Effect of Brisk Walking, Jogging, Strength Training With Equal Increases in Intensity in Combinations on LDL Cholesterol of Young Women

Dr. A. Giridhar Raju
Assistant Director in Physical Education, Sri Venkateswara University, Tirupati Andhra Pradesh.

Abstract: 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. 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. The percentage of LDL is most significant factor than others as this factor is highly influencing factor for atherosclerotic plaque. High prevalence of LDL in blood is a strong precipitating factor for atherosclerosis of arteries. 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 LDL-C of healthy, young and previously untrained Women.

Methodology: 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. 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.

Results: Analysis of Covariance indicates that the obtained F value i.e. 33.627 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 LDL-C of the individuals of the study. Scheffe’s Post Hoc comparison elicits that the Post experimental adjusted mean decrement differences between 50% intensity start group and 55% intensity start group (-4.08), 50% intensity start group and 45% intensity start group (-5.51) and 30% intensity start group and 40% intensity start group (-7.15) are all significant, indicating that the 50% intensity start group experienced significant decrease in their LDL-C when compared to all the other three intensity start groups.

Conclusions: All the four start intensities of combination of aerobic and resistance training protocols of the experimentation brought significant decrements in the LDL-C of the individuals of the study. Starting intensity of fifty and progressing to sixty five percent of aerobic and resistance training brought highly significant decrease in LDL-C of the individuals of the study than the other three starting intensity protocols.

Key words: Physical fitness, Hyperlipidemia, Atherosclerosis, LDL cholesterol, brisk walking, aerobic running, strength training.

Introduction and background of the study: Decreasing physical activity trends across the globe has seen rapid increase in these types of diseases especially the cardiovascular diseases like Hypertension, Atherosclerosis, Coronary Heart Diseases and metabolic disorders like Diabetes Mellitus. 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. Regular physical activity of different types may be essential to keep functional efficiency of different systems of the body so that the degenerative disease affecting different systems may be prevented. Atherosclerosis starts as an injury to arterial endothelium because of various factors. The injury to this endothelial wall may be because of chronic Hypertension, wear and tear and toxic chemicals. The injury at endothelium allows substances in the plasma, like Cholesterol to penetrate into the intima of the artery. Ordinarily, endothelial cells act as a barrier to cholesterol and other lipids. However, an injury to the endothelial cells results in their inundation with blood fats. This process causes a proliferation of the arterial smooth muscle that eventually results in it’s encroachment into the intima and arterio-vascular space. 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. Hypercholesterolemia (HCH) is characterized by an increase of the total-Cholesterol and LDL-cholesterol in serum, and is generally recognized as a risk factor of atherogenesis, oxidative stress and oxidatively modified LDL play a crucial role.

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), IDL (intermediate level density lipoproteins) and LDL (low density lipoproteins). The circulating lipids in the blood may be categorized into five types according to the density, composition and size. They are Very Low Density Lipoprotein (VLDL), Low Density Lipoproteins (LDL), Intermediate Density Lipoprotein (IDL), High Density Lipoproteins (HDL) and Chylomicrons. HDL subfractions are HDL-1, HDL-2 and HDL-3. The percentage of LDL is most significant factor than others as this factor is highly influencing 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.

With aerobic training the mobilization of fats from various sources in the body may be done effectively causing changes in lipid profiles of the individuals who train aerobically regularly. There are many forms of aerobic training like swimming, cycling, Jogging, dancing, trecking, 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. Strength training in the form of resistance training leads to muscle protein anabolism and may lead to both strength increments and muscle hypertrophy. Increased muscle protein content demands more energy for resting biological purposes and causes for the increase in resting metabolic rate. 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 LDL-C, among healthy, young and previously untrained Women.

**Methodology:** 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. 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. Each session of exercise consisted of brisk walk for fifteen minutes followed by Jogging for fifteen minutes and followed by weight training session for fifteen minutes. But, the intensity of each form of exercise was increased progressively by five percent at the beginning of the successive month and was held constantly for the month before another five percent was increased at the beginning of the next month. 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.

