The distribution of the preferences on receive further information on chemotherapy

Table 10 - Responses given by the study participants regarding the questions asked to assess the expectations of breast cancer patients.

Question asked	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Do you expect to share this information with family or care giver?	199	96.1%	8	3.9%
Do you expect further explanation on drugs that given to take home?	167	80.7%	40	19.3%
Do you think nursing officers should give advice on managing side effects?	200	96.6%	7	3.7%

The results show that they think nurses should advice on management of side effects of chemotherapy and more about their medications. They were expected to share

their knowledge with the other family members and friends.

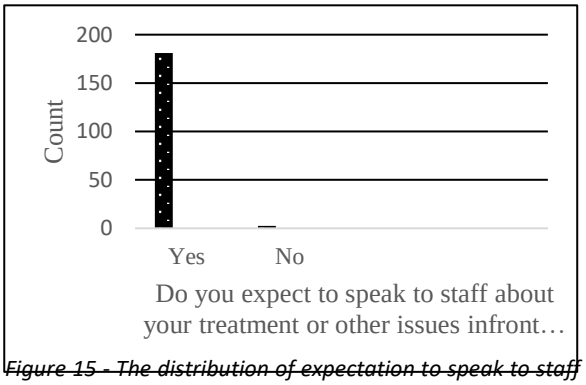

Figure 15 - The distribution of expectation to speak to staff about treatment or other issues in front of other patients.

Out of the sample 26 (12.6%) of participants need privacy to open-up their health problems. But majority 181 (87.4%) of participants did not consider about privacy staff.

As a conclusion, it is important to provide more detailed information to patients about chemotherapy, along with potential side-effects prior to its commencement, patients will be better informed, and they will understand the treatment that they are about to receive. Introducing an emergency telephone number also will helpful for the far away patients. Nurses can make use of the results of the present study in order to enhance the quality of healthcare. They should be effective in changing the patients' lives by restoring the concept of hope. Nurse would be in an ideal position to counsel patients on the administration of chemotherapy, expected side effects, and its management.

The educational booklet, brochure, and educational programs about the side effects of chemotherapy are strongly suggested. Thus, Educational programs will be an effective strategy to cope with side effects of chemotherapy and special training programs for the oncology nurses in Apeksha hospital for health education. Feedback from the patient for each visit on nursing care and relevant issues for the improvement of the care is important and to introduce an emergency telephone number for all the cancer patients. There should be a place that provides privacy to the patients who expect privacy when they have health problems and should be addressed whether the patient expect privacy or not. Developing an oncology website on breast cancer to provide updated information is strongly suggested. Using technology for the communication, education, giving information individually will be time saving and efficient for the present and future health sector in Sri Lanka.

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Knowledge, Attitudes And Practices On Antibiotic Therapy Among Parents Of Children Admitted To A Specialized Children's Hospital In Sri Lanka

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Abstract:- Antibiotics are used to prevent and treat bacterial infections. It is mostly prescribed for sick children globally than for adults. Antibiotic resistance is a critical global health issue. Over-prescription and inappropriate self-medication are the main culprits of antibiotic resistance. The objective of this study was to assess knowledge, attitudes and practices regarding antibiotic therapy among the parents of children getting admitted to a specialized children's hospital in Sri Lanka. A descriptive cross sectional study was carried out with 403 participants at Sirimavo Bandaranayake Specialized Children's Hospital, Sri Lanka from January to March, 2020. A pre-tested, self-administered questionnaire was used to collect data. Participants had 51.85% overall knowledge on scale. Urban parents had higher knowledge (59%) than rural parents. 67% have never heard of antibiotic resistance and 69% have never received health education on antibiotics. 25% recognized that antibiotics can treat bacterial infections. Amoxicillin was the mostly identified antibiotic. 80.9% responded that antibiotics cure viral flu. Majority (64%) strongly agreed that parents should be further educated on pediatric antibiotic use. Parents had good attitudes (78.21%) and practices (71.27%) in using antibiotics. The study concludes that Sri Lankan parents have moderate knowledge but they have achieved good attitudes and practices. Parental health education on antibiotics was critically poor. Parents believe that they should be further educated on judicious antibiotic use. Majority never self-medicate antibiotics to children without physicians' prescription. Physicians were the main source of information, and involvement of nurses and other healthcare professionals was low. Telecommunication minimally contributes in community health education on antibiotics.

Keywords: Antibiotics, Parents, Paediatric, Antibiotic resistance, Knowledge

Introduction - Antibiotics are medicines, which are used to prevent and treat bacterial infections as defined by the World Health Organization-WHO (World Health Organization, 2018). One of the major causes to seek medical advices world widely is acute illnesses in children (Williams *et al.*, 2018). They are more prone to get infectious diseases than adults and it is often difficult to etiologically diagnose them because of the non-specific manifestations of infections. Therefore, the microbiological tests are more appropriate for the infected children to confirm their definitive indication and to decide the initiation of rational antibiotic therapies (Chaw *et al.*, 2018). The evidence shows that, globally, the most common prescription drugs given to children are antibiotics(Vangay *et al.*, 2015). Antibiotic resistance is a rapidly emerging global public health crisis, especially in countries where resources of health care are limited (Williams *et al.*, 2018)(Chaw *et al.*, 2018)(Van Hecke *et al.*, 2019)(Hsia *et al.*, 2019)(McMullan *et al.*, 2019)(Fink *et al.*, 2020)(Schrier *et al.*, 2018). In developing countries where health facilities such as laboratory testing facilities for the community are limited, the bacterial species such as *Streptococcus*, *Salmonella* and *Helicobacter pylori* have reported antibiotic resistant patterns. In these countries, the infectious diseases are common and hold higher rates (Chaw *et al.*, 2018). Inappropriate

prescribing of antibiotics for children can be commonly noted during regular clinical practice in clinical setup (McMullan *et al.*, 2019)(Choe and Shin, 2019). According to WHO, self-medication can be defined as using pharmaceutical or medicinal products by the consumer to treat self-recognized disorders or symptoms, the intermittent or continued use of a medication previously prescribed by a physician for chronic or recurring disease or symptom, or the use of medication recommended by lay sources or health workers not entitled to prescribe medicine (Arulmoli, Sivachandiran and Perera, 2009). It increases inappropriate use of antibiotics, further leading to antibiotic resistance (Al-Dosari, 2013). Antimicrobial stewardship program is the most appropriate strategy to prevent antimicrobial resistance and has been recognized as the key intervention to promote effective and proper prescribing of antibiotics. But there is a remarkable lack of assessment to evaluate the effectiveness of AMS program (McMullan *et al.*, 2019). It focuses on improving the quality of treatment by initiating appropriate use of antibiotics and reducing its' over use (Schrier *et al.*, 2018).

Inappropriate parental education, fewer number of children in the family, and less exposure to sources of health information, especially social media and telecommunication, are significant reasons of weak parental knowledge on antibiotics. Generally, the existing misconceptions and inappropriate knowledge lead parents to misuse antibiotics and promote self-prescribing patterns. The parents do not consider the fact that some illness of children do not require antibiotic treatments. Parents expect the physicians to prescribe antibiotics to sick children even though it is not needed (Hernández-Díaz *et al.*, 2019).

The results reflect the sources of information which help parents to gain the knowledge regarding antibiotic use and the risk of developing antibiotic resistance among children due to misuse of antibiotics. It helps to evaluate the effectiveness of current antibiotic related health educational interventions and programs in Sri Lanka. Furthermore this is helpful in designing and updating health educational interventions and antibiotic guidelines using modern telecommunication methods and social media to approach the parents of children as well as the general population of Sri Lanka.

Objective - The general objective of this study is to assess the knowledge, attitudes and practices regarding antibiotic therapy among the parents of children admitted to a specialized hospital in Sri Lanka.

Methodology - A descriptive cross sectional study was conducted at the medical wards of Sirimavo Bandaranayake Specialized Children's Hospital, Peradeniya, Sri Lanka from January to March, 2020. 403 parents of children who were admitted to the medical wards participated. Parents who were illiterate in Sinhala or Tamil were excluded from the study. A pre-tested, self-administered, structured questionnaire was used to collect data. The collected data was arranged in a MS Excel spread sheet. IBM SPSS Statistics version 21 was used to analyze data.

Results and discussion - Among total 403 participants, there were 389 (96.5%) mothers. Majority of the participants were educated up to advanced level, Sinhala (88.3%), and living in rural sector (74.4%). Most families received a gross monthly income between 25,001-50,000LKR. 26.6% were working mothers. Sri Lankan parents in this study had overall 51.85% knowledge on antibiotics on the scale, which is greater than the assessed overall knowledge in rural Chinese parents (39%). Similarly to the Chinese study, urban Sri Lankan parents showed higher overall knowledge (59.37%) than rural (50%) and estate living (43.88%) parents (Yu *et al.*, 2014). More than half (69%) of parents responded that they have never received

health education on antibiotics. Among 31% of parents who have received health education responded that physicians (45.14%), Nurses and other healthcare professionals (16.73%), and pharmacists were (10.51%) their main sources of education which is a similar response to previous studies in China, Palestine and Saudi Arabia, but the contribution of doctors was over 80% in those countries (Yu *et al.*, 2014)(Zyoud *et al.*, 2015)(Al-Ayed, 2019). The contribution of newspaper and telecommunication on health education regarding antibiotics in Sri Lanka was significantly low according to the results.

