Factors associated with anaemia during pregnancy in a semi urban area Dehiwala Mount Lavinia: a case-control study

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Abstract—Sri Lanka is much ahead in many health indicators when compared with other developing countries. However, this is not so with regard to indicators on nutrition, and the determinants are not only health but also economic, social and others. Therefore, to describe selected factors associated with anaemia during pregnancy; this study was conducted in the Medical Officer of Health (MOH) area of Dehiwala – Mount Lavinia which is the field training area of General Sir John Kotelawala Defence University (KDU).

Following the World Health Organisation (WHO) guidelines, anaemia was taken as haemoglobin level below 11.0 g/dl (6.8mmol/l). Cases were selected from all the antenatal clinics in the KDU Field Training Area during the study period of two weeks. For each case, two controls were selected who were the next two attendees with a haemoglobin level of 11.0 g/dl or above.

Twenty three mothers with low haemoglobin levels were used as cases while 46 were selected as controls. Cases and controls were not different in respect to income level, other demographics, and particulars about previous pregnancies. Age, (OR = 0.3429 CI=0.1219-0.9644) and having taken worm treatment within the past 3 months (OR = 0.2132 CI=0.054-0.8208) were differ from each others. There were more housewives among the cases.

Data were analyzed based on their breakfirst, lunch and dinner menus. Lunch was the main meal for both cases and controls. Consumption of animal proteins was more in controls than in the cases who were anaemic. Also they had their meals with less animal proteins.

This study reveals, anaemic pregnant females were older than the controls and had not taken worm treatment during the preceding three months. Therefore, all pregnant females should be encouraged to take antihelmintics.

Keywords— Anaemia, Pregnancy, Sri Lanka

I. INTRODUCTION

Pregnancy period is a precious time for any woman. Pregnant female has a vital role in giving birth to a healthy baby. The expectant period is crucial to the females in trial through obstacles. Along with more difficulties, anaemia during pregnancy can be considered as very important since it is seen as having a combined effect on the mother, the foetus and the baby in later life.

Factors associated with anaemia during pregnancy, has been studied by number of investigators in many occasions in Sri Lanka. (Abeysena, Jayawardana and Seneviratna 2010) As factors associated with anaemia are multi factorial, an integrated approach to antenatal care that recognises the combined effects that health, nutrition and socio-cultural stimulation have on foetal growth and mother's wellbeing during pregnancy need to be studied.

A diet low in iron (e.g. in vegetarians), lack of folic acid in the diet, or more rarely, a lack of vitamin B12, loss of blood due to bleeding from haemorrhoids or stomach ulcers, pregnancies at close intervals and women carrying twins or triplets are causes for anaemia.

II. LITERATURE REVIEW

Iron deficiency anaemia during pregnancy is an important cause of restricted foetal growth leading to low birth weight, preterm delivery, maternal illness and deaths(Allen,2000).

It is estimated that more than one-third of women in the world are anemic and iron deficiency is the most common cause of anemia in majority of settings (McLean, 2009). In addition, many of these women live in rural communities of developing countries where intestinal parasitic infections are endemic (WHO, 2009).

Iron deficiency is thought to be the most common cause of anemia globally, but other nutritional deficiencies (including folate, vitamin B12 and vitamin A), acute and chronic inflammation, parasitic infections, and inherited or acquired disorders that affect hemoglobin synthesis, red blood cell production or red blood cell survival can all cause anemia. Of the parasitic infestations, hookworm infections contribute to severity of anemia and persistent by causing chronic blood loss(Brooker, Hotez & Bandy 2008; Crompton, 2000).

Human hookworm infection has long been recognized among the major causes of anaemia in poor communities, but understanding the benefits of management of

hookworm infection in pregnancy has lagged behind other major causes of maternal anaemia.

It has been hypothesized that the antihelminthic drugs mebendazole and albendazole may have a positive impact on birth outcomes if administered during pregnancy, but conclusive evidence is still lacking. Preventive therapy through mass de-worming is recommended when the prevalence of infection with any soil-transmitted helminth exceeds 20% (WHO, 2006).However, very few countries have promoted routine antihelminthic treatment in women of reproductive age (Larocque & Gyorkos, 2006).