The direct homogeneous assay method was used to calculate the LDL cholesterol of the individuals. The reagent kit for direct LDL cholesterol assay used was Cholestest-LDL was obtained from Daiichi pure Chemicals co., Tokyo, Japan, marketed by in India By Accurex Biomedical Pvt Ltd., Mumbai. The kit contains two ready to use stable liquid reagents that directly measures the concentration of LDL cholesterol by homogenous method based on detergent technology. The detergent one in reagent one disrupts the structure of HDL, VLDL and Chylomicrons and causes release of cholesterol. The cholesterol esterase releases free cholesterol. The cholesterol oxidase releases hydrogen peroxide from free cholesterol, which reacts with 4- aminoantipyrine in the presence of peroxidase to give a colorless product. The second step starts with the addition of reagent two. Detergent two in reagent two specially acts on LDL releasing cholesterol. With the action of cholesterol esterase and cholesterol oxidase, hydrogen peroxide is liberated from free cholesterol of LDL. The coloring agent N, N-bis(sulfofbutyl) m-toluidine disodium salt(DSBmT) reacts with hydrogen peroxide in the presence of peroxidase to give a bluish purple product measured at 546 nm main and 660 subsidiary. The intensity of color is proportional to concentration of LDL cholesterol. This was done by expert clinical lab technicians in a local commercial standard laboratory.
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. Scheffé’s Post Hoc individual comparison test for all the four criterion variable was also done to find out the significant source of difference and to know which intensity showed significant impact in bringing changes in the five criterion variable among the individuals. 0.05 level of significance was used to test the statistical derivatives.

Results of the study: Analysis of Covariance as depicted in table I, indicates that the obtained F value i.e. 33.627 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 LDL-C of the individuals of the study.

Table III Scheffe’s Post Hoc Individual comparisons for LDL-C (Comparison difference = 3.61)

<table>
<thead>
<tr>
<th>Groups &amp; Values</th>
<th>55%</th>
<th>45%</th>
<th>40%</th>
<th>CG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>134.56</td>
<td>135.99</td>
<td>137.63</td>
<td>144.12</td>
</tr>
<tr>
<td>50%</td>
<td>-4.08</td>
<td>-5.51</td>
<td>-7.15</td>
<td>-13.64</td>
</tr>
<tr>
<td>130.48</td>
<td>Sig</td>
<td>Sig</td>
<td>Sig</td>
<td>Sig</td>
</tr>
<tr>
<td>55%</td>
<td>-1.43</td>
<td>-3.07</td>
<td>-9.56</td>
<td></td>
</tr>
<tr>
<td>134.56</td>
<td>N.Sig</td>
<td>N.Sig</td>
<td>Sig</td>
<td></td>
</tr>
<tr>
<td>45%</td>
<td>-1.64</td>
<td>N.Sig</td>
<td>Sig</td>
<td></td>
</tr>
<tr>
<td>135.99</td>
<td></td>
<td></td>
<td>Sig</td>
<td></td>
</tr>
<tr>
<td>40%</td>
<td></td>
<td></td>
<td>-6.49</td>
<td></td>
</tr>
<tr>
<td>137.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The post experimental adjusted mean of the 50% start group was lowest with 130.48, which appears significantly lower when compared to the Pre experimental mean i.e. 142.2. And also the other three groups of experimentation viz 55% intensity start group(134.56), 45% intensity start group(135.996) and 40% intensity start group(137.627) have also experienced decrements in their LDL-C when compared to base level values. Scheffe’s Post Hoc comparison in table III elicits that the Post experimental adjusted mean decrement differences between 50% intensity start group and 55% intensity start group (-4.08), 50% intensity start group and 45% intensity start group (-5.51) and 50% intensity start group and 40% intensity start group (-7.15) are all significant, indicating that the 50% intensity start group experienced significant decrease in their LDL-C when compared to all the other three intensity start groups. Post experimental adjusted mean decrement differences between 55% intensity start group and 45% intensity start group (-1.43) was not significant increase. And also the difference between 55% intensity start group and 40% intensity start group (-3.07) was not significant. The post experimental adjusted mean decrement difference between 45% intensity start group and 40% intensity start group (-1.64) was also not significant. Hence, the 50% intensity start group experienced significant decrements in the LDL-C of individuals than any other intensity start group.

All the four intensity start groups reported significant decrements in their LDL-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 LDL-C of the individuals. But, the combination of aerobic and resistance training with a starting intensity of fifty percent and progressing to sixty five percent intensity proved highly effective in increasing the LDL-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. Hence, medium intensity of aerobic and resistance training combination was not effective in lowering significantly the LDL-C of the individuals.

**Conclusion from the study:** All the four start intensities of combination of aerobic and resistance training protocols of the experimentation brought significant decrements in the LDL-C of the individuals of the study. Starting intensity of fifty and progressing to sixty five percent of aerobic and resistance training brought highly significant decrease in LDL-C of the individuals of the study than the other three starting intensity protocols.

**References:**


