CHAPTER – IV

ANALYSIS OF DATA AND RESULTS OF THE STUDY

The analysis of data pertaining to the effect of sixteen weeks aerobic training programme on serum lipoprotein profiles and body composition variables among middle aged men are presented in this chapter.

The pre-test and post-test data of the two experimental (sedentary and occasional participants) and the two control groups were analysed following the t-ratio and analysis of covariance. The t-ratio was computed to examine the significance of difference between the pre-test and post-test data in the serum lipoprotein profiles and body composition variables for each of the experimental and control groups. To compare the significance of difference from pre-test to post-test data among the experimental and control groups the analysis of covariance was applied. The post-hoc comparisons were done for the paired adjusted means wherever necessary. The statistical analysis were tested for significance at 0.05 level.

Findings

The results pertaining to the t-ratio and analysis of covariance for total cholesterol are presented in tables 3 to 5.
Table 3

SIGNIFICANCE OF DIFFERENCE BETWEEN THE PRE-TEST AND POST-TEST MEANS FOR TOTAL CHOLESTEROL AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test Means</th>
<th>Post-test Means</th>
<th>Dm</th>
<th>σDm</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>212.13</td>
<td>207.53</td>
<td>4.60</td>
<td>1.95</td>
<td>2.35*</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary</td>
<td>209.33</td>
<td>211.73</td>
<td>2.40</td>
<td>2.28</td>
<td>1.05</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td>203.80</td>
<td>197.80</td>
<td>6.00</td>
<td>2.96</td>
<td>2.03</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td>206.13</td>
<td>204.07</td>
<td>2.06</td>
<td>3.07</td>
<td>0.67</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

\[ t_{0.05 (29)} = 2.04 \]

The above table of comparison of pre-test and post-test data on total cholesterol indicates that the t-ratio in case of sedentary experimental group was 2.35, which is significant as it is greater than the t-value of 2.04 required for significance at 0.05 level. However, the t-ratio in case of sedentary control-, occasional experimental- and occasional control- groups were 1.05, 2.03 and 0.67 respectively, which were not significant as the obtained values were lesser than the t-value of 2.04 required for significance at 0.05 level. The findings indicate that there was a significant decrease in total cholesterol from pre to post test data in case of sedentary experimental group.
The pre-test and post-test means of the experimental and control groups in total cholesterol is graphically represented in figure 1.

The findings pertaining to the analysis of covariance for total cholesterol among the experimental and control groups are shown in tables 4 and 5.

Table 4

ANALYSIS OF COVARIANCE FOR TOTAL CHOLESTEROL AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>SV</th>
<th>df</th>
<th>SS</th>
<th>MSS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Among</td>
<td>3</td>
<td>598.44</td>
<td>199.48</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>56</td>
<td>26407.20</td>
<td>471.55</td>
<td></td>
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<tr>
<td>Pre Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sed Exp.</td>
<td>212.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sed Cont.</td>
<td>209.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occas Exp.</td>
<td>203.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occas Cont.</td>
<td>206.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sed Exp.</td>
<td>207.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sed Cont.</td>
<td>211.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occas Exp.</td>
<td>197.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occas Cont.</td>
<td>204.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sed Exp.</td>
<td>204.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sed Cont.</td>
<td>210.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occas Exp.</td>
<td>200.92</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occas Cont.</td>
<td>205.39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level
F 0.05 (3,56) = 2.76

The above table of analysis of covariance for total cholesterol among experimental and control groups indicates that the F-ratios for pre-test and post-test means were 0.42 and 1.50 respectively, which were not significant as the obtained values were lesser than the F-value of 2.76 required for significance at 0.05 level. However, the adjusted post means yielded a significant value of 3.20, thereby indicating significant differences among the groups.
Fig. 1. Pre and Post Test Means of the Experimental and the Control Groups in Total Cholesterol.
The paired adjusted final means and differences between means of the experimental and control groups are shown in table 5.