According to the Annual Report of Sri Lanka, Family Health Programme – 2010, the percentage of mothers with anaemia has increased by 3 % during the previous 4 years to reach 8.3% in 2010. Only 0.7% was severely anaemic (Hb<7g/dl) and a notable geographical variation in prevalence of anaemia among mothers is seen (Family Health Bureau, 2011). This figure may seem low, as the data are of the mothers attending antenatal clinics and tested for haemoglobin at government MOH antenatal clinics. But, other studies also had comparable results of 7.1% (95% CI 5.4-8.9%) and 8.2% (Abeysena, jayawardana & Senaviratna, 2010; Sivaganesh &Senarath, 2009)

A study in Anuradhapura District revealed the prevalence of anaemia in the first, second and third trimesters as 7.6%, 19.7% and 19.3% respectively. Gestational age adjusted anaemia prevalence among pregnant women in this study population was 14.1% (95% CI 12.0-16.4%) (Chathurani, 2012).

The present study was conducted to describe selected factors associated with anaemia during pregnancy, in the Medical Officer of Health (MOH) area of Dehiwala – Mount Lavinia which is the field training area of the General Sir John Kotelawala Defence University (KDU).

In Sri Lanka, MOH area is a health unit headed by a Medical Officer of Health. The MOH and the staff of Public Health Midwives, Public Health Inspectors, Public Health Nursing Sisters and others provide preventive and primitive health services to the area which usually corresponds with the administrative boundary of a divisional secretariat division.

III. METHODOLOGY

This is a case control study carried out within the MOH area of Dehiwala – Mount Lavinia.

Mothers with haemoglobin level below 11 g/ dl were selected as cases and mothers with haemoglobin level 11 g/ dl and above were the control group. Qualitative data regarding diet was analysed manually.

Following the WHO guidelines, anaemia was taken as haemoglobin level below 11.0 g/dl (6.8 mmol/l (WHO, 2011).

MOH Area Dehiwala –Mt.Lavinia
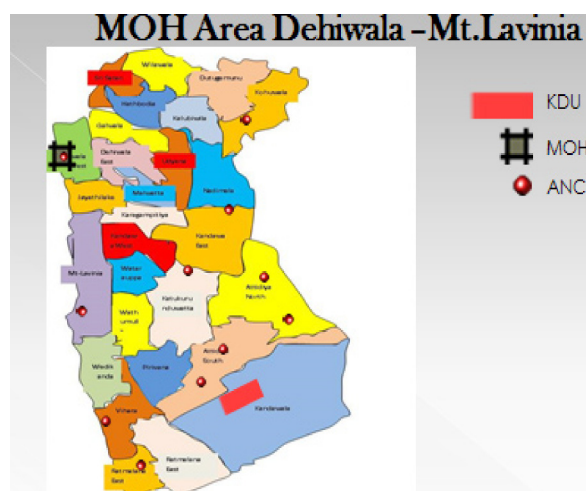
The study population was all the antenatal mothers who utilize care from clinics within the MOH area Dehiwala -Mt. Lavinia. The cases were selected from all the antenatal clinics in the KDU Field Training Area during the study period of two weeks. For each selected case, subsequent two mothers with normal haemoglobin levels were recruited as controls.

Data collection was through an interviewer-administered questionnaire. Basic demographic details, information regarding the family and past pregnancies, haemoglobin level and a 24-hour dietary recall were collected.The variables collected were mother's age, religion, ethnic group, occupation, current period of amenorrhoea (POA), haemoglobin level with the investigation date and family average monthly income.

Ethical clearance wasobtained from the Ethics Review Committee of the Faculty of Medicine, General Sir John Kotelawala Defence University. Informed written consent of the participants were obtained. Collected data was entered in MS-Excel® and analyzed using SPSS version 10®.

IV. RESULTS

Results presented are for23 mothers with low haemoglobin and 46 as controls. Factors associated with anaemia during pregnancy can be linked with socioeconomic variables such as level of education, unemployed (being housewives), family income, religious beliefs and number of family members.

The results indicated that cases and controls were not different in respect to income level, other demographics and particulars about previous pregnancies.

In this study, the declared family income of the mothers in the low haemoglobin level group was lower than among the controls. However, this was not statistically significant (Table 1).

Income (Rs.)	Case No. (%)	Control No. (%)	Total No. (%)
<15,000	5 (21.7)	5 (10.9)	10 (14.4)
15,000-29,999	11 (47.8)	25 (54.3)	36 (52.2)
30,000 & over	7 (30.4)	16 (34.8)	23 (33.3)
Total	23 (100)	46 (100)	69 (100)

$\chi2 = 2.74$, p = .60

Table 1. Distribution of cases and controls according to declared monthly average family income (in Rupees)
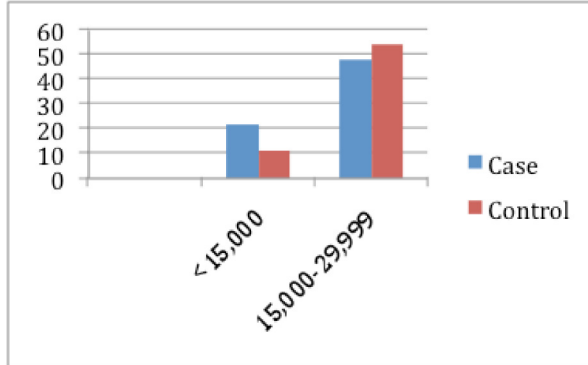

