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Effect of brisk walking, jogging, strength training with equal increases in intensity in combinations on high density lipoprotein cholesterol (HDL cholesterol) of young women

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Abstract
Introduction: Physical wellness dimension of Wellness has become an important factor of interest among the people. This dimension of wellness has been recognized as a significant factor of prevention from various degenerative diseases like Cardiovascular Diseases, Diabetes Mellitus, Obesity, Certain types of cancers. Scientific way of exercise training is the only way to achieve this physical wellness. Coronary Artery Disease (CAD) has significant correlation to the increments in certain bio markers like Circulating lipids, cholesterol sub fractions. HDL cholesterol acts as a scavenger of LDL and reduces the dangerous LDL and other low-density lipoproteins, and hence, HDL cholesterol favorable concentrations are good for health. The study aimed to examine and analyze the effect of different progressive intensities of combinations of brisk walking, aerobic running and resistance training on the HDL-C, among healthy, young and previously untrained Women.
Methodology: Out of the identified seventy five individuals, fifteen each for each of five groups were drawn on random basis. Four of these groups acted as activity or experimentation groups and one group acted as control group. Progressive intensities of aerobic jogging after brisk walking, followed immediately by resistance form of strength training in every session was the independent variable used in the experiment.
Results: Analysis of Covariance indicates that the obtained F value i.e. 51.64 is higher than the table F value i.e. 2.21 at the desired level of significance i.e. 0.05. Hence, the experimental exercise trainings of four different combinations caused significant increase in the HDL-C of the individuals of the study. Post experimental adjusted mean of the 55% start group was highest with 52.009, which appears significantly higher when compared to the Pre experimental mean i.e. 44.8.
Conclusion from the study: All the four start intensities of combination of aerobic and resistance training protocols of the experimentation brought significant increments in the HDL-C of the individuals of the study. Starting intensity of fifty five and progressing to seventy percent of aerobic and resistance training brought highly significant increase in HDL-C of the individuals of the study.

Keywords: Physical wellness, Coronary Artery Disease, HDL cholesterol, Brisk walking, resistance training

1. Introduction

Physical activity involvement leads to increases in physical fitness of the individuals and this in turn enhances the capacity and opportunity of individuals to engage in more intensified physical activity for better health benefits. Physical fitness per se is not directly linked to the enhanced health status as some individuals though possess high levels of physical fitness may still carry degenerative disease factors. Physical wellness dimension of Wellness has become an important factor of interest among the people. This dimension of wellness has been recognized as a significant factor of prevention from various degenerative diseases like Cardiovascular Diseases, Diabetes Mellitus, Obesity, Certain types of cancers. Scientific way of exercise training is the only way to achieve this physical wellness. Several scientific studies in the field of fitness management have conclusive evidences that the regular involvement in physical activity can prevent several degenerative diseases and as well can control them effectively by bringing positive changes in several risk factors and bio markers of these diseases. Coronary Artery Disease (CAD) has significant correlation to the increments in certain bio markers like Circulating lipids, cholesterol sub fractions along with the precipitating factor the presence of hypertension. Atherosclerosis develops because of smooth muscle proliferation, lipid accumulation and connective tissue formation in the arterial intima. The most important biomarkers of CAD seem the resting lipid profiles of the individuals.

Higher levels of circulating lipids in the blood than normal levels may be considered as Hyperlipidemia and epidemiological studies indicate a general trend towards a greater incidence of Atherosclerosis and incidence of Cardio Vascular Disease among people with hyperlipidemia. More body fat percentage leads to the risk of more circulating fats in the shape of FFAs (free fatty acids) and cholesterol. Excessive body fat can elevate the triglyceride concentrations in the circulation. Hence, excessive fat percentage in body composition is a risk factor. But, various subcomponents of cholesterol are to be considered, like HDL (high density lipoproteins), VLDL (very low density lipoproteins), ILDL (intermediate level density lipoproteins) and LDL (low density lipoproteins). Among these HDL cholesterol acts as a scavenger of LDL and reduces the dangerous LDL and other low-density lipoproteins, and hence, HDL cholesterol

favorable concentrations are good for health. Metabolic dislipidemia in which the circulating HDL cholesterol decreases significantly is pro-atherogenic risk factor. HDL acts as reverse transfer system to LDL for cholesterol. High prevalence of LDL in blood is a strong precipitating factor for atherosclerosis of arteries. It is also low HDL cholesterol concentration than normal limits viewed as potential causative factor for atherosclerotic condition. Physical activity and especially Cardio respiratory endurance runs are helpful in controlling these bio markers of the CHD.