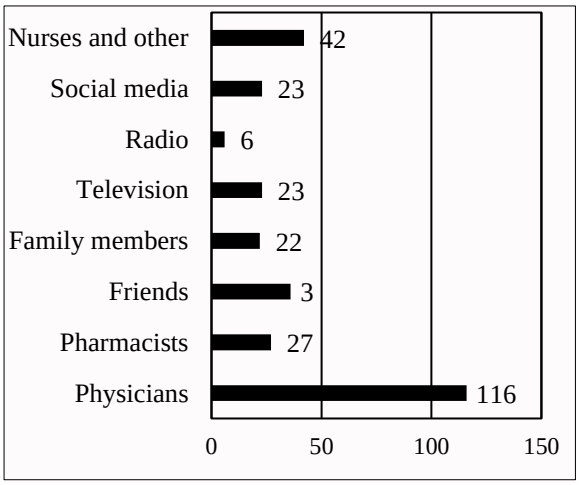

Figure 1 - Sources of Health Information on Antibiotics

From the participated population in this study, 272(67%) of parents identified that antibiotics fight against infections. Among that, 73.4% of parents thought that antibiotics can cure viral infections which is a similar finding in rural Chinese parents (79%) (Yu *et al.*, 2014). Only 25.1% of parents knew that antibiotics are indicated for bacterial infections. A previous study in Sri Lanka concluded that only 4.7% knew that antibiotics fight against bacterial infections (Premaratne *et al.*, 2006), which shows an improvement of parental knowledge over the years. Even though the participants identified pneumonia (51.9%), urinary tract infections (45.9%), and meningitis (33%) as antibiotic indicated diseases, they also identified viral flu (80.4%), common cold/influenza (54.5%), and Dengue fever (35.7%) can be treated with antibiotics. Similar results were found from China and Jordan. In both countries, more than 70% of participants did not know that antibiotics are solely indicated for bacterial infections, and reported that antibiotics could be indicated for fever, sore throat, and rhinitis (Yu *et al.*, 2014)(Mukattash *et al.*, 2020). The results show that the Sri Lankan parents recognized Amoxicillin (48.9%), Cefuroxime (19.0%) and Penicillin (19.4%) as antibiotics, meanwhile Paracetamol (35.5%), Piriton (28.0%), and ORS (25.3%) were also identified as antibiotics.

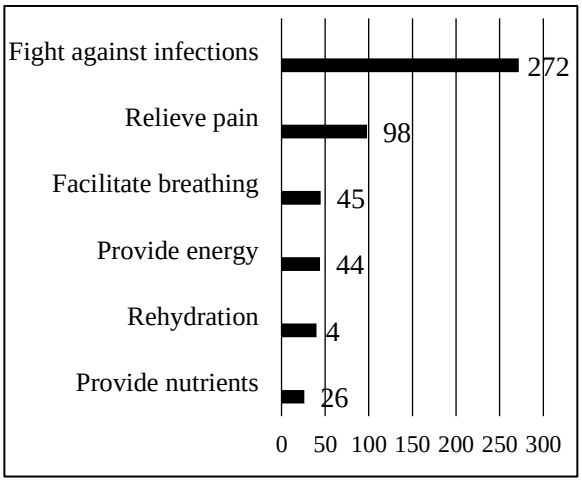

Figure 2 - Purposes of antibiotics

67% of Sri Lankan parents in this study had never heard of the term "antibiotic resistance", and 39.7% of parents failed to decide whether antibiotic resistance is a global public health issue, but 83% American parents were familiar with the term (Szymczak *et al.*, 2018). Almost all the parents (96.3%) agreed that they should be further informed about judicious use of antibiotics. Chinese parents also showed the same results that 68% of them had little knowledge on antibiotic resistance and majority wished to be educated more about appropriate use of antibiotics. Furthermore 63% agreed that excessive antibiotic use can increase the risk of antibiotic resistance (Yu *et al.*, 2014).

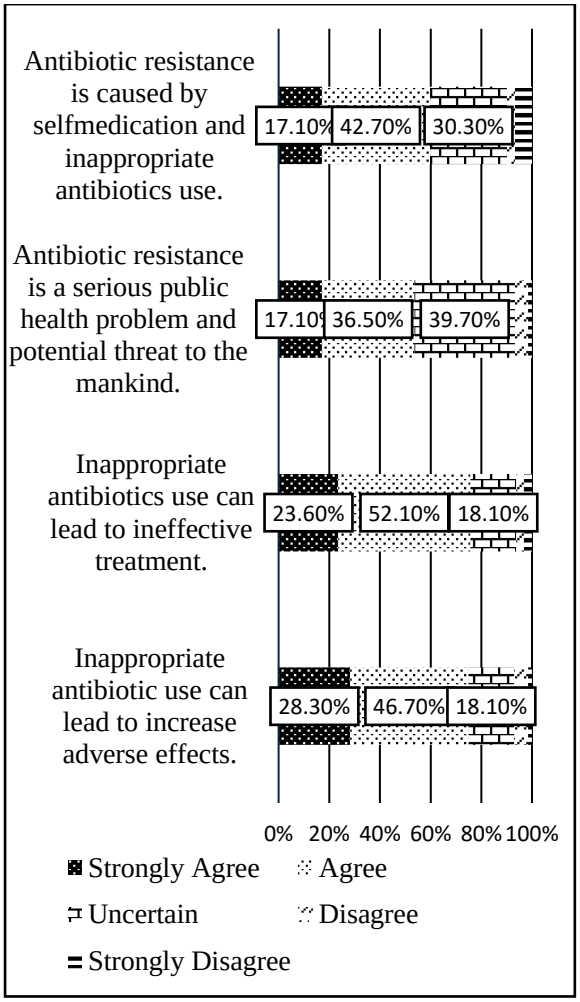

Figure 3 - Parental knowledge on antibiotics

In general, participants had 78.21% good attitudes in the scale regarding antibiotic therapy. Majority of parents reported that they never give antibiotics to their children without physicians' prescription in any circumstances. 26% of parents think that sometimes they can self-medicate antibiotics to their children either when they think the child's condition is not too serious or when the physicians have prescribed same antibiotics previously, for the same symptoms, while 19.90% parents sometimes tend to give antibiotics to children when they do not have enough time to spend at clinics or lack of money to pay for medical consultation. A local study showed the same results except 89% mothers implied that mild symptoms in child is a reason for self-medication practices (De Silva *et al.*, 2017). Lebanese parents (24.7%) also showed the same results of self-prescribing antibiotics to children because of unaffordable clinic visits (Hallit *et al.*, 2020).

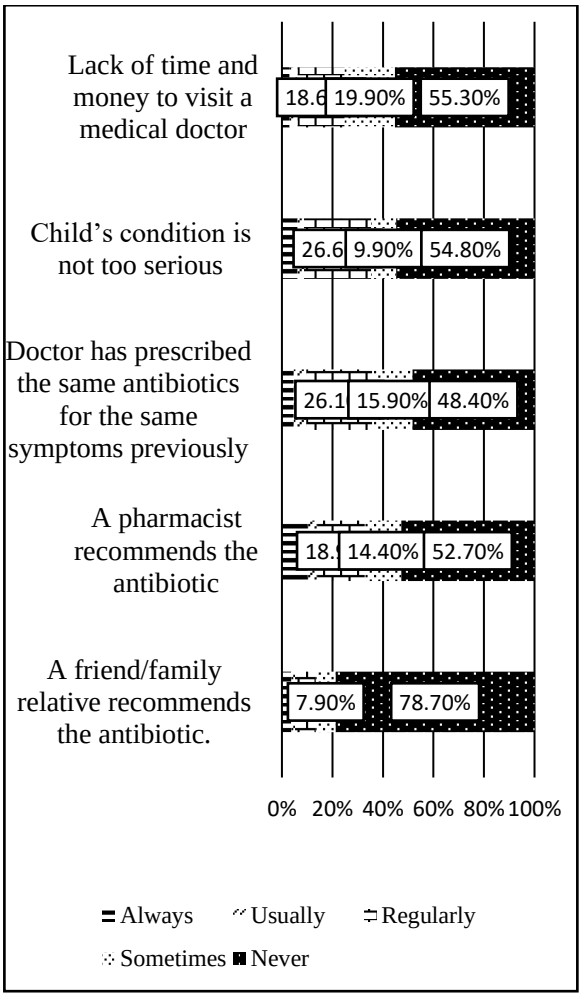

Figure 4 - Parents' reasons for self-medicating antibiotics without physicians' prescriptions

Almost all the parents (96.3%) agreed or strongly agreed that they should be further informed about judicious use of antibiotics. Majority of the parents believed that antibiotics are excessively used in Sri Lanka, and they think that the physicians should confirm the cause of illness using laboratory test or physical examination, before prescribing antibiotics to children. Rural Chinese parents also showed the same results that 68% of them had little knowledge on antibiotic resistance and majority wished to be educated more about appropriate use of antibiotics. Furthermore 63% agreed that excessive antibiotic use can increase the risk of antibiotic resistance (Yu *et al.*, 2014).