When considering the educational level it was seen that the majority of anaemic mothers had studied only up to G.C.E. (O/L) in contrast to the controls where the majority had G.C.E. (A/L) education (Table 2).

| Educational level	Case No. (%)	Control No. (%)	Total No. (%)
O/L & below	13 (56.5)	21 (45.7)	34 (49.3)
Above O/L	10 (43.5)	25 (54.3)	35 (50.7)
Total	23 (100)	46 (100)	69 (100)

$\chi2 = 0.73$, p = .40

Table 2. Distribution of cases and controls by educational level
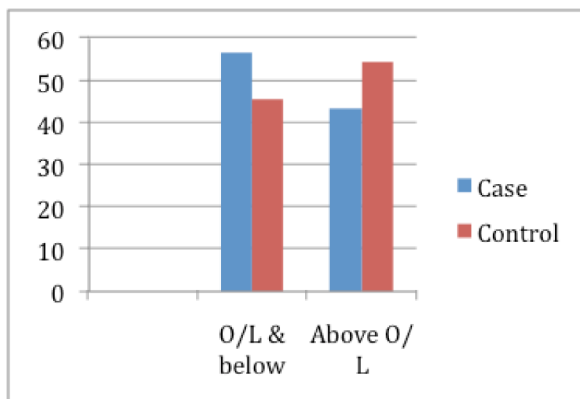
Considering the employment status, present study shows that 74% of cases and 62% controls were housewives. But, the association was not significant (Table 3).

Employment states	Case No. (%)	Control No. (%)	Total No. (%)
Housewife	18 (75)	28 (62.2)	46 (66.2)
skilled worker	6 (25)	16 (35.6)	22 (32.4)
unskilled worker	0 (0.0)	1 (2.2)	1 (1.5)
Total	24 (100)	45 (100)	69 (100)

Table 3. Distribution of cases and controls by employment status
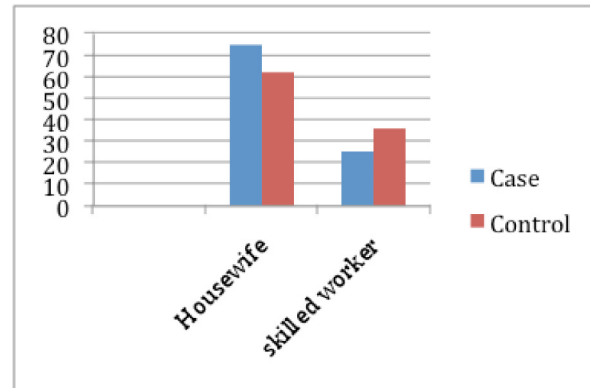
Age group was significantly associated with the status of anaemia (Table 4).

Cases (mean 31.09, SD 5.13) and controls (mean 4.87, SD 0.72) t-test 1.96, p .054.

| Age groups	Case No. (%)	Control No. (%)	Total No. (%)
Below 30 years	9 (39.1)	30 (65.2)	39 (56.5)
30 years & above	14 (60.9)	16 (34.8)	30 (43.5)
Total	23 (100)	46 (100)	69 (100)

$\chi2 = 4.25$, p = .04

Table 4. Distribution of cases and controls by age group
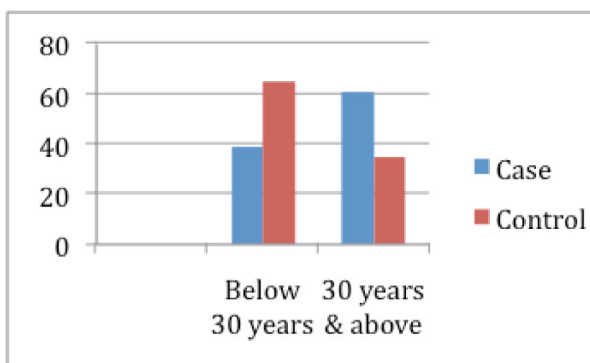
Of the anaemic mothers, 35% were multi parousas against 16% of controls (Table 5). A mother in her second pregnancy can have low iron reserves from malnutrition and /or earlier pregnancies. Considering mother's trimester, all the respondents were in the second or 3rd trimesters. With regard to the stage of pregnancy from the beginning of the second trimester there is a major expansion in the maternal red cell mass, which continue to the third trimester.

