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EFFECT OF SWIMMING ON BIOCHEMICAL AND ANTHROPOMETRICAL PARAMETERS IN YOUNG BEGINNERS

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Background: *Sedentary lifestyle has become a health menace nowadays. The tremendous increase in the incidences of cardiovascular diseases and Diabetes mellitus has led us to testify the usefulness of exercise in prevention of these chronic diseases. Swimming is one exercise which can be performed by people of all age groups especially those who cannot go for brisk walking, jogging and cycling.*

Methodology: *The study was planned to check the improvement in biochemical and anthropometrical parameters which are related to health and fitness. The age, body weight and height, were recorded to constitute a group along with which fasting blood samples before the training were taken and were analyzed for lipid profile and glucose levels. Similar measurements were done after the training of 12 weeks.*

Result: *Significant differences were found between the serum levels of total cholesterol, Triglycerides, and VLDL Cholesterol. Fall in the level of LDL-C was accompanied by increase in the level of HDL-C, though they were not significant. The level of serum glucose was raised but insignificantly.*

Conclusion: *Swimming has beneficial effects in improving the lipid profile and in reducing the BMI and BFM%. But the exercise should not become a physical stress to the body. Exercise habits should be encouraged in general population to decrease the risk of lifestyle diseases.*

Keywords: swimming, lipid profile, life style disease (LSD).

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HDL-high density lipoprotein, LDL-low density lipoprotein, VLDL-very low density lipoprotein, TC-total cholesterol, GOD-POD-glucose oxidase-peroxidase, BMI -body mass index, BFM- Body Fat mass

Introduction

Due to urbanization and rapid increase in the technology, life has become easy and comfortable. Now more and more people are having sedentary lifestyles. This has led to exponential growth in number of life style diseases like diabetes mellitus and cardiovascular diseases. According to Diabetes Atlas published by the International Diabetes Federation (IDF), there were an estimated 40 million persons with diabetes in India in 2007. The countries with the largest number of diabetic people will be India, China and USA by 2030[1]. The reported prevalence of coronary heart disease (CHD) in adult surveys

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has risen 4-fold over the last 40 years (to a present level of around 10%), and even in rural areas the prevalence has doubled over the past 30 years (to a present level of around 4%). Cardiovascular disease is now the leading cause of death, accounting for 29% of all deaths in 2005, according to the WHO [2]. The economic loss incurred upon the treatment of these diseases as well as their complications is also alarming [3]. Moreover, all the drugs that are used carry some side effects. The impact of stress both physical and mental along with lifestyle changes has a strong effect of increasing incidence of these life style diseases [4]. Therefore, it becomes imperative to take precautions and avoid these diseases as far as possible. Exercise is one most economical way of preventing these life style diseases [10]. Exercise means excessive use of muscles for a short interval of time. Regular exercise is very important for health and fitness of the body. It not only reduces stress, anxiety and depression and improves mental health that in turn improves physical health. These changes are also reflected in individual's clinical parameters like improvement in the lipid profile. Therefore, exercise contributes to overall improvement in health.

The average age at the time of onset of LSD is rapidly falling. Earlier these diseases were usually diagnosed at the age of around 50 years [5], which has now declined due to the stressful lifestyle [6]. Actually, the phenomena which lead to LSD starts about 10 years before the diagnosis of the disease. Therefore, it becomes justifiable that youngsters should be regularly scrutinized for fluctuations in their biochemical as well as different physical parameters like abdominal obesity and should be taught about healthy habits.

In the present study we have attempted to correlate regular swimming with changes in various biochemical parameters to evaluate its effectiveness in prevention of deadly diseases like diabetes mellitus and cardiovascular disorders.