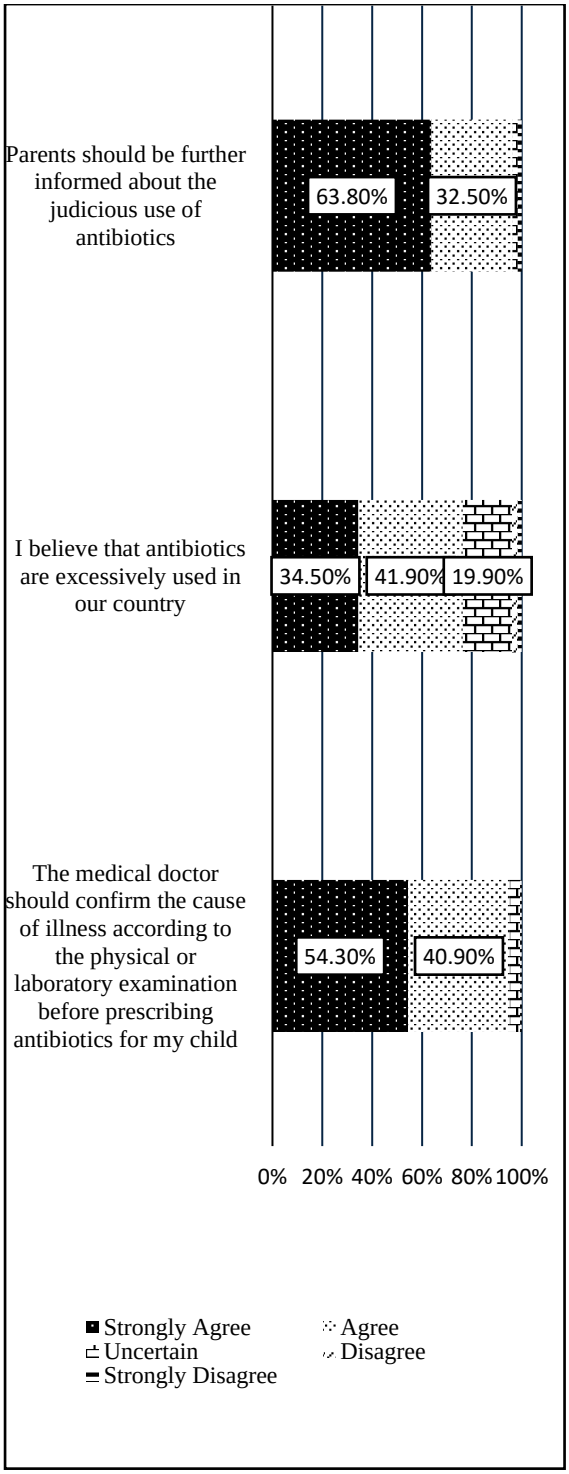

Figure 5 - Parental attitudes towards antibiotics

The participants had 71.27% good practices in utilizing antibiotics. Majority (81.6%) of the participants reported that they do not preserve leftover antibiotics at home. Opposite to this result, Chinese parents reported that they tend to keep antibiotics at home for future use and self-medicate children with leftover antibiotics (Yu *et al.*, 2014).

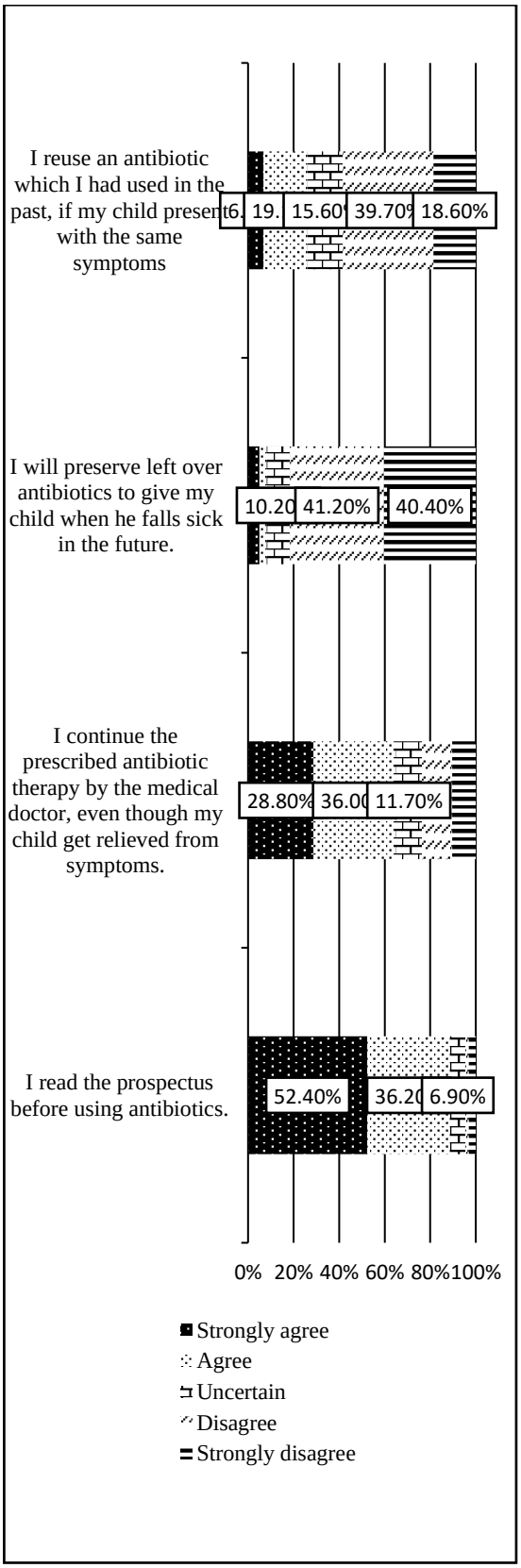

Figure 6 - Parental practices

Conclusion - Sri Lankan parents have moderate (30%-50% on scale) knowledge on paediatric antibiotics therapy but they have achieved good attitudes and practices. The exposure of parents to health education was critically poor in areas such as knowledge on use and types of antibiotics, bacterial diseases and antibiotic resistance. Parents believe that they should be further educated on judicious use of antibiotics. Majority of parents never self-medicate antibiotics to their children without medical prescription. More than half of the parents tend to continue recommended antibiotic therapy even if the symptoms get relieved. They knew that inappropriate use of antibiotics cause adverse effects and ineffective treatment. Physicians were the main educators on antibiotics, and involvement of nurses and other healthcare providers was low. Telecommunication methods and newspapers minimally contribute in community health education regarding antibiotics.

Limitations - The study was conducted in a selected study setting. There was a lack of participants from some sociocultural groups, and residential areas. The study did not approach dosing and administration practices of parents in giving antibiotics to children, and sociocultural influences on antibiotics, which is important to understand of parental practices, beliefs, and misconceptions.

Future recommendations - Conducting an island survey in future to assess the knowledge attitude and practices including participants from all provinces belonging to different strata should be considered. Designing new effective health education programmes is important. Self-medication, drug dosing and administration pattern of antibiotics in children could be studied in future studies. A survey is recommended to identify the scope of telecommunication in community health education. Furthermore, the establishment of strict antibiotic guidelines should be considered in a legal aspect.

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Occupational risk factors related to Cutaneous Leishmaniasis: A descriptive study

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Abstract:-Cutaneous Leishmaniasis (CL) is an endemic disease in Sri Lanka and it is considered as a notifiable disease from year 2008. Anuradhapura has been one of the areas shows highest incidences of Leishmaniasis in Sri Lanka. The purpose of this present study was to identify the occupational risk factors associated with Cutaneous Leishmaniasis. A quantitative cross-sectional study was conducted among patients who were diagnosed with CL and visit to Dermatology clinic at the Base Hospital Thabuththegama. Two hundred participants were recruited to the study by using convenience sampling method. A self-administered questionnaire was used to collect data and Statistical Package for Social Sciences (SPSS) Version 21 was used to analyze the data. Majority of the participants were male (n=145, 72.5%) and 46% of participants were over 40 years old. More than half (n=123, 61.5%) of the participants were paddy cultivators. Being a paddy cultivator was a significant occupational risk factor for CL. The results showed that gender was statistically significant variable for CL (P< 0.05). Statistically significant associations were also found at the level of 0.01 between occupation with gender, age and educational level. Furthermore, laborers (7.5%) were also more prone to affect by CL comparable with other occupations. Hence, a special attention should be given to male paddy cultivators by providing health education on the disease, identifying reservoir hosts and vector control will be important initiatives to prevent the spread of this disease.

Keywords: Occupational Risk factors, Cutaneous Leishmaniasis

Introduction

Cutaneous Leishmaniasis (CL) is a neglected disease strongly associated with the poorest population of the world (Thilahun et al., 2014). Leishmaniasis is a vector-bone disease caused by a protozoan parasite of the genus Leishmanial and transmitted by the bite of an infected female phlebotomine sand fly (Galgamuwa et al., 2017). Patients with CL present with a single ulcer or nodular lesions near the site of insect bite (Mccwir & Satoskar, 2013). The ulcers or nodules can be seen uncovered areas of the body such as the face, forearms and lower legs (Mccwir et al., 2013). According to the World Health Organization (WHO) Leishmaniasis threatens about 350 million people and children in 88 countries worldwide (WHO, 2017). As estimated, 0.9 to 1.3 million new patients and 20000 to 30000 deaths occurred annually in worldwide (Bmorovat et al, 2018). As many as 12 million people are believed to be currently affected (WHO, 2017).