Cardiovascular efficiency or Aerobic fitness is an important component of Health Related Fitness as this fitness is essential to conduct aerobic endurance exercise programs at desired intensity and for desired duration to derive the desired health benefits. Especially, the aerobic endurance training in any form is quite useful and effective in initiating the required metabolic cascading and can bring positive changes in resting state lipid profiles of individuals. Performances of long duration activities like recreational jogging, long walking are aerobic activities. Especially when the exercise is sustained for more minutes at a comfortable intensity, the aerobic metabolic pathway dominates in the energy supply to such exercise. More free fatty acids are mobilized from the adipose tissue through the release of lipolytic enzymes. Also the Plasma Adiponectin concentration may be an influencing factor in fat oxidation. There are many forms of aerobic training like swimming, cycling, Jogging, dancing, trekking, skiing etc. Aerobic exercises in general are favorable in utilizing the fat resources of the body more effectively especially among the aerobically trained individuals. Aerobic exercises regularly done may be useful in influencing significantly and positively the lipid profiles of the individuals. Endurance exercise training improves plasma lipoprotein and lipid profiles and reduces cardiovascular disease risk. The study aimed to examine and analyze the effect of different progressive intensities of combinations of brisk walking, aerobic running and resistance training on the HDL-C, among healthy, young and previously untrained Women.

2. Methodology

As the study intends to offer training program with aerobic activities, several volunteers approached from different colleges of the area. Out of the volunteers the researcher included only those who have never experienced a regular physical training earlier or have not participated or took coaching in any kind of sports activities. This is to offset the effect of training status which may be one important factor that needs to be equated at the base level, as people with regular physical training may start with positive magnitude of the criterion variables selected. Age of the individuals included for the study ranged between eighteen and twenty one years. Out of the identified seventy five individuals, fifteen each for each of five groups were drawn on random basis. Four of these groups acted as activity or experimentation groups and one group acted as control group. Activity groups practiced combined progressive exercise programs at respective intensity and control group did not perform anything during the five months of experimentation period. Progressive intensities of aerobic jogging after brisk walking, followed immediately by resistance form of strength training in every session was the independent variable used in the experiment. The selected starting intensities for the study were forty, forty five, fifty, fifty five and by the fourth month of experimentation the groups worked in the intensities of fifty five, sixty, sixty five and seventy percent.

High Density Lipoprotein cholesterol was included as this happens to be a strong biomarker in controlling the atherosclerotic process of arteries and is considered as good cholesterol. Direct HDL method was used, which measures directly the HDL in serum. The apoB containing lipoproteins in the specimen are reacted with a blocking reagent that renders them non reactive with the enzymatic cholesterol reagent under conditions of assay. The apoB containing lipoproteins are thus effectively excluded from the assay and only HDL cholesterol is detected under assay conditions. The reagents are from Roche/Boehringer Mannheim. The method used sulphated alpha cyclodextrin in the presence of Mg+2 which forms complexes with apoB containing lipoproteins and polyethylene glycol coupled cholesterol esterase and cholesterol oxydase for the HDL cholesterol measurement. The measurement was done at a standard clinical laboratory under standard conditions. The criterion variable was measured baseline ie one day before the commencement of orientation period and post training values of the criterion variables were measured one day after the conclusion of the five month experimentation period. Analysis of Covariance (ANCOVA) was used to find whether the combined Brisk Walking, Jogging and strength training with progressive intensities had shown any impact and brought significant changes in the criterion variable among the four experimental groups. Scheff's Post Hoc individual comparison test was also done to find out the significant source of difference and to know which intensity showed significant impact in bringing changes in the criterion variable. 0.05 level of significance was used to test the statistical derivatives.

3. Results of the study

Analysis of Covariance as depicted in table I, indicates that the obtained F value i.e. 51.64 is higher than the table F value i.e. 2.21 at the desired level of significance i.e. 0.05. Hence, the experimental exercise trainings of four different combinations caused significant increase in the HDL-C of the individuals of the study.

Table 1: Analysis of Covariance for HDL-C

Source	Df	SS	MS	F	Cr.F
Total	75	679.2762			
BG	4	505.5203	126.3801	51.6413	2.21
WG	71	173.7559	2.4473		

As per the table 2, the post experimental adjusted mean of the 55% start group was highest with 52.009, which appears significantly higher when compared to the Pre experimental

Table 2: Pretest, Posttest and Adjusted Posttest means for HDL-C

Groups	MX	MY	MY.X
40%	44.933	47.466	47.102
45%	45.966	49.4	48.445
50%	43.333	48.666	49.589
55%	44.8	52.266	52.009
CG	43.666	43.533	44.187

Mean i.e. 44.8. And also the other three groups of

experimentation viz 50% intensity start group(49.58), 45% intensity start group(48.445) and 40% intensity start group(47.102) have also experienced increments in their HDL-C when compared to base level values. Scheffe's Post Hoc comparison in table VI elicits that the Post experimental adjusted mean increment differences between 55% intensity start group and 50% intensity start group (2.42), 55% intensity start group and 45% intensity start group (3.57) and 55% intensity start group and 40% intensity start group (4.91) are all significant, indicating that the 55% intensity start group experienced significant increase in their HDL-C when compared to all the other three