Parity	Case No (%)	Control No (%)	Total No (%)
Primi	15 (65.2)	37 (84.1)	52 (77.6)
Multi	8 (34.8)	9 (15.9)	17 (22.4)
Total	23 (100)	46 (100)	69 (100)

Table 5. Distribution of cases and controls by parity
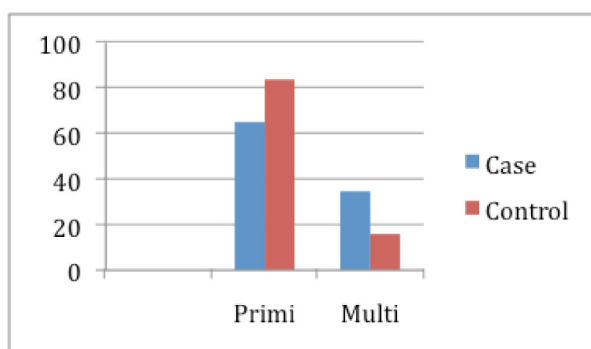
Being less than 30 years old (OR 0.34,95% CI0.12-0.96) and having taken worm treatment within the past 3 months (OR 0.21, CI0.05-0.82) were protective against anaemia during pregnancy.

Most of the mothers' knowledge was not at satisfactory levels on factors related to anaemia. They believed causes such as not taking a balance diet and believed not eating enough foods.

In the qualitative data analysis, it was seen that the majority of the cases and controls consumed rice with curry for breakfast and a fair number consumed string hoppers and pulses. Those who ate bread had consumed it with curries. There were similar percentages of cases and controls who did not have anything to eat for breakfast and many of them were in their first trimester.

When compared with cases, more controls had eaten rice and curry for dinner. The cases who had their dinner bought from outside had it with usually only one curry. This is despite a higher percentage of cases than controls being housewives. Lunch was the main meal for both cases and controls. Consumption of animal proteins was more in controls than in the cases who were anaemic.

Most of the antenatal mothers believe spinach as an iron rich food. But the relevant literature shows that it is a strong inhibitor of iron absorption. (Ministry of Health & Women's Affairs, 2000)

There were more Hindus and less Catholics among the cases though it was not statistically significant. There were more housewives among the cases. According to the figures it has revelled most of the housewives are not concerned about their meals and do not eat a variety of food. Workers if they prepare one or two curries for their lunch they eat daily more than that sharing with office staff.

V. DISCUSSION

Available information from both developed and developing countries highlighted the high prevalence of anaemia among pregnant women (Ratnam,1993).

This study was conducted to identify factors associated with anaemia during pregnancy in the selected area.

Annual Report, Family Health Programme in Sri Lanka – (2010), found that the percentage of mothers with anaemia has increased by 3% during the previous 4 years to reach 8.3% in 2010.

Factors of this study arecorresponding to the WHO, findings in the year 2009. (WHO 2009). Evoidance for percentages of mothers who have taken antihelmintics were fewer, it's only 13.0%among cases. Those who have taken anthelmintics among controls were 41.3%. Therefore, parasitic infections can regard as a considerable problem with anemia during pregnancy in this study.

It was evident that money was not the only factor to determine the iron intake of the mothers. They took animal proteins with fewer meals. When comparing their animal protein consumption, 87% of cases were non vegetarians. Among controls97.8% were non vegetarians. Though they had small quantity of animal proteins it was not enough for the daily requirement. They took meat, fish, egg or liver daily could be seen among controls. However, this account in part for the relatively high incidence of low birth weight, inhibition of infant growth, impaired immunity and increase morbidity from infectious diseases.

According to the results, most of the housewives are not concern about their meals and they do not eat variety of food. Workers if they prepare one or two curries for their lunch they eat daily more than that sharing with office staff.

Maternal care is provision of excellent in the health care system of Sri Lanka. The wide spread supplementation of iron-folate and vitamins to all pregnant women in maternal and child health programme and Thriposha – protein energy micronutrient supplement –also helped to reduce their nutritional deficiencies (Ministry of Health & Women Affairs 2000).Conversely, there is an inadequacy

of relevant information regarding their knowledge and attitudes on factors associated with this problem.

VI. CONCLUSION

This study conducted to identify factors associated with anaemia during pregnancy revealed that anaemic pregnant females were older than the controls and had not taken worm treatment during the preceding three months. Also they had taken animal proteins with fewer meals.

Some of the other factors could have been significantly associated with anaemia during pregnancy. But due to the lower sample size in this study they were not statistically significant. Further studies with larger sample sizes and preferably qualitative studies are needed to analyse the effect of animal proteins on anaemia.

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