

# INFLUENCE OF REGULAR EXERCISE ON ANTHROPOMETRIC AUTONOMIC AND LIPID PARAMETERS IN PREMENOPAUSAL WOMEN

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**Abstract:** Regular exercise activity has been repeatedly shown to have many health benefits in woman. The study was aimed to determine the influence of regular exercise on anthropometric and autonomic parameters in premenopausal woman. This cross sectional study included a total of 100 healthy premenopausal women who were divided into two groups which included the exercising group and the non exercising group. The exercising group included 50 women who were selected from the health and fitness centres in Mangalore. The control group included 50 healthy non exercising women selected from the general population. In the present study, the anthropometric and autonomic parameters were significantly increased in the ( $P < 0.05$ ) in the non exerciser group when compared to the exercisers group. Further, serum lipid profile analysis showed a significant increase ( $P < 0.05$ ) in the serum LDL level and LDL: HDL ratio in the non exercisers group when compared to the exercisers group. In conclusion, regular aerobic exercise as a part of life style modification will improve cardiac autonomic functions and lipid profile.

**Keywords:** Regular exercise, Premenopausal women, Lipid profile, Heart rate, Body weight

## I. INTRODUCTION

Anthropometry is an essential tool to evaluate underweight and obesity conditions, which are both important risk factors for severe diseases and disability. Women are clearly more concerned about their health. There have been significant increases in the number of women who worry about having a stroke or getting osteoporosis, diabetes or Alzheimer's across all ethnic groups. Obesity is a condition of an abnormal or excessive accumulation of body fat in adipose tissue to the extent that health may be impaired [1]. However, obesity develops from the interaction between genotype and the environment. However, it involves the integration of social, behavioural, cultural, physiological, metabolic, and genetic factors [1]. It is well established that directly or indirectly obesity is associated with various diseases, especially cardiovascular disease, hypertension, diabetes mellitus, sleep apnea, osteoarthritis, fatty liver disease, gallbladder disease, and certain types of cancer. Therefore, its manifestation poses a real threat to health [2]. Studies have proposed that lower physical activity contributes to middle-age weight gain in women [3, 4].

Physically active women are leaner than sedentary women [5]. This may be due to self-selection, exercise-induced weight loss, or the attenuation of age-related weight gain. The causal relationship between vigorous exercise and weight loss, although logically self-evident is not strongly supported by intervention trials, particularly in premenopausal women [6, 7], although examples exist [8]. Regular physical exercise leads to considerable changes demonstrated in the increase of health related fitness and in the decrease of the risk factors leading to a number of disabling medical conditions which occur

in people who are inactive [9,10]. Body weight, Waist hip ratio and waist circumference can be easily measured and therefore are frequently used in large-scale epidemiologic studies to find out the health hazards caused by obesity. Cardiovascular disease (CVD) in women is the leading cause of mortality in the present society, and less than optimal lipid and lipoprotein levels are major risk factors for CVD. Heart rate is the number of heartbeats per unit of time, typically expressed as beats per minute. A number of investigations indicate that faster resting heart rate has emerged as a new risk factor for cardiovascular mortality in human beings [11]. Faster heart rate may accompany increased production of inflammation molecules and increased production of reactive oxygen species in cardiovascular system, in addition to increased mechanical stress to the heart [12]. The present study attempts to associate the influence of regular exercise on anthropometric and autonomic parameters in premenopausal woman. With this information, this study might provide direction of further research which, in turn will serve to generate directional and predictive hypothesis useful in establishing guidelines for the maintenance of a good health in premenopausal woman.