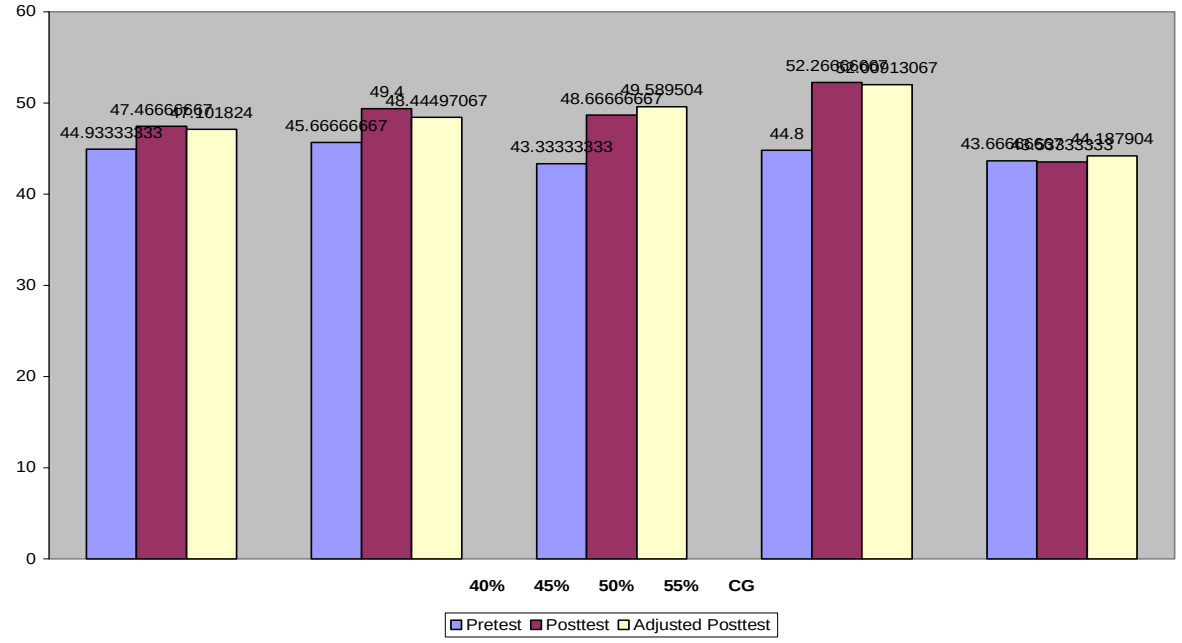

Fig 1: Pre, Post and Adjusted Posttest Means for HDL-C

Table 3: Scheffe's Post Hoc Individual comparisons for HDL-C (Comparison difference = 1.16)

Groups & Values	50% 49.59	45% 48.44	40% 47.1	CG 44.19
55% 52.01	2.42 Sig	3.57 Sig	4.91 Sig	7.82 Sig
50% 49.59		1.15 N.Sig	2.49 Sig	5.4 Sig
45% 48.44			1.34 Sig	4.25 Sig
40% 47.1				2.91 Sig

intensity start groups. Post experimental adjusted mean increment differences between 50% intensity start group and 45% intensity start group (1.15) was not significant increase but, the difference between 50% intensity start group and 40% intensity start group (2.49) was significant. The post experimental adjusted mean increment difference between 45% intensity start group and 40% intensity start group (1.34) was also significant.

All the four intensity start groups reported significant increments in their HDL-C levels when compared to the Control group. The combination of aerobic and resistance training even at the starting intensity of forty percent and progressing to fifty five percent of intensity was also useful in increasing the HDL-C of the individuals. But, the combination of aerobic and resistance training with a starting intensity of fifty five percent and progressing to seventy percent intensity proved highly effective in increasing the HDL-C of the individuals of the study, when compared to the other three start intensities of aerobic and resistance training and progressing to the respective high intensities of the experimental protocol. It is also that both the forty five percent and fifty five percent start intensity combination of aerobic and resistance training and progressing to sixty percent and sixty five percent intensities respectively brought significant increments in HDL-C of the individuals when compared to the forty percent start intensity of aerobic and resistance training and progressing to fifty five percent intensity. Though medium intensity aerobic and resistance training was also effective in enhancing the HDL-C of the individuals, the high intensity aerobic and resistance training was highly effective in increasing the HDL-C of the individuals.

4. Conclusion from the study

All the four start intensities of combination of aerobic and resistance training protocols of the experimentation brought significant increments in the HDL-C of the individuals of the study. Starting intensity of fifty five and progressing to seventy percent of aerobic and resistance training brought highly significant increase in HDL-C of the individuals of the study.

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