Military Training Improves Lipid Profile

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Abstract *-The effect of physical exercise during military training on plasma lipid levels has not been investigated in Sri Lankan military establishments. This study examined the effect of military training on lipid profiles of officer cadets in one of the training centres in Sri Lanka.*

The study sample consisted of four groups; 1. Non–exercised control group (NE), 2. Military training for 6 months (E6M), 3. Military training for 18 months (E18M) and 4. Military training for 30 months (E30M). Each group consisted of 30 participants. Plasma HDL-cholesterol, triglycerides and total cholesterol (TC) were measured using enzymatic techniques and colorimetric determination. LDL-cholesterol level was calculated using the standard equation.

A significant reduction in mean TG was observed in all groups that had military training; E6M ($p<0.005$), E18M ($p< 0.05$) and E30M ($p<0.001$) as compared to control. LDL-cholesterol levels were also significantly low in groups that had military training compared to the control group ($p<0.005$). The reduction in TC was significant in groups E18M ($p<0.01$) and E30M ($p<0.005$) and it was observed that prolonged exercise resulted in greater improvements in TC. HDL-cholesterol levels were significantly high in groups who underwent military training for more than 18 months ($p<0.005$ in E18M and $p<0.01$ in E30M).

Military training has significantly improved lipid profiles of young officer cadets.

Keywords— exercise, HDL-cholesterol, LDL-cholesterol, triglycerides, total cholesterol

I. INTRODUCTION

Life style changes due to industrialization and urbanization has led to many health issues. Non-communicable diseases are one such category. Excess weight during adult life significantly alters individual's risk for cardiovascular disease (1,2) Hyperlipidaemia leading to atherosclerosis causes significant contribution to morbidity and mortality in many countries including Sri Lanka (3). Lack of physical exercises is a recognized contributory factor for hyperlipidaemia. Low plasma levels of high-density lipoprotein (HDL) cholesterol, and elevated low-density lipoprotein (LDL) cholesterol and triglyceride (TG) are important independent risk factors for atherosclerosis (4). Physical exercise has shown to improve lipid profiles by increasing insulin sensitivity and serum HDL cholesterol while decreasing serum LDL cholesterol and triglycerides (5).

Physical exercise is an essential component in military training. Military service requires strict adherence to body composition, fitness (6) and medical standards (7). Military personals are generally considered as healthy, physically-fit adults with a low risk for developing cardiometabolic disease. The officer cadets recruited to the General Sir John Kotelawela Defence University (KDU) undergo regular military training in addition to their academic work. Studies have not been carried out in Sri Lanka to investigate whether the physical exercise during military training improves plasma lipid levels. Hence, this study was carried out to investigate the effect of regular physical exercises on lipid profiles of officer cadets recruited to the KDU.

II. METHODS

A. Research design

The study sample consisted of gender matched four groups with 30 participants in each group. The ages ranged from 18 – 22 years. A non-military student group of the KDU with no regular exercise was taken as the control (NE). The other three groups had formal military training with regular exercise for varying durations; six months (E6M), eighteen months (E18M) and thirty months (E30M). Written informed consent was obtained from all the participants. The study protocol was approved by the Ethics Review Committee of the KDU.

B. Amount of physical exercise

The exercise groups participated in a supervised, progressive, strength training programme, with 45 minute to 2 hour sessions five days a week which included running, stretching and muscle strengthening exercises. In addition, a 45 minutes swim per week was also conducted.

C. Study protocol

5 mL of venous blood samples were drawn into heparinised tubes after 12 hours of overnight fast. The samples were centrifuged immediately at 1500×g for 15 min to separate plasma. Plasma samples were used to measure HDL-cholesterol, TG and total cholesterol (TC). HDL-cholesterol level was measured using HDL Cholesterol kit (Human, Germany). A TG kit (Biolab, France) was used to measure TG levels and cholesterol liquicolor kit (Human, Germany) was used to measure TC levels. All the reactions were carried out according to the manufacturer's protocols and colorimetric determination was done at given wave lengths using a spectrophotometer. LDL- cholesterol was calculated by using the following standard equation; LDL = TC - HDL - TG/5.0 (mg/dL).

D. Data collection

Information about the participants' sleeping behavior, alcohol usage, smoking habits and medication usage were recorded in addition to collection of blood.

E. Statistical analysis

Statistical analyses were conducted using SPSS statistical software. ANOVA was used to evaluate the difference between mean values of exercise groups and controls. Significant levels were determined by Post Hoc comparison of NE with exercised groups.

III. RESULTS

Table 1: Mean height and weight of the participants

Group	Mean height (cM)	Mean weight (KG)
NE	168.8	67.3
E6M	169.7	59.1
E18M	172.1	58.7
E30M	168.8	63.0

A. Effect of military training on total cholesterol

Those who had 30 months regular exercises had 20% reduction in TC (181.3±7.6 *vs* 145±8 mg/dl; $p<0.005$; Fig 1). The reduction in TC was significant in all exercise groups E18M ($p<0.01$) and E30M ($p<0.005$) compared to the control group.