### II. MATERIALS AND METHODS

This cross sectional study included a total of 100 female subjects (30-45 years) in two groups, the exercising group and non exercising group. The exercising group included 50 women who were selected from the health and fitness centres in Mangalore. The aerobic exercise program consisted of a 5 min warm up, followed by a 45 min limb and trunk fast exercise session and a 10 min cool down. Movements such as lunges, squats, staircase step, jumping jacks, and push-ups are conducted so as to raise the heart rate. The total exercise time duration was for one hour, three times a week for six months. The control group included 50 healthy non exercising women. They were selected from the general population. After detailed enquiry of the medical history of the subjects, those with history of smoking, alcoholism, medical illness were excluded. Subjects on oral contraceptive pill, hormonal replacement therapy, drugs that alter the cardiovascular functions were also excluded from the study. Informed written consent was obtained from all participants, and the experiment protocol was approved by Ethics committee of the college. Weight was recorded to the nearest 0.1 kg, using an electronic weighing scale (Seca 841) and height was measured to the nearest 0.1 cm in standing position, using a rigid stadiometer (Seca 220). The stadiometer was checked for accuracy and the scale was calibrated before examination. Including weight and height measurements. The waist circumference was measured at the level of the umbilicus, whereas the hip circumference was measured at the iliac crest in standing position. The ratio between the two was calculated to provide the Waist-Hip Ratio (WHR). Waist circumference (WC) measurement was done with minimal, adequate clothing (lightcloths) with feet 25–30 cm apart and weight equally balanced with a tailor’s measuring tape in a plane perpendicular to the long body axis at the level of umbilicus without compression of the skin with nearest to 0.1 cm (WC >= 90 cm) were defined as abdominal obesity using WHO Asia Pacific prospective guidelines. The heart rate (beats/minute) and blood pressure (mm Hg) were measured after five minutes of rest in sitting position. 5 ml venous blood was collected from each subject after an overnight fast of 12-14 hours. Serum was separated within one hour of the blood collection and stored at -200C until analyzed for lipid profile. Serum samples were analyzed for lipid profile estimations, using Roche/ Hitachi auto analyzer. Parameters was analyzed statistically using SPSS (Statistical Package for Social Sciences) version 11.5. “Student t test was done to compare between the exercising and non exercising group. P- Value < 0.05 was considered as statistically significant.

### III. RESULTS

Table I: Body weight, waist hip ratio and waist circumference and heart rate in exercisers and non exercisers group; Values are expressed in Mean ±SD.

Parameters	EXERCISERS GROUP (N=50)	NON EXERCISERS GROUP (N=50)
BODY WEIGHT	54.72±5.33	66.07±9.11*
WAIST HIP RATIO	0.80± 0.042	0.92± 0.04 <sup>‡</sup>
WAIST CIRCUMFERENCE	78.18±7.30	92.15±5.21 <sup>§</sup>
HEART RATE	71.70±3.43	80.64±4.57 <sup>¶</sup>

N = Total number of subjects in the study

\* P< 0.001; Comparison of body weight in exercisers group and non exercisers group

‡P<0.001; Comparison of waist hip ratio in exercisers group and non exercisers group

§P<0.001; Comparison of waist circumference in exercisers group and non exercisers group

¶P<0.001; Comparison of waist circumference in exercisers group and non exercisers group

Table II: Serum lipid profile variations in exercisers and non exercisers group; Values are expressed in Mean ±SD.

Parameters	EXERCISERS GROUP (N=50)	NON EXERCISERS GROUP (N=50)
Total Cholesterol	174.76±31.25	186.52±34.26 <sup>NS</sup>
Triglycerides	85.52±33.09	98.44±45.33 <sup>NS</sup>
HDL	47.78±8.69	48.37±13.07 <sup>NS</sup>
LDL	107.71±25.03	118.43±27.14 <sup>∞∞</sup>
VLDL	19.11±8.39	19.71±9.52 <sup>NS</sup>
Total cholesterol: HDL	3.72±0.70	4.05±1.13 <sup>NS</sup>
LDL:HDL	2.30±0.588	2.61±0.88 <sup>**</sup>