Leishmaniasis is an endemic disease in Sri Lanka since the first autochthonous CL case was identified in 1992 (Weerakoon et al., 2016; Galgamuwa et al., 2017). The percentages of patients have increased in the last few decades due to numerous reasons such as human migration from endemic to endemic areas, poverty, deforestation and urbanization (Galgamuwa et al., 2017). More than 2000 cases have been identified from 2000 to 2009 and nearly 8487 patients have

been recorded during 2009 to 2016 representing at least one case from all 25 administrative districts (Wijerathna et al., 2018). Anuradhapura is one of the most endemic districts for CL in Sri Lanka. (Galgamuwa et al., 2017). Although, after conducting several studies, it can be seen the development of Leishmaniasis remains the same. Therefore, it is necessary to understand the risk factors to control and prevent Leishmaniasis properly hence we decided to perform this study. The purpose of this study is to identify occupational risk factors related to Cutaneouse Leishmaniasis among patients who visit to the dermatology clinic at Base Hospital Thabuththegama.

Methodology

Study Design

A descriptive cross-sectional study was conducted among patients who were diagnosed with CL, visit to Dermatology clinic at Thabuththegama.

Study setting

This study was conducted at dermatology clinic in Base Hospital Thabuththegama. It is one of the largest base hospitals in Anuradhapura district. Diagnosed patients with Cutaneous Leishmaniasis visit dermatology clinic every Wednesday for treatments. Approximately, there are 35 to 40 patients daily at the clinic. All the diagnosis, treatments, care and procedures in the clinic are conducted under the supervision of one dermatologist while coordinating by nursing officers relevance to clinic.

Study population

The population of the research was the patients who visit the dermatology clinic at the Base Hospital Thabuththegama. 215 diagnosed patients with CL were selected as the sample by using convenience sampling method. Inclusion criteria for the study were patients who have diagnosed with CL. Patients who have mental illnesses, disabilities or difficulties to communicate were excluded from the study.

Study material & Data collection

A self-administered questionnaire was developed in three languages Sinhala, English and Tamil. The questionnaire was consisted of two parts, part A-Socio demographic data (Age, Gender, and Educational level) and part B- Occupation related data. The questionnaire was pre-tested with 25 patients with CL, those data were not considered in the study. Reliability was established with results of pre-test. Face validity and content validity was done with supervisor and subject experts at the dermatology clinic. Modified questionnaire was used to collect data. The value of Cronbach's Alpha was more than 0.7 in the study.

Ethical consideration

Ethical approval was obtained from ethical review committee of National Hospital of Sri Lanka. All the information was gathered anonymously after obtaining the informed consent from the participants. Participants had the right to withdraw from the participation at any time of the study. Privacy and confidentiality of the participants and their information were ensured to the maximum at every stage of the research.

Data collection

The data collection was conducted from June 2019 to one month period.

Data Analysis

Analysis of collected data were carried out with the Statistical Package for Social Sciences, (Version 21).

Results and Discussion

Total of 215 patients who were diagnosed as Cutaneous Leishmaniasis in the dermatology clinic at base hospital Thambutthegama were invited to participate for answer the questionnaires. 15 questionnaires were excluded from final analysis due to incomplete

data. The final study sample was consisted of 200 subjects. Majority of patients were male (n=145, 72.5%) and the female represented 27.5% (n=55) of the total participants. The results showed that gender was statistically significant variable for CL (P< 0.05). When considering age 46% (n=92) of participants were over 40 years and 23.5% (n=47) of the participants were between 18-30 years old while 30.5% (n=61) were in-between 31-40 years. Majority (48.5%, n=97) of the participants were educated below ordinary level and most of the participants' (48%, n=96) monthly income were < 5000 rupees.

Table 1 - Socio-demographic data of the Participants

Socio-demographic data	Category	n	%
Gender	Male	145	72.5%
	Female	55	27.5%
Age	18-30 years	47	23.5%
	31-40 years	61	30.5%
	>40 years	92	46.0%
Religion	Buddhist	191	95.5%
	Christian	05	2.5%
	Islam	04	2.0%
Marital status	Married	141	70.5%
	Unmarried	48	24.0%
	Living together	04	2.0%
	Divorced	04	2.0%
	Widow	03	1.5%
Education level	O/L	60	30.0%
	A/L	36	18.0%
	Diploma	04	2.0%
	Graduate	03	1.5%
	<O/L	97	48.5%
Monthly income	<5000	96	48.0%
	5000-15000	52	26.0%
	15000-40000	41	20.5%
	>40000	11	5.5%

Source: KDU IRC 2020

Table 2 - Occupation related factors

Occupation	Count (n)	Percentage (%)
Paddy cultivator	123	61.5
Chene cultivator	4	2.0
Poultry	1	0.5
Teacher	4	2.0
Clerk	2	1.0
Housewife	10	5.0
Labourer	15	7.5
Government officer	9	4.5
Businessman	4	2.0
Others	11	5.5
No	17	8.5
Total	200	100.0

Source: KDU IRC 2020

Table 3 - Monthly income of Paddy cultivators

Monthly income	Frequency (n)	Percent (%)
<5000	82	66.7
5000-15000	27	22.0
15000-40000	13	10.6
>40000	11	0.8
Total	123	100.0

Source: KDU IRC 2020

Table 4 - Correlations between Occupation and socio-demographic data

Variable	Correlation significant level
Age	0.01
Religion	0.05
Gender	0.01
Educational level	0.01

Source: KDU IRC 2020

Out of 200 participants surprisingly 61.5% (n= 123) were paddy cultivators. Monthly

income of most of the paddy cultivators was less than 5000 rupees (Table 3). Statistically significant associations were found between occupation with gender, age, religion, and educational level (Table 4).

Being a paddy cultivator had a significant association to the presence of CL ($p<0.05$). Similar finding to that of a study conducted in Ethiopia (Tilahun, Alemu, & Mulatu, 2014). The reason for the finding confirmed that the people whose occupations were closely related to paddy field were more prone to sand fly bites due to presence of increase the density of sand fly breeding places. A study conducted in Mekelle City, Ayder referral hospital. Tigray, North Ethiopia done by F.Tilahun et al in 2014 highlighted that the most of males and the farmers were relatively exposure for CL.

The findings of the present study revealed that gender was statistically significant variable for CL. This result agrees with finding of the previous study in Iran, (Oryan & Aetal, 2014). Another similar study conducted in Ethiopia that the sex was significant, highlighted that the gender had significant association to the prevalence of CL (Thilahun et al., 2014). Previous similar findings were reported even in Sri Lanka that the infection of CL was higher among males than females (Galgamuwa et al., 2017). Further findings were reported in Colombia, Silit, India, Libia and Pakistan. However, the reason for that in this study is that the main livelihood of most of the participants is paddy cultivating. Furthermore, the paddy fields facilitate favorable resting breeding habitants for sand flies and the north central province can be described as a province adorned by irrigated colonies and eco-systems which are for paddy cultivation.

Conclusion

Occupation was significantly associated with the disease of CL. Being a paddy cultivator was a main risk factor for CL and being a labourer also a risk for affect by the disease comparable with other occupations. Because most of them work in open environment such as field and agricultural farms and wearing cloths to cover only lower part of the body. Therefore, they have a high risk of exposure to sand fly bites. According to this study results, males have a high risk to affect this disease since most of them perform outdoor activities mainly paddy cultivation. Hence, a special attention should be given to male paddy cultivators by providing health education on the disease, identifying reservoir hosts and vector control will be important initiatives to prevent the spread of this disease.

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Exploration Of The Door To Needle Time Gap Of Administering Anti-Venom Serum (AVS) And Its Determinants: A Mixed-Method Study

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Abstract:-A mix method study was conducted at the Teaching hospital, Anuradhapura (THA) to describe the demographic characteristics of snake bites, determine the median time gap of administering anti-venom, identify reasons for delaying administration of anti-venom serum and propose measures to be adopted in order to shorten the door to needle time gap. Ethical approval was obtained by ethical committee, Faculty of Medicine, KDU. The descriptive cross-sectional part was based on snake bite victims elder than 16 years(n=50) who were admitted to the THA and received AVS (Anti-venom serum) therapy over a 3 ½ months period from 15th July 2019 and 50 victims were sample size for quantitative study. The data was collected through an interviewer administrated questionnaire .Participants were purposively recruited for the qualitative study and in-depth interviews were conducted with health care professionals in THA and peripheral hospitals. Qualitative data analyzed by thematic analysis with four themes including limited physical and human resources, issues in the diagnosis of envenoming, delays in preparation of AVS, reasons and delays in transferring patients from the local hospital to THA. Data were analyzed by using SPSS 23 with Mann-Whitney U test.

There were 88% (44) male and 12% (8) female victims. The most bites were not identified (50%) and most of the common bite were Russell's viper (46%).Below the ankle 82% and between 6 a.m. to 6 p.m. was the commonest bite site and time. There were 40 (80%) indirect admissions and 10 (20%) direct admissions. Door to needle median gap of all direct and indirect admission was 125 (IQR= 65-158) minutes. Door to needle median gap in indirect admissions was 178 (IQR=90-210) minutes and direct admissions median gap was 72 (IQR=30-104) minutes. There was a significant difference between the median time gap of indirect and direct admissions. Poor rural hospital facilities, overcrowding, inadequate staffing and the unavailability of quality tubes for whole blood clotting time are the main factors contributing to the time gap. Final suggestions are increasing bed capacity and implementation of a triage system in the ETU.