Materials and Methods

The number of undergraduate students who took part in swimming training for 12 weeks was 30. Age of the cases varied from 20-27years. They were allowed to swim for 30 minutes daily in the morning. Initially they were started to in 4 feet water and gradually they shifted to deeper ranges according to their ability. To perform the estimation of serum glucose and total cholesterol, HDL- cholesterol and triglycerides tests, kits were purchased from Span Diagnostics. The Systronic semiautoanalyser was used to estimate biochemical parameters. 5ml blood was collected by venipuncture on the first day of training in the fasting state in the morning. Serum was separated by centrifugation at 5000rpm for 10 mins. Estimation of glucose was based on GOD-POD method and other estimations were also enzyme based. Parameters like VLDL cholesterol and LDL cholesterol were calculated as per Friedewald Equation [7]. BMI was calculated from their height and body weight and body fat mass % was calculated from the formula [8]

Adult Body Fat % = (1.20 x BMI) + (0.23 x Age) - (10.8 x gender) - 5.4

where male gender= 1, female=0.

After 12 weeks of free style swimming training, a fasting venous sample was collected again and similar tests were performed.

Results

The results are based on the 30 cases who completed the study. There were no significant differences in age, body mass index (BMI), intake of total and fat calories of all the cases. 12 weeks of training

resulted in a 11.35% decrease in total cholesterol ($p<0.05$); 1.19% decrease in LDL cholesterol ($p>0.05$) and 13.59% increase in HDL cholesterol ($p>0.05$). A statistically significant ($p>0.05$) fall in triglyceride concentration (49.11%) was observed following the swimming program. Serum glucose level showed an increase of 1.19% but it was not significant ($p>0.05$). LDL: HDL ratio showed a change from 2.37 to 2.06. TC/HDL-C also changed from 4.09 to 3.18. Fall in the weight (10.7%) was noticed which was accompanied by the fall in BMI (9.5%) and BFM% (9%).

Discussion

Metabolically most significant effect of exercise on human body is on the serum levels of lipids and glucose, which are main risk factors for the lifestyle diseases. During exercise, the requirement of glucose increases. Therefore, glucose is lowered by exercise due to increased permeability of glucose in peripheral tissues. But in our study we saw a slight increase in the levels of serum glucose. This finding can be attributed to the increase in appetite of the young students subjected to exercise. The other reason to be responsible for the finding may be that swimming is perceived as stress by the body and leads to the release of stress hormones like cortisol and catecholamines which can cause increase in the serum glucose[8]. Moreover cortisol itself has its own natural peak secretion in the morning. The lipid profile has shown tremendous improvement in the cases. A statistically significant drop was seen in the levels of total cholesterol and LDL-cholesterol. A fall in the levels of triglycerides and an increase in the levels of HDL-cholesterol were observed though it is not statistically significant. These observations support the fact that the lipid profile is improved by the short term swimming programme. Since some of the results are not statistically significant, it implies that if the duration of swimming programme is increased then those findings may also become significant. Moreover, one more significant change being noticed is the decrease in standard deviation of all the parameters. This observation can be interpreted as that the rate of improvement is directly proportional to the abnormality in the blood levels. Similar observations have been reported by Lippi et al [9] and he concluded and recommended regular aerobic exercise as a means of favourably altering lipid profile and reducing risks for cardiovascular disease. Oyeloola et al [10] concluded that exercise appeared to decrease the TC: HDL ratio in athletes by lowering LDL cholesterol, while the HDL-cholesterol remained unaffected. Tokmakidis et al [11] has emphasized that regular exercise training has beneficial effects on blood lipid profile but this effect can be reversed if one stops the exercise and therefore, it becomes important to make exercise a habit. Marti et al [12] confirm that individually prescribed, unsupervised jogging increased HDL-C levels and improved the serum lipoprotein profile in non-smoking males. Many studies [13] have supported that swimming is as good as land exercises and may prove even better [14,15,16] in reducing the cardiac risk.

Conclusion

On the basis of our observations and the observations of elsewhere, it can be concluded that regular swimming helps in decreasing LDL cholesterol, Total cholesterol, Triglycerides and in increasing HDL cholesterol. The exercise should be planned in such way that it does not become a stress to the body. The improvement in the lipid profile due to swimming is similar to other land exercises.

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