N = Total number of subjects in the study, NS- Non significant

∞∞ P< 0.01; Comparison of serum LDL in exercisers group and non exercisers group

\*\*P<0.01; Comparison of LDL: HDL in exercisers group and non exercisers group

In the present study, the body weight, the waist hip ratio, waist circumference, heart rate (Table I) was significantly increased in the (P<0.05) in the non exerciser group when compared to the exercisers group. Further, serum lipid profile analysis (Table II) showed a significant increase (P<0.05) in the serum LDL level and LDL: HDL ratio in the non exercisers group when compared to the exercisers group

#### IV. DISCUSSION

Obesity and physical activity levels are both important concerns for young women. Obesity in women is a major global health threat. The present study showed that as compared with exercisers the non exercisers controls, females had an increased body weight, waist hip ratio, waist circumference, heart rate. Further, serum LDL level and HDL: LDL ratio increased in the non exercising group. This result suggests that regular physical exercise leads to considerable changes demonstrated in the increase of health related fitness. Body mass index (BMI), waist circumference and waist-to-hip ratio are employed for classifying obesity and the risks of abdominal fat accumulation [13]. The results of the present study provides a supportive evidence that non exercisers woman are more associated with the increase in the BMI, waist hip ratio and waist circumference. BMI is a reliable way to tell if body weight is putting a person at generalized health risk. Waist circumference and waist-to-hip ratio are measures of central adiposity that appear to predict cardiovascular and diabetes risk [14]. The decrease in the heart rate in regular aerobic exercisers might be possibly due to the combination of various adaptive mechanisms. Regular Aerobic training makes the heart becomes more efficient at pumping. Further, Exercising regularly causes the muscles to become more efficient using the oxygen in the blood so that they require a lower volume of blood at a given physical activity level. Since the purpose of every heart beat is to deliver blood to the areas of the body that need it, more efficient muscles mean that the heart does not have to pump as often. Aerobic exercise also

causes the blood vessels to open up more, allowing blood to flow more freely and decreasing resistance for the heart as it pumps. In addition, aerobic exercise causes the blood vessels to sprout more capillaries, which are the area of the vessels where oxygen and carbon dioxide are exchanged. More capillaries allow more oxygen to get to the muscles so they don't need as much blood and the heart does not need to pump as frequently. The parasympathetic nervous system controls activities in the body automatically, including heart rate. The parasympathetic system is the relaxation system that slows heart rate to conserve energy. In summary the lowered resting heart rate from exercise training is proposed to be due primarily to an increase in the parasympathetic nervous activity with a minor decrease in sympathetic nervous discharge.

Lipids and lipoproteins are well known risk factors for ischemic heart disease [15]. Elevated levels of triglyceride, cholesterol and LDL are documented as risk factors for atherogenesis [15]. LDL in its oxidized or acetylated form has been identified as a major atherogenic particle; as it not only load macrophages with cholesterol for the formation of foam cells but also because it is chemotactic for circulating monocytes, is cytotoxic and can adversely alter coagulation pathways [16-18]. The blood level of HDL-C in contrast bears an inverse relationship of the risk of atherosclerosis and coronary heart disease that is higher the level, smaller the risk [19]. Different plasma lipids vary significantly in various population groups due to difference in geographical, cultural, economical, social conditions, dietary habits and genetic makeup. In the present study, regular aerobic exercising decreased the serum LDL level and LDL-HDL ratio decreased in the regular aerobic exercisers compared to the non exercisers. Further, there was a non-significant increase in the serum level of cholesterol, triglycerides, VLDL and total cholesterol: HDL ratio in non-exercisers when compared with the regular exercisers. These results suggest that, regular aerobic exercise produces favourable changes in serum lipid and lipoprotein-cholesterol concentrations and is beneficial to the lipid profile of women.

## V.CONCLUSION

In Conclusion, the present study shows that regular aerobic exercise as a part of life style modification will improve cardiac autonomic functions and lipid profile. Premenopausal women find it difficult to keep themselves involved in a routine exercise program due to their numerous family responsibilities and career obligations compared with postmenopausal women. In conclusion, this study indicates that high-impact exercise is efficient, safe, and inexpensive way to preventing health complications later in life.

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