Key Words - Snake envenoming, AVS therapy, Door to needle time gap (the time between admission to the Teaching Hospital Anuradhapura or Peripheral hospital to administration of AVS)

Background - Estimates suggest 4.5-5.4 million snakebites, 1.8-2.7 million envenoming and 81 000 to 138 000 deaths occur due to snakebites globally each year (WHO, 2019). In Sri Lanka, it is estimated that 80,000 bites, 30,000 envenoming and 400 deaths occur due to snakebite each year, much more than claimed by official statistics. Most of the cases are reported from the dry zone of the country (Ediriweera et al., 2016). Antivenom, the only specific treatment must be given without a delay for the snakebite patients.

Possible factors that could determine door-to-needle time gap (the time gap between the times of hospital admission to the end of AVS therapy) includes time taken to develop clinical features of systemic envenoming, time taken to become positive in ward CT (Clotting Time), delay in lab CT reports, time taken to prepare AVS (Anti-Venom Serum) and developing adverse reactions during AVS administration. In addition, patients are transferred to tertiary care units from peripheral units due to lack of facilities including heart monitors, AVS (anti-venom serum), trained nurses, doctors and emergency care facilities. The Teaching Hospital Anuradhapura is the largest tertiary care hospital in the Northern Central Province and also in the dry zone of Sri Lanka. Teaching Hospital Anuradhapura rats over 1000 snake bite patients annually. The majority of snakebite victims in the region seek western medical treatments and most of them enter the health care system as soon as possible. The purpose of this study is to determine the mean time between the time of admission to the hospital to end of the AVS (Anti-Venom Serum) therapy as well as to determine the preventable and non-preventable factors contributing to the mean door to needle time gap.

Objectives - To describe the demographic characteristics of snake bites, to determine the median time gap of administering anti-venom, reasons for delaying AVS administration and suggestions to be adopted in order to shorten the door to needle time gap.

Methods - This was a mix method study with two phases. The descriptive cross-sectional study was based on snakebite victims who were presented in THA (Teaching Hospital Anuradhapura) and received AVS therapy over a 3 ½ months period from 15th July 2019 and took these all admissions (50 admissions) as the quantitative sample size. And also Quantitative study design was interviewer administrate questioner. Qualitative study was based on in-depth interview of health care professionals (medical officers, nurses, medical laboratory technicians who were experienced at least two years in snake bite management) and the health care assistants work at the THA as well as medical officers in peripheral hospitals (District Hospital Nochchiyagama, Rural Hospital Senapura, Peripheral Unit Mihinthle, Peripheral Unit Thalawa). Sampling method was purposive sampling technique. Qualitative data analysed using thematic analysis method and quantitative data analysed using SPSS 23 version. Ethical clearance for the study will be obtained from the Ethics review committee of the Faculty of Medicine, General Sir John Kotelawala Defence University. Participants will be recruited to the study after obtaining written permission by the respective Provincial Director of Health – North Central Province, Regional Director of Health, and Ethical board of the Teaching Hospital Anuradhapura. Written informed consent will be obtained from the recruited participants prior to commencement of the study. Confidentiality of all information and identities of participants will be strictly maintained and will not be disclosed when publishing the results of the study. Information sheet and consent form will be translated to Sinhala and Tamil to ensure that it's accessible to members

Results - Among the total 50 victims, 88% (44) were (>16 years) adult male and the 12% (6) were (>16 years) adult females. There were 23 (46%) Russell's viper bites, 1(2%) common cobra bite, 1 (2%) Indian Krait bite and 25 (50%) unidentified. Most victims had bites below the ankle (82%). 58% (29) bites were occurred during 6 am-6pm. Of all patients, 40 (80%) were indirect admissions and the rest were direct admissions to THA. There was no significant difference of median time durations after admission to the THA to the AVS administration in direct and indirect admissions. Door (Primary Care Hospital or

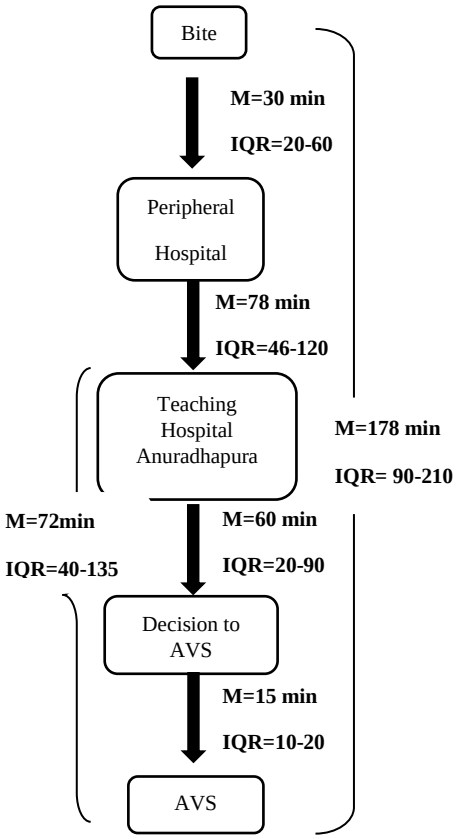
THA) to needle median time gap for all admission was 125 (IQR=65-158) minutes.

For indirect admissions door to needle median time gap was 178 (IQR=90-210) minutes. This included bite to door median time gap of 30 (IQR =20-60) minutes and door to THA admission median time gap of 78 (IQR=46-120) minutes. The median time gap between the THA admissions to AVS was 60 (IQR= 20-90) minutes and AVS decision to needle time gap was 15 (IQR= 10-20) minutes. The median time gap between THA admissions to needle was 72 (IQR=40-135) minutes. In direct admissions, the bite to door median time gap was 50 (IQR=24-63) minutes and the door to needle median time gap was 72 (IQR=30-104) minutes. The time gap between the admission to THA and the decision to give AVS was 60 (IQR=35-99) minutes and the median time gap between decision to give AVS and needle was 10 (IQR=5-18) minutes.

According to qualitative result, main factors such as poor rural hospital facilities, overcrowding, inadequate staffing and unavailability of quality tubes for whole blood clotting time contribute to increase total median time gap between door to needle. Most of the health care professionals made their suggestions with their experiences to improve health care environments to effectively manage snakebite victims. The limited and the lack of a triage system to handle the flow of admission to the ETU, were highlighted. Limited human resources such as the shortage of Medical Laboratory Technicians and health care assistants may contribute to the lengthening of diagnostic laboratory Clotting Time. In reducing the time wasted for diagnosing envenoming, possibility of replacing lab Clotting Time (which requires the service of the laboratory) with WBCT20 (Whole Blood Clotting Time 20) which a simple, bedside test is used , in the ETU by providing fresh and clean glass tubes.

Median = M Interquartile rate = IQR

Indirect admission (N=40)



Direct admission (N=10)

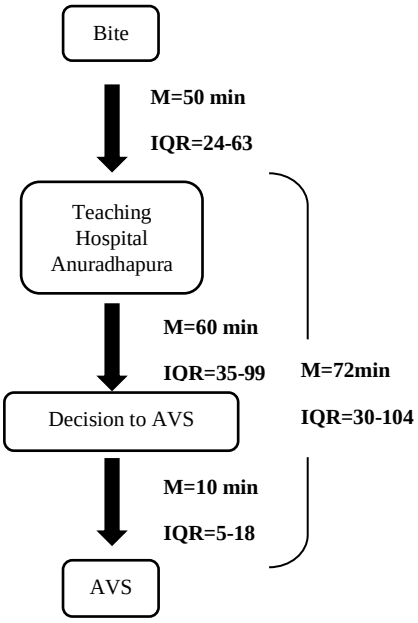


Figure 1 - Time gap of bite to AVS in direct admission versus indirect admissions

Conclusions – Median door to needle time gap for all admissions (All direct and indirect

admission) was 125 (IQR=65-158) minutes. Median door to needle time gap in indirect admissions was 178 (IQR=90-210) minutes and median door to needle time gap indirect admissions is 72 (40-135) minutes. Such median time gaps were obtained because of poor facilities of rural hospitals.

There was no significant median time gap between admission to THA at the time of onset of AVS among direct and indirect admissions. Overcrowding, inadequate staffing and unavailability of quality glass tubes for WBCT are the main factors contributing to door to needle time gap for all admissions (All direct and indirect admission).

Key Words - Snake envenoming, AVS therapy, Door to needle time gap (the time between admission to the Teaching Hospital Anuradhapura or Peripheral hospital to administration of AVS)

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Dietary Adherence With Guideline Recommendations In Patients Undergoing Continuous Ambulatory Peritoneal Dialysis

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Abstract:- Dietary nutrient intake plays a dominant role in maintaining proper nutritional status in Continuous Ambulatory Peritoneal Dialysis (CAPD) patients. Adhering to multiple dietary restrictions imposed on CAPD patients may be difficult but crucial in maintaining proper nutritional status. The study aimed to assess the dietary adherence with renal specific European Society for Parenteral and Enteral Nutrition (ESPEN) guideline recommendations for CAPD patients. This cross-sectional study carried out engaging 102 patients (66 were male) who attended to the CAPD clinic, General Hospital Kandy from January to April 2020. Participants were selected by simple random sampling method. Interviewer administrated food frequency questionnaire was used to collect dietary data. A small minority of the patients reached recommended targets of energy (30.4%) and protein (10.8%). The Number of adherents to potassium and phosphorus was also as lower as 10.8% and 17.6% respectively. Most of the participants consumed less than target recommendation in relation to potassium and phosphorus. Only 10.8% consumed sufficient fiber. Furthermore, only 26.5% were within recommended dietary sodium targets and 20.6% of participants' sodium intake was higher than recommendations. It is generally accepted that dietary intake of CAPD patients are relatively lower than target recommendations. Majority of CAPD patients participated in this study also did not meet current renal specific dietary recommendation in relation to all the selected dietary components. Therefore, other than conventional dietary counselling, nutritionally sound, appropriate dietary interventions should be implemented in order to improve adherence to recommended dietary intake to obtain the best optimum results.