Table 5.
PAIR ED ADJUSTED FINAL MEANS AND DIFFERENCES BETWEEN MEANS AMONG THE EXPERIMENTAL AND CONTROL GROUPS ON TOTAL CHOLESTEROL

<table>
<thead>
<tr>
<th>Group Means</th>
<th>Mean difference</th>
<th>Critical difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Experimental</td>
<td>Sedentary Control</td>
<td>Occasional Experimental</td>
</tr>
<tr>
<td>204.23</td>
<td>210.58</td>
<td>6.35*</td>
</tr>
<tr>
<td>204.23</td>
<td>200.92</td>
<td>3.31</td>
</tr>
<tr>
<td>204.23</td>
<td>205.39</td>
<td>1.16</td>
</tr>
<tr>
<td>210.58</td>
<td>200.92</td>
<td>9.66*</td>
</tr>
<tr>
<td>210.58</td>
<td>205.39</td>
<td>5.19</td>
</tr>
<tr>
<td>200.92</td>
<td>205.39</td>
<td>4.47</td>
</tr>
</tbody>
</table>

Table 5 of difference between paired adjusted final means for total cholesterol between sedentary experimental and sedentary control was 6.35 which was significant as it was greater than the critical difference value of 6.30 required for significance at 0.05 level. The difference between the paired adjusted final means between sedentary control and occasional experimental group was 9.66, which was also significant at 0.05 level. However in case of the differences between the paired adjusted final means for other
group comparisons, none of the differences were significant as all the values were lesser than the critical difference value of 6.30 required for significance.

The findings reveal that the total cholesterol values for sedentary experimental and occasional experimental groups were significantly lesser than the cholesterol values for the sedentary control group. The paired adjusted final means of the experimental and control groups for total cholesterol is shown in figure 2.

The results pertaining to the t-ratio and analysis of covariance for high density lipoprotein cholesterol are presented in tables 6 and 7.

Table 6

SIGNIFICANCE OF DIFFERENCE BETWEEN THE PRE-TEST AND POST-TEST MEANS FOR HIGH DENSITY LIPOPROTEIN CHOLESTEROL AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test Means</th>
<th>Post-test Means</th>
<th>Dm</th>
<th>σDm</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>43.33</td>
<td>44.07</td>
<td>0.74</td>
<td>3.38</td>
<td>0.22</td>
</tr>
<tr>
<td>Experimental</td>
<td>42.33</td>
<td>40.93</td>
<td>1.40</td>
<td>1.44</td>
<td>0.97</td>
</tr>
<tr>
<td>Sedentary</td>
<td>46.33</td>
<td>47.80</td>
<td>1.47</td>
<td>0.70</td>
<td>2.10*</td>
</tr>
<tr>
<td>Control</td>
<td>45.67</td>
<td>44.27</td>
<td>1.40</td>
<td>1.37</td>
<td>1.02</td>
</tr>
<tr>
<td>Occasional</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

\[ t_{0.05 (29)} = 2.04 \]
Fig. 2. Paired Adjusted Final Means of the Experimental and Control Groups for Total Cholesterol
Table 6 of comparison of pre-test and post-test data on high density lipoprotein cholesterol indicates that the t-ratio in case of sedentary experimental group, sedentary control group, and occasional control group were 0.22, 0.97 and 1.02 respectively, which were not significant as the obtained values were lesser than the t-value of 2.04 required for significance at 0.05 level. However, the t-ratio in case of occasional control group was significant as the obtained value of 2.10 was greater than t-value of 2.04 required for significance at 0.05 level. The findings indicate that there was a significant increase in high density lipoprotein cholesterol from pre to post test data in case of occasional experimental group.

The pre-test and post-test means of the experimental and control groups in high density lipoprotein cholesterol is graphically represented in figure 3.