B. Effect of military training on HDL and LDL cholesterol

There was a strong trend towards a significant decrease in LDL cholesterol in the exercising groups ($p<0.05$) (Fig 2). Decrease in LDL seen in 30 months exercise group was 33.9% compared to the control group. HDL-cholesterol levels were significantly high in groups who underwent military training for more than 18 months ($p<0.005$ in E18M and $p<0.01$ in E30M) (Fig 3). In addition, E30M shows 38.9% increase in HDL compared to NE. Further, a significant decrease in the LDL to HDL cholesterol ratio was observed in the exercising groups.

C. Effect of exercises on triglycerides

The mean TG difference between control and exercise group was significant; E6M ($p<0.005$), E18M ($p< 0.05$) and E30M ($p<0.001$). The total reduction of TG at the end of the 30 months was 37.2% (Fig 4). However, there was an increase in the TG in E30M compared to the E18M.

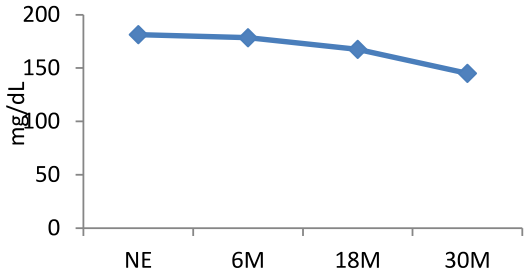

Figure 1: The pattern of total cholesterol level with the duration of exercise

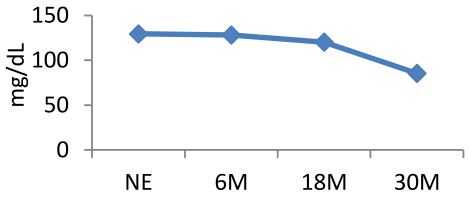

Figure 2: The pattern of LDL- cholesterol level with the duration of exercise

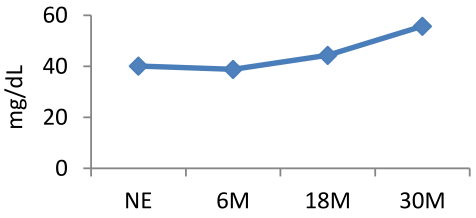

Figure 3 : The pattern of HDL- cholesterol level with the duration of exercise

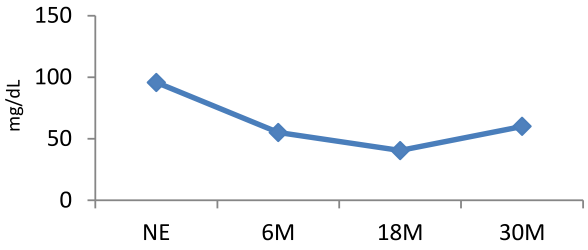

Figure 4: The pattern of triglycerides level with the duration of exercise

IV. DISCUSSION

To the best of our knowledge, this is the first scientific research done in Sri Lanka to assess the effects of military training on lipid profiles. The present study clearly shows that the military training during the cadet life of officer cadets at the KDU induces a significant improvement in the lipid profiles.

This finding is in agreement with reports of previous studies. A similar study was carried out in young men undergoing military service with a structured exercise training program (8). They reported a decrease in total cholesterol, LDL cholesterol, triglycerides, and decreased ratios of LDL/HDL cholesterol and total/HDL cholesterol after 12 months of resistance training.

In our study the improvements in lipid levels were observed after 18 months of regular exercise. This trend was particularly seen in total cholesterol, LDL and HDL cholesterol levels. These results support the efficacy of regular physical exercises in altering lipid profiles in young individuals.

Table 2: P values of one way ANOVA and means for different types of serum lipids of different study groups

Biochemical parameter	NE	E6M	E18M	E30M	P One way ANOVA
Total Cholesterol (mg/dL)	181.3±7.6	178.4±5.3**	167.5±7.1*	145±8‡	0.01
HDL-Cholesterol (mg/dL)	40.1±6.5	38.8±1.3	44.3±1.7‡	55.7±5.9*	0.000
LDL- Cholesterol (mg/dL)	129.3±9.9	128.1±5.7**	120.2±7**	85.4±9‡	0.000
Triglycerides (mg/dL)	95.7±5.4	55.1±3.1**	40.4±3.3‡	60.1±3.3*	0.006

Values are mean± standard error.

NE, Non–exercised control; **E6M**, exercised for 6 months; **E18M**, exercised for 18 months; **E30M**, exercised for 30 months

†P <0.001 for the comparison with the control group.

Diet is an important factor for lipid profile (9). Our study was conducted in a military setting and a dietary intervention was not included.

None of the participants had consumed alcohol or smoked during the past 24 hours prior to the experiment. All the participants had nearly 5 hours of sleep during the night before data collection.

The favorable alterations observed in this study in the lipid profile might be due to the comprehensive lifestyle modifications required during military training.

V. CONCLUSIONS

Military training improves the lipid profile; improvements are more significant when the duration of training reaches 30 months.

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