Keywords: CAPD, adherence, recommendations, ESPEN

Introduction

Chronic kidney disease (CKD) is progressive loss of kidney functions which is defined as kidney damage or an estimated glomerular filtration rate (eGFR) of less than 60ml/min/1.73m^2 (Hajira, Samiullah and Chawla, 2013). Renal transplantation and renal replacement therapies such as Continuous Ambulatory Peritoneal Dialysis (CAPD) and hemodialysis (HD) are the only treatment modalities available to sustain and prolong the life of the final stage of CKD or End-Stage Renal Disease (ESRD) patients. CAPD has been available as an effective and safe renal replacement treatment for ESRD patients in and around the world.

CAPD patients have to adhere to multiple recommended dietary regimens related to dietary nutrient components and also fluid intake. It is said to be difficult for patients to follow the renal diet as there may be restrictions imposed on amount of protein, sodium, potassium, phosphorus, and calcium allowed in the diet. Due to this complexity of dietary modifications, majority of dialysis patients are having difficulties in adhering and continuing in the long term (Beto and

Nicholas, 2009). There is no consensus guideline available, but there are number of renal specific nutrition guidelines using around the world. There are slight differences in recommended values in each guideline. European Society for Parenteral and Enteral Nutrition (ESPEN) guideline (Cano *et al.*, 2009) is one of the most accepted guidelines among them.

Dietary intake of patients can be assessed through several methods, i.e., 24-hour dietary recall, dietary diary, food frequency questionnaires are available for epidemiological purposes. Some of these methods are complex and laborious. Population studies require simple, and reliable methods. Food frequency questionnaires often use as practical, cost-effective and efficient method for assessing dietary intake over periods of time (Biró *et al.*, 2002). FFQs are most commonly used method to assess dietary intake because of its low cost and ability to capture usual food patterns (Zang *et al.*, 2019).

Multiple dietary restrictions recommended to CAPD patients may be difficult to achieve and at the same time may result in nutritional deficiencies rendering a poor dietary quality. Adherence to a specific dietary regime is not easy. It requires individual, social, cultural and environmental adaptations too (Cupisti and Kalantar-Zadeh, 2013). It is believed that there are five associated factors which leads to dietary non-adherence according to WHO Multidimensional adherence model (Chaudri, 2004). Those are, socio-economic factors, condition-related factors, therapy-related factors, health care team and system factors and patient-related factors. As patients cannot switch into dialysis diet on their own there should be dietary counseling for them to help to change their dietary intake and it should be part of treatment for ensure they are taking adequate calorie and protein (Prasad *et al.*, 2008).

Very few studies have been done to address nutritional aspect of CAPD patients in Sri Lanka. As the previous literature was not available on similar studies in Sri Lanka, conducting this type of research will be important to understand nutritional status of this population. Assessing the adherence to the dietary recommendations in these population may be the first step towards directing appropriate nutritional interventions which is crucial to maintain proper nutritional status. Therefore, this study aimed to identify deviations of current nutrient intake from CAPD guideline recommendations in the study sample.

Methodology

Cross-sectional study was done at CAPD clinic, Nephrology and Transplantation Unit, National Hospital, Kandy. The study was carried out engaging 102 patients who attended to CAPD clinic. Simple random sampling method was used to select patients for the study. Considering about inclusion criteria, patients who were on CAPD treatment more than one month were recruited for the study. Total number of participants attending to clinic were 135 at the time of starting data collection. Simple random sampling method used to select patients for the study. Patients were asked to pick a chit randomly among chits which were numbered from 1 to 135. Only those patients who picked numbers in between 1 to 102 included in the study. Patients who were having peritonitis and other therapy related complications were excluded from the study.

A validated food frequency questionnaire (FFQ) which was developed for Sri Lankan adult population (Mallika Arachchige, 2013) was used to collect information about currently consuming foods on daily, weekly and monthly basis. The average frequency of food intake per week and month of the FFQ was converted to a daily intake value. In this FFQ, details about the quantity and frequency

of 90 food items were asked. Food portion sizes were obtained using standard household utensils such as cup, bowl, plate, glass, coconut spoons and other spoons; and these were clarified by demonstration using real utensils, portion size photographs and food atlas (Jayawardena and Herath, 2017). Then, all foods recorded in the FFQ were converted into grams and intake of nutrients was analyzed using NutriSurvey 2007 (EBISpro, Germany).

Finally, the actual daily intake of individuals compared to daily recommended values of ESPEN guideline.

Results and discussion

The study population consisted with 102 participants. Among them 35.3% (n=36) were female and rest were male (64.7%). The mean age of the participants was 54.91±12.57 years. 78.4% (n=80) of the sample were Sinhalese, 6.9% (n=7) were Tamil and 14.7% (n=15) were Muslim in ethnicity. Majority were married (91.2%). 32.4% (n= 33) of patients fulfilled lowest educational qualification which was considered as below O/L while 19.6% (n=20) of patients reported highest education qualification which was up to degree/diploma level.

Table 1 - Daily intake of nutrients and proportion of participants within recommended targets

Nutrients	Daily intake	N (%) within recommended targets	Daily recommendation
Protein	0.714(0.55)	11 (10.8)	1.2-1.5 g/kg/day/BW
Energy	20.76(11.46)	31 (30.4)	25 kcal/kg/day/BW
Phosphorus	687.8(352.07)	18 (17.6)	800 -1000mg
Potassium	1321.35(589.82)	11 (10.8)	2000-2500mg
Sodium	1755.5(1440.7)	27 (26.5)	1800-2500mg
Fiber	12.65(8.53)	11 (10.8)	20-25g/day

Data are expressed as median (interquartile range)

In the current study dietary energy and protein intakes were under recommended levels according to the ESPEN guideline reference ranges. Based on nitrogen studies ESPEN has proposed that CAPD patients should have a minimum of 1.2g/kg/BW daily protein intake to make sure a neutral protein balance (Akbulut *et al.*, 2013). In the current study, average daily protein intake was 0.7g/kg/BW reporting only 10.8% participants adhering to the recommendation. Apart from that recommended dietary energy intake of 25kcal/kg/BW reached by only 30.4% participants and average energy intake was only 20.7kcal/kg/BW. These findings are compatible with majority of studies where those studies also showed that most of the participants' energy and protein intake was inadequate (Luis *et al.*, 2016). A study revealed that the percentage of adherents for energy and protein recommendations is as low as 26% and 39% respectively (Wang *et al.*, 2003).

In this study reported potassium intakes were lower than target recommendations. Potassium adherence was 10.8% and 85.3% (n= 87) and most participants' intake was lower than the recommendation. Only 3.9% (n=4) consumed more than the recommended intake. This is a finding in agreement with a previous literature (Luis *et al.*, 2016). Generally, patients on CAPD should adhere to some limitations on most of the nutrients they consume. They are cautioned against excessive intake of dietary potassium as well.

Usually high protein foods contain high amount of phosphate. In this study as their dietary protein intake was low, it might lead to unintentional reduction of dietary phosphorus. In these patients, dietary phosphorus adherence was as lower as 17.6%, a finding that seems in agreement with previous literature (Luis *et al.*, 2016). Percentage of 66.7% (n=68) were below than recommendations. Meanwhile 15.7% (n=16) patients' phosphorus intake was higher than current recommendation. Fiber intake was also lower than the target recommendation (12.65g/day). The majority of individuals did

not consume sufficient fiber. Proportion of non-adherent was 85.3% (n=87). This finding is in line with a study which found that less consumption of dietary fiber. They suggest that it may be as a result of dietary advices received by patients to avoid fruits and vegetables as a measure to control potassium levels (Luis *et al.*, 2016). Constipation is a common complaint in CAPD patients and low fiber intake is a cause for constipation. Fiber-rich foods are normally high in potassium and phosphorus (Sutton, Talbot and Stevens, 2001). Advices to restrict potassium and phosphorus may adversely affect on the intake of sufficient fiber in these patients.

There are lots of uncertainties when estimating salt intake as daily consumption varies depending on their choices and preferences on daily basis. Food composition tables are also unable to consider each and every commercial product detail and exact salt amounts of regional preparation of dishes. Therefore, salt intake estimation is a difficult task (Vaz *et al.*, 2014). However, the average of sodium consumption of our participants was 1755.5(1440.7) mg/day while ESPEN recommendation proposes 1800-2500mg/day intake. Proportion of individuals consumed more than target daily sodium was 20.6% (n=21) and 52.9% (n= 54) individuals consumed less than target range.

Conclusion

In conclusion, the majority of CAPD patients, participated in this study did not meet current renal specific dietary recommendation in relation to all the selected dietary components. Furthermore, results show that majority of the participants consumed less than recommended intake. Finally, conventional dietary counselling which has received by all the participants is not enough in order to achieve proper dietary knowledge as well as to adhere to dietary modifications to reach recommended dietary targets values.