The findings pertaining to the analysis of covariance for high density lipoprotein cholesterol among the experimental and control groups is shown in table 7.
Fig. 3. Pre and Post Test Means of the Experimental and the Control Groups in High Density Lipoprotein Cholesterol.
Table 7
ANALYSIS OF COVARIANCE FOR HIGH DENSITY LIPOPROTEIN CHOLESTEROL AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th></th>
<th>Sed Exp.</th>
<th>Sed Cont.</th>
<th>Occas Exp.</th>
<th>Occas Cont.</th>
<th>SV</th>
<th>df</th>
<th>SS</th>
<th>MSS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>43.33</td>
<td>42.33</td>
<td>46.33</td>
<td></td>
<td></td>
<td>45.67</td>
<td>144.58</td>
<td>48.19</td>
<td>0.77</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>56</td>
<td>3522</td>
<td>62.89</td>
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</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td>44.07</td>
<td>40.93</td>
<td>47.80</td>
<td></td>
<td></td>
<td>44.27</td>
<td>354.53</td>
<td>118.17</td>
<td>2.23</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>56</td>
<td>2967.20</td>
<td>52.98</td>
<td></td>
</tr>
<tr>
<td>Adj.</td>
<td>44.38</td>
<td>42.15</td>
<td>46.84</td>
<td></td>
<td></td>
<td>43.67</td>
<td>176.99</td>
<td>58.99</td>
<td>1.57</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55</td>
<td>2062.87</td>
<td>37.50</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

\[ F_{0.05} (3,56) = 2.76 \]

The above table of analysis of covariance for high density lipoprotein cholesterol among experimental and control groups shows that the F-ratios for pre-test and post-test and adjusted post-test means were 0.77, 2.23 and 1.57 respectively, which were not significant as the obtained values were lesser than F-value of 2.76 required for significance at 0.05 level. The analysis indicates that there was no difference from pre to post test means among the experimental and control groups on high density lipoprotein cholesterol.
The results pertaining to the t-ratio and analysis of covariance for low density lipoprotein cholesterol is presented in tables 8 and 9.

Table 8

SIGNIFICANCE OF DIFFERENCE BETWEEN THE PRE-TEST AND POST-TEST MEANS FOR LOW DENSITY LIPOPROTEIN CHOLESTEROL AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test Means</th>
<th>Post-test Means</th>
<th>Dm</th>
<th>σ Dm</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>138.53</td>
<td>134.87</td>
<td>3.66</td>
<td>3.19</td>
<td>1.15</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary</td>
<td>137.00</td>
<td>141.73</td>
<td>4.73</td>
<td>2.79</td>
<td>1.70</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td>133.40</td>
<td>127.27</td>
<td>6.13</td>
<td>3.21</td>
<td>1.91</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td>138.93</td>
<td>138.06</td>
<td>0.87</td>
<td>3.63</td>
<td>0.24</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

$ t_{0.05 (29)} = 2.04 $  

The above table of comparison of pre-test and post-test data on low density lipoprotein cholesterol indicates that the t-ratios in case of sedentary experimental group, sedentary control group, occasional experimental group and occasional control groups were 1.15, 1.70, 1.91 and 0.24 respectively, which were not significant as the obtained values were lesser than the t-value of 2.04 required for significance at 0.05 level. The
findings indicate that there was no significant change in low density lipoprotein cholesterol from pre to post test data in case of any of the experimental and control groups.

The pre-test and post-test means of the experimental and control groups in low density lipoprotein cholesterol is graphically represented in figure 4.

The findings pertaining to the analysis of covariance for low density lipoprotein cholesterol among the experimental and control groups is shown in table 9.

| Table 9 |

**ANALYSIS OF COVARIANCE FOR LOW DENSITY LIPOPROTEIN CHOLESTEROL AMONG THE EXPERIMENTAL AND CONTROL GROUPS**

<table>
<thead>
<tr>
<th></th>
<th>Groups</th>
<th>SV</th>
<th>df</th>
<th>SS</th>
<th>MSS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sed</td>
<td>Sed Occas Occas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre Means</td>
<td>138.53</td>
<td>137.00 133.40 138.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Among</td>
<td>3       285.66 95.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>56      19480.26 347.86</td>
<td></td>
<td></td>
<td></td>
<td>0.27</td>
</tr>
<tr>
<td>Post Means</td>
<td>134.87</td>
<td>141.73 127.27 138.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Among</td>
<td>3       1704.44 568.15</td>
<td></td>
<td></td>
<td></td>
<td>1.51</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>56      21072.53 376.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. Post Means</td>
<td>133.53</td>
<td>141.70 130.28 136.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Among</td>
<td>3       1058.38 352.79</td>
<td></td>
<td></td>
<td></td>
<td>2.38</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>55      8166.27 148.48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

F 0.05 (3,56) = 2.76
Fig. 4. Pre and Post Test Means of the Experimental and the Control Groups in Low Density Lipoprotein Cholesterol.
Table 9 of analysis of covariance for low density lipoprotein cholesterol among experimental and control groups indicates that the F-ratios for pre-test and post-test and adjusted post-test means were 0.27, 1.51 and 2.38 respectively, which were not significant as the obtained values were lesser than F-value of 2.76 required for significance at 0.05 level. The analysis indicates that there was no difference from pre to post test means among the experimental and control groups on low density lipoprotein cholesterol.