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Evaluation Of Efficacy & Efficiency In Implementing Knee Ankle Foot Orthosis (KAFO) As A Functionally Assistive Indoor Ambulatory Device For Motor Complete Thoracic Level (T_{10} –T_{12}) Spinal Cord Injury In Males

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Abstract:- The objective was to evaluate walking velocity, walking endurance & energy expenditure in use of KAFOs over the alternative Aluminum Back Slab & Toe Raising Straps (ABS & TRS) on paraplegic (T_{10} –T_{12}) ambulation which has not been performed among Sri Lankan patients. This was a case cross over study where fifteen, T_{10} – T_{12} motor complete paraplegic males who were practicing indoor ambulation with ABS & TRS & recommended to use KAFOs were recruited. A two weeks standardized ambulatory training was provided with either device prior to test. The 10 meter walk test, 6-minute walk test & physiological cost index (PCI) were used to assess walking velocity, walking endurance & energy expenditure respectively. Testing was done 6 weeks apart. A statistically significant difference was seen in walking velocity ($z = -3.30$, $p = 0.001$), with ABS & TRS having faster velocity. The walking endurance was significantly less ($z = -3.41$, $p = 0.001$,) & the energy expenditure was significantly high ($z = -3.41$, $p = 0.001$) with KAFOs relative to ABS &TRS. The results are closely compatible with previous studies, but remarkably differed with values of healthy individuals in normal ambulation. The walking velocity & the walking endurance of participants were relatively greater with less energy expenditure during ambulation with ABS & TRS. Therefore, it is concluded that KAFOs have less efficacy & efficiency as a functional indoor ambulatory device over ABS & TRS in rehabilitation of T_{10} –T_{12} paraplegic males.

Keywords: KAFOs, ABS & TRS, T_{10} – T_{12} paraplegics, walking velocity, walking endurance, energy expenditure, 10 meter walk test, 6-minute walk test, physiological cost index (PCI).

Introduction

A pair of Knee Ankle Foot Orthosis (KAFOs) is recommended as an assistive functional indoor ambulatory device for subjects with paraplegia resulting from T_{10} –T_{12} traumatic spinal cord lesions in local settings where an analysis of the efficacy and efficiency of the device yet to be perform among Sri Lankan patients undergoing rehabilitation following spinal cord injuries. Hence the objective of this study was to evaluate walking velocity, walking endurance & energy expenditure in use of KAFOs over the alternative Aluminium Back Slab & Toe Raising Straps (ABS & TRS) on paraplegic (T_{10} –T_{12}) ambulation which has not been performed among Sri Lankan patients.

Methodology

This was a case cross over study conducted at the Department of Spinal injury rehabilitation, Rheumatology & Rehabilitation Hospital, Ragama during the period of 4 months from April 2019 to evaluate the gait related parameters in indoor ambulation using a pair of KAFOs & that of using ABS with TRS. Fifteen,

T_{10} – T_{12} motor complete paraplegic males who were eligible for indoor ambulation with ABS & TRS as well recommended to use a pair of KAFOs were recruited for the study. They were providing with 2 weeks standardized ambulatory training with either device prior to test. The walking velocity, walking endurance & energy expenditure were assessed first with ABS & TRS & then with KAFOs.The10 meter walk test (see Figure 3) ,6-minute walk test (see Figure 4) & physiological cost index (PCI) were used respectively. Testing was done 6 weeks apart. Three data collecting trials were performed for 10MWT & PCI where it was two for 6-minute walk test. The ethical approval was gained from the Ethical Review Committee of Faculty of Medicine, University of Kelaniya, Sri Lanka.

Figure 1 - Pair of KAFOs

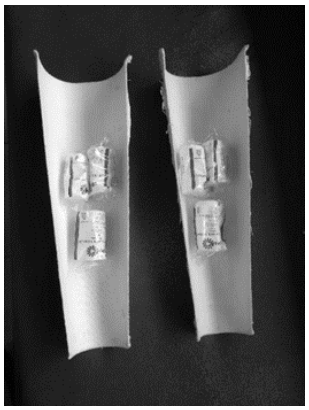

Figure 2 - Pair of ABS & TRS

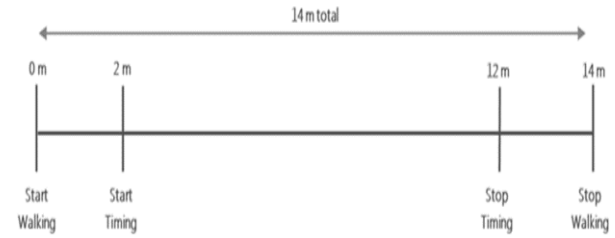

Figure 3 - Illustration of 10 MWT – Walking Path

Source: http://blog.parker.com

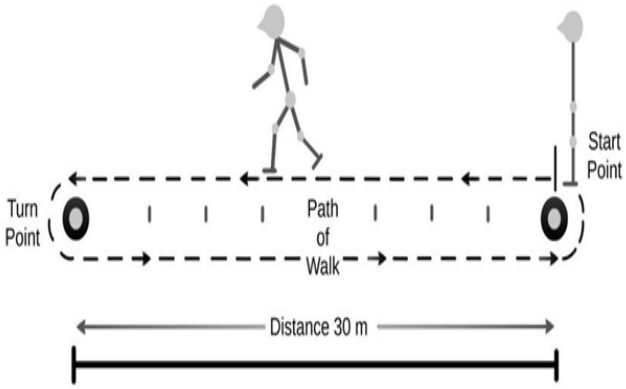

Figure 16 - Illustration of 6 MWT – Walking Path

Source: https://www.researchgate.net

Result

10-meter walking velocity with ABS & TRS was significantly (z = -3.30, p = 0.001) faster than that of KAFOs with a median (IQR) value of 5.36 m/min (4.50– 5.86) & 4.12 m/min (3.48 - 4.82) respectively. The walking endurance of lower thoracic level motor complete paraplegics with 6-minute walk test was significantly less with KAFOs (z = - 3.41, p = 0.001,) than ABS & TRS, with median (IQR) values being 27.48 m (19.60 m – 33.20 m) and 30.40 m (27.20 m – 38.40 m) respectively. A statistical significant difference was seen in energy expenditure values (z = -3.41, p = 0.001) where it is higher with KAFOs than that with ABS & TRS which showed median (IQR) values as 7.14 beats/m (5.95– 9.08) & 4.68 beats/m (2.91– 5.30) respectively.

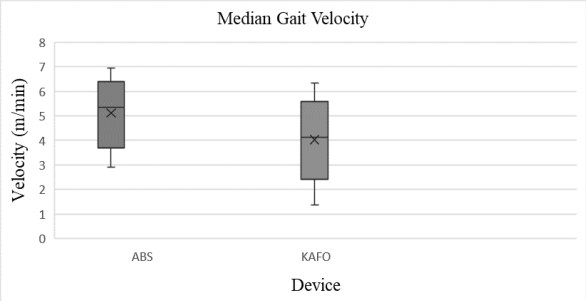

Figure 17 - Illustration of median gait velocities

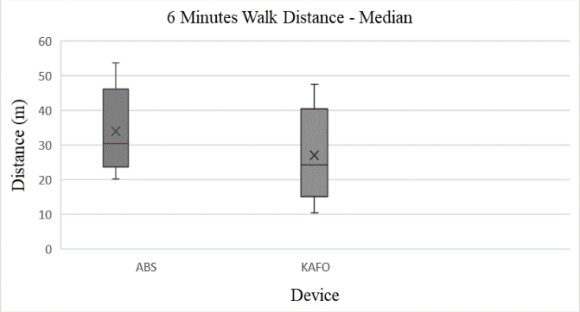

Figure 18 - Illustrate the median distance

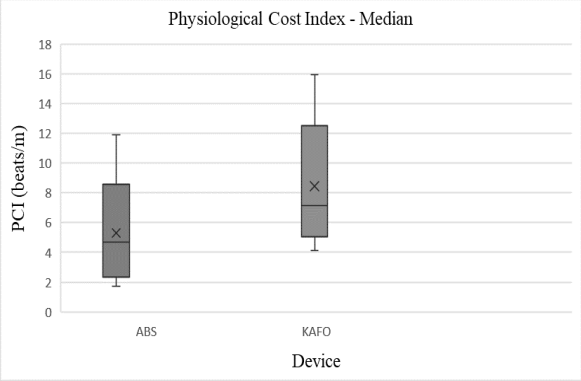

Figure 19 - Illustrate the median PCIs

Discussion

The extent to which an individual with paraplegia is capable of ambulate with an orthotic device is not merely determined by the lesion level itself. The degree of energy consumption, speed of ambulation, physical endurance, user friendliness, independency & several demographic factors as age & gender are crucial.

Since KAFO lost its popularity among the international setting with high abandon rate, use of KAFO as a functional assistive indoor ambulatory device in local setting is questionable. This study was conducted to evaluate the functional efficacy & efficiency of KAFO use of paraplegics with complete lesion at the level of T_{10} –T_{12}.

Results of the present study revealed that the walking velocity with ABS & TRS was significantly greater than that of KAFOs. It specifies that the subjects are proficient of walking faster with the alternative device than with more sophisticated KAFOs. As the same user tested with each device, the reason could be the considerably high amount of (almost triple) weight of the entire KAFO unit with the foot wear.

One parameter that has high demand in evaluating efficacy & efficiency of functional ambulation of paraplegics is the walking endurance. There was no literature related to endurance of orthotic ambulation.