The results pertaining to the t-ratio and analysis of covariance for triglycerides are presented in tables 10 to 12.
Table 10
SIGNIFICANCE OF DIFFERENCE BETWEEN THE PRE-TEST AND
POST-TEST MEANS FOR TRIGLYCERIDES AMONG THE
EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test Means</th>
<th>Post-test Means</th>
<th>Dm</th>
<th>σDm</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>151.07</td>
<td>14</td>
<td>0</td>
<td>6.27</td>
<td>13.91</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary</td>
<td>142.60</td>
<td>145.07</td>
<td>2.47</td>
<td>8.66</td>
<td>0.29</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td>120.53</td>
<td>115.87</td>
<td>4.66</td>
<td>7.55</td>
<td>0.62</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td>107.00</td>
<td>109.53</td>
<td>2.53</td>
<td>8.14</td>
<td>0.31</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

\[ t_{0.05(29)} = 2.04 \]

The above table of comparison of pre-test and post-test data on triglycerides indicates that the t-ratio in case of sedentary experimental, sedentary control, occasional experimental, and occasional control groups were 0.45, 0.29, 0.62 and 0.31 respectively, which were not significant as the obtained values were lesser than the t-value of 2.04 required for significance at 0.05 level. The findings indicate that there was no significant variation in triglycerides from pre to post test data in case of the experimental and control groups.

The pre-test and post-test means of the experimental and control groups in triglycerides is graphically represented in figure 5.
Fig. 5. Pre and Post Test Means of the Experimental and the Control Groups in Triglycerides.
The findings pertaining to the analysis of covariance for triglycerides among the experimental and control groups are shown in tables 11 and 12.

### Table 11

**ANALYSIS OF COVARIANCE FOR TRIGLYCERIDES AMONG THE EXPERIMENTAL AND CONTROL GROUPS**

<table>
<thead>
<tr>
<th>Groups</th>
<th>SV</th>
<th>df</th>
<th>SS</th>
<th>MSS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sed</td>
<td>Exp.</td>
<td>151.07</td>
<td>142.60</td>
<td>120.53</td>
<td>107.00</td>
</tr>
<tr>
<td>Sed</td>
<td>Cont.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occas</td>
<td>Exp.</td>
<td>Among</td>
<td>3</td>
<td>18312.33</td>
<td>6104.11</td>
</tr>
<tr>
<td>Occas</td>
<td>Cont.</td>
<td>Within</td>
<td>56</td>
<td>102234.26</td>
<td>1825.61</td>
</tr>
<tr>
<td>Pre</td>
<td>Means</td>
<td>144.80</td>
<td>145.07</td>
<td>115.87</td>
<td>109.53</td>
</tr>
<tr>
<td>Post</td>
<td>Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj.</td>
<td>Post</td>
<td>Among</td>
<td>3</td>
<td>5774.58</td>
<td>1924.86</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td>Within</td>
<td>55</td>
<td>38043.27</td>
<td>691.69</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

F $0.05 (3,56) = 2.76$

The above table of analysis of covariance for triglycerides among experimental and control groups indicates that the F ratios for pre-test, post-test and adjusted post means were 3.34, 5.93, and 2.78 respectively, all of which were significant as the obtained values were greater than F-value of 2.76 required for significance at 0.05 level. The results indicate that there were significant difference from pre to post test means among the experimental and control groups.
To find out which of the paired adjusted final means differed significantly, the post-hoc test was applied and the comparisons of the paired adjusted final means and differences between means of the experimental and control groups are shown in Table 12.