The distance covered over 6 minutes was used as the predictor of endurance & it was significantly higher with the ABS & TRS than with KAFOs. This reveals that KAFOs has placed a greater exhaustion on paraplegics even in short distance ambulation. The less endurance in ambulation with KAFOs again could be due to the heaviness of the unit that subject has to propel with at a low velocity.

The endurance of healthy subjects ranged from 400m -700m.Therefore, compared to the healthy subjects, paraplegics have remarkably less endurance in ambulation with either device (ABS & TRS > KAFO).

Finally, the results of all the timed measures of this study support to prove the hypothesis of the functional performance of paraplegics in indoor ambulation with ABS & TRS is greater than that of KAFO.

Conclusion

According to the findings, the efficacy & the efficiency of the paraplegic ambulation with ABS & TRS is greater than that with KAFOs. The results showed a relatively greater gait velocity & comparatively higher endurance under less energy consumption with ABS &

TRS. Therefore, it is concluded that ABS & TRS would be a functionally effective indoor ambulatory alternative in rehabilitation of T_{10} –T_{12} thoracic level paraplegics in local settings rather using highly expensive less beneficial KAFOs.

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Psychological Experiences of Parents having a Child with Cleft Lip and Palate

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Abstract:-Cleft Lip and Palate (CLP) is one of the most common congenital craniofacial conditions globally. Parents' who are having Children with CLP are facing various types of experiences. A qualitative study was conducted to explore the parent's psychological experiences of having a child with CLP. Twenty parents who take care of children with CLP more than three months were purposively recruited for this phenomenological study. The study was conducted at Dental Teaching Hospital, Peradeniya and ethical approval was obtained from the Faculty of Allied Health Sciences, University of Peradeniya. Data were collected using semi-structured interviews and data analysis was done using thematic analysis method. Three major themes were emerged from the data as excessive sorrow, fear towards the surgery and coping with the child's birth defect. Not having the child that parents expected to have, low body weight of the child and sadness towards child's future with CLP were perceived as reasons for excessive sorrow. Probable complication of the surgery and lack of knowledge regarding the surgery were reasons for fear towards the surgery. Follow up treatments and family supports were helped parents to coping with the child's birth defect. These main negative adverse experiences and drawbacks help to understand several hidden unpleasant experiences of parents having a child with CLP. Hence, it is needed to ensure the importance of arranging social support services for these parents which are one of the neglected areas within the health care context of Sri Lanka.

Keywords: Cleft Lip and Palate, Parents, Experiences

Introduction

The CLP are among the most common congenital craniofacial birth defect globally. The CLP is referred to an abnormal opening of the lip and roof of the mouth (Revezes, 2013). A cleft lip and, on occasions a cleft palate, may be visualised antenatally by ultrasound scan and if identified early allows an opportunity to inform parents prior to birth. However, a facial cleft lip may also remain undiagnosed until the birth, when the full extent of the anomaly becomes apparent at delivery (Beaumont, 2006).

Child with CLP can be emotionally, socially, traumatic for parents (Johansson, 2004). The worldwide parents have so many experiences with CLP children. Johansson (2004) further explained parents slowly adapted to this situation. Most of the time, there is no major difficulties or problems with feeding a newborn child with Cleft Lip whereas a child with Cleft Palate has feeding problems because of its incapability to produce effective oral suction. According to clinical standards advisory group in United Kingdom (1998), the CLP may affect to child's capability such as feeding, chewing, breathing, and hearing along with cause to disorders of dental, facial, speech and even in language development.

Addressing about the 'loss', 'mourning' and 'correcting' have been common aspects in

research viewpoints in surrounding the diagnosis of a child with a cleft, which informed by the assumptions of previous theoretical perspectives (Olshansky 1962; Solnit & Stark 1962; Drotar et al., 1975). Both pre- and post-nataly, across countries and cultures, parents' feelings of shock, anger, grief and worry have been identified equally in surveys and in qualitative studies (Bradbury & Hewison 1994). Coy et al. (2002) found that some mothers of children with CLP or CP showed extraordinary protectiveness and responsiveness towards their children, as they viewed them as vulnerable.

There are many studies in worldwide regarding parents' experiences having child with cleft lip and palate. However, it is hard to find published studies related to this area in local context. Therefore, this study was aimed to determine the experiences of parents who are having children with CLP and identifying what kind of humanistic nursing care that should be provide to these parents

METHODOLOGY

This is a qualitative phenomenological study. Semi- structured interviews were used to collect data on parents' experiences and close observations to observe their expressions and responses. A sample of 20 participants was selected purposively considering the characteristics of population and objectives of the study. Parents who take care of children with CLP more than three months were recruited to the study and child should be diagnosed with CLP by a pediatrician and Oro Maxilla Facial surgeon and record should be available. This study conducted at the Dental Teaching Hospital, Peradeniya. Ethical approval was obtained from the ERC of Faculty of Allied Health Sciences, University of Peradeniya. Data analysis was done using thematic analysis method.

RESULTS

Sample was comprised with 85% of Sinhalese, 5%of Muslims and10% of Tamils. They were belongs to three age groups as 40% in18 - 25 years, 35% in 25 - 35 years and 25% over 35 years. As level of education60% parents had completed Ordinary level (O/L), 30% had completed Advanced level (A/L) and 10%were graduates. Furthermore, 10% of them were employed, 90% were unemployed. Considering the gender of the child 70% were male and 30% were female. Within the sample only 10% was diagnosed pre-natal stage. Among 20 children 5% diagnosed as Cleft lip, 15% children were diagnosed as Cleft palate and 80% diagnosed as both cleft lip and palate. From those 20 children 15% had family history of cleft lip or palate. When considering the birth order of child 55% were first child of the family.

Three major themes were emerged from the data as excessive sorrow, fear towards the surgery and Coping with the child's birth defect.

Excessive sorrow: Not having the child that parents expected to have, low body weight of the child and sadness towards child's future with CLP were perceived as reasons for excessive sorrow.

"*When I saw her, I didn't know what I could do with her. I thought there would be nothing anyone can do to my child. I was feeling something terrible" (Participant 06).*

"This is my first baby. We were looking for three years for a baby. We never thought our baby will be like this. When the nurse has shown my baby to me, I felt like this baby is not mine. I cried lot" (participant 8).

"When compared to other children, my baby is having low body weight. it's always make me sad" (participant 2).

"She is a girl; I really worry about her future with this condition" (Participant 5).

Fear towards the surgery: Probable complication of the surgery and lack of knowledge regarding the surgery were reasons for fear towards the surgery.

"I saw my baby lay on the theatre bed unconsciously. I was afraid. The doctor said that the baby is sleeping. But I had a fear that my baby will not be recovered after surgery" (participant 14).

"I searched about surgery via online. And I saw photos of babies before and after surgery. Then I strongly decided to go to the surgery as soon as possible. Before that I wasn't that much sure about the surgery" (participant 1).

Coping with the child's birth defect: Follow up treatments and family supports were helped parents to Coping with the child's birth defect.

"*When I took her to the clinic, I saw some children who were in the same condition. I understood that this is common, and I saw the pictures before and after treatment. I felt guilty that I hid my child in the beginning. I saw a nurse with the same condition and I was more encouraged that my daughter also will have bright future" (Participant11).*

"When I came to the hospital I saw many children with cleft lip and palate with their mothers, and I found that very strengthening. It helped me keep on track. I saw some children who have got treatment. I got new hope" (Participant3).

"As I went to hospital, I met many in the same condition. I became strong and even encouraged them. When I am there, I forget things that bother me and I feel am in a better position where treatments are available." (Participant14).

Most of participants worried of their family acceptance. There were many complaining, comparing with other children and not supportive from their extended family such as mother, mother in law, grandmother, sisters and sister in law.

"My mother in law said me that I was the first lady to give birth a child like this in their family" (participant 09).

"My sister in law always comparing her two children with my little one. She said again and again try to emphasise my baby is giving an extra burden to the family" (participant 12).

However, some participant has good family acceptance.

"My mother was with me until I got stronger and emotionally stable. Even in the hospital, she was the first one who came to see my baby. I was very happy to have her standing by my side" (Participant 4)).

"I think my mother in law is a great woman. She never complained me. She supports me always. She kept lot of hopes of her granddaughter. She always said with me that all the things happened according to the karma and we have to accept it. She participated to the bodhi puja to bless my child" (participant 09).

DISCUSSION

All most all participants of this study had great sorrow due to their children's condition. They were shocked when they were showing their baby at the first time. Similar findings were identified in other studies done in South Africa and Nigeria (Hlongwa & Rispel2018; Fakuade et al., 2012). This study was identified that most of the participants were denial to accept unfortunate condition and appearance of their child. Nidley (2016) also stated that the most parents of child with CLP in United States had denied.

All of participant initially had fear and confused for surgery. most of parents had reduced the fear in second time in palate surgery. These findings are also consistent with another study done by Chuacharoen et al., (2009).

Coping with the child's birth defect is a major finding that was identified in this study. Follow up treatment and family support were the sub themes in coping with condition. Most participants said that regular follow up treatment was help them coping with the child's birth defect and reduce psychological

discomfort. In a study done by Young *et al., (*2001) also found similar situation in their study which highlighted that follow up treatment was a good coping strategy.

CONCLUSION

Majority of the parents who are having children with CLP had negative experiences that they had to face in their life. The findings of this study can be used in staff education to promote understanding of Parents' experience and how best to help them to recover from psychological issues. And also counseling program will be started in the hospital for parents with cleft lip and palate child for reduce psychological disturbances.

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