Table 12.
PAIRED ADJUSTED FINAL MEANS AND DIFFERENCES BETWEEN MEANS AMONG THE EXPERIMENTAL AND CONTROL GROUPS ON TRIGLYCERIDES

<table>
<thead>
<tr>
<th>Group Means</th>
<th>Mean difference</th>
<th>Critical difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Experimental</td>
<td>135.91</td>
<td>139.80</td>
</tr>
<tr>
<td>Sedentary Control</td>
<td>135.91</td>
<td>120.04</td>
</tr>
<tr>
<td>Occasional Experimental</td>
<td>135.91</td>
<td>119.50</td>
</tr>
<tr>
<td>Occasional Control</td>
<td>139.80</td>
<td>120.04</td>
</tr>
<tr>
<td>139.80</td>
<td>119.50</td>
<td>20.30*</td>
</tr>
<tr>
<td>120.04</td>
<td>119.50</td>
<td>0.54</td>
</tr>
</tbody>
</table>

Table 12 of difference between paired adjusted final means for triglycerides between sedentary experimental and sedentary control was 3.89; between sedentary experimental and occasional experimental was 15.87; between sedentary experimental and occasional control was 16.41; and between occasional experimental and occasional control was 0.54, all of which were not significant as all the obtained values were lesser than the critical difference value of 19.03 required for significance at 0.05 level. The
difference between the paired adjusted final means between occasional experimental and sedentary control group was 19.76; and between sedentary control and occasional control was 20.30, both of which were significant as these values were greater than the critical difference value of 19.03 required for significance at 0.05 level.

The paired adjusted final means of the experimental and control groups for triglycerides is shown in figure 6.

The results pertaining to the t-ratio and analysis of covariance for very low density lipoprotein cholesterol are presented in tables 13 and 14.
Fig. 6. Paired Adjusted Final Means of the Experimental and Control Groups for Triglycerides
Table 13

SIGNIFICANCE OF DIFFERENCE BETWEEN THE PRE-TEST AND POST-TEST MEANS FOR VERY LOW DENSITY LIPOPROTEIN CHOLESTEROL AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test Means</th>
<th>Post-test Means</th>
<th>Dm</th>
<th>σDm</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Experimental</td>
<td>30.27</td>
<td>28.87</td>
<td>1.40</td>
<td>2.83</td>
<td>0.49</td>
</tr>
<tr>
<td>Sedentary Control</td>
<td>30.00</td>
<td>29.06</td>
<td>0.93</td>
<td>1.74</td>
<td>0.54</td>
</tr>
<tr>
<td>Occasional Experimental</td>
<td>24.07</td>
<td>22.27</td>
<td>1.80</td>
<td>1.10</td>
<td>1.64</td>
</tr>
<tr>
<td>Occasional Control</td>
<td>21.40</td>
<td>21.73</td>
<td>0.33</td>
<td>1.60</td>
<td>0.21</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

\[ t_{0.05(29)} = 2.04 \]

The above table of comparison of pre-test and post-test data on very low density lipoprotein cholesterol indicates that the t-ratio in case of sedentary experimental, sedentary control, occasional experimental, and occasional control groups were 0.49, 0.54, 1.64 and 0.21 respectively, which were not significant as the obtained values were lesser than the t-value of 2.04 required for significance at 0.05 level. The findings indicate that there was no significant variation in very low density lipoprotein cholesterol from pre to post test data in case of of the experimental and control groups.
The pre-test and post-test means of the experimental and control groups in low density lipoprotein cholesterol is graphically represented in figure 7.

The findings pertaining to the analysis of covariance for very low density lipoprotein cholesterol among the experimental and control groups is shown in tables 14 and 15.

**Table 14**

ANALYSIS OF COVARIANCE FOR VERY LOW DENSITY LIPOPROTEIN CHOLESTEROL AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Sed Exp.</th>
<th>Sed Cont.</th>
<th>Occas Exp.</th>
<th>Occas Cont.</th>
<th>SV</th>
<th>df</th>
<th>SS</th>
<th>MSS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>30.27</td>
<td>30.00</td>
<td>24.07</td>
<td>21.40</td>
<td>Among</td>
<td>3</td>
<td>875.26</td>
<td>291.75</td>
<td>4.04*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Within</td>
<td>56</td>
<td>4041.46</td>
<td>72.17</td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td>28.87</td>
<td>29.06</td>
<td>22.27</td>
<td>21.73</td>
<td>Among</td>
<td>3</td>
<td>730.44</td>
<td>243.48</td>
<td>6.95*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Within</td>
<td>56</td>
<td>1962.53</td>
<td>35.04</td>
<td></td>
</tr>
<tr>
<td>Adj.</td>
<td>27.13</td>
<td>27.45</td>
<td>23.33</td>
<td>24.01</td>
<td>Among</td>
<td>3</td>
<td>237.76</td>
<td>79.25</td>
<td>3.01*</td>
</tr>
<tr>
<td>Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Within</td>
<td>55</td>
<td>1448.83</td>
<td>26.34</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

F 0.05 (3,56) = 2.76
Fig. 7. Pre and Post Test Means of the Experimental and the Control Groups in Very Low Density Lipoprotein Cholesterol.
Table 14 of analysis of covariance for very low density lipoprotein cholesterol among experimental and control groups indicates that the F-ratios for pre-test, post-test and adjusted post means were 4.04, 6.95, and 3.01 respectively, all of which were significant as the obtained values were greater than F-value of 2.76 required for significance at 0.05 level. The results indicate that there was significant difference from pre to post test means among the experimental and control groups on very low-density lipoprotein cholesterol.

The paired adjusted final means and differences between means of the experimental and control groups on very low-density lipoprotein cholesterol are shown in table 15.

Table 15.

<table>
<thead>
<tr>
<th>Group Means</th>
<th>Mean difference</th>
<th>Critical difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Experimental</td>
<td>27.13</td>
<td>27.45</td>
</tr>
<tr>
<td>Sedentary Control</td>
<td>27.13</td>
<td>27.45</td>
</tr>
<tr>
<td>Occasional Experimental</td>
<td>27.13</td>
<td>23.33</td>
</tr>
<tr>
<td>Occasional Control</td>
<td>27.13</td>
<td>24.01</td>
</tr>
<tr>
<td>27.45</td>
<td>23.33</td>
<td>4.12*</td>
</tr>
<tr>
<td>27.45</td>
<td>24.01</td>
<td>3.44</td>
</tr>
<tr>
<td>23.33</td>
<td>24.01</td>
<td>0.68</td>
</tr>
</tbody>
</table>
Table 15 of difference between paired adjusted final means for very low density lipoprotein cholesterol between sedentary experimental and sedentary control was 0.32; between sedentary experimental and occasional control was 3.12; between sedentary control and occasional control was 3.44; and between occasional experimental and occasional control was 0.68, all of which were not significant as all the obtained values were lesser than the critical difference value of 3.71 required for significance at 0.05 level. The difference between the paired adjusted final means between sedentary experimental and occasional experimental group was 3.80; and between sedentary control and occasional experimental was 4.12, both of which were significant as these values were greater than the critical difference value of 3.71 required for significance at 0.05 level.

The paired adjusted final means of the experimental and control groups for total cholesterol is shown in figure 8.

The analysis pertaining to the body composition variables are presented in tables 16 to 24.

The findings pertaining to the t-ratio and analysis of covariance for total body weight is presented in tables 16 to 18.
Fig. 8. Paired Adjusted Final Means of the Experimental and Control Groups for Very Low Density Lipoprotein.
Table 16

SIGNIFICANCE OF DIFFERENCE BETWEEN THE PRE-TEST AND POST-TEST MEANS FOR TOTAL BODY WEIGHT AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test Means</th>
<th>Post-test Means</th>
<th>Dm</th>
<th>σDm</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>73.20</td>
<td>71.53</td>
<td>1.67</td>
<td>0.15</td>
<td>11.13*</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary</td>
<td>71.77</td>
<td>71.37</td>
<td>0.40</td>
<td>0.22</td>
<td>1.82</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td>67.07</td>
<td>65.83</td>
<td>1.24</td>
<td>0.26</td>
<td>4.73*</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td>73.67</td>
<td>73.33</td>
<td>0.34</td>
<td>0.23</td>
<td>1.48</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

$t_{0.05(29)} = 2.04$

The above table of comparison of pre-test and post-test data on total body weight indicates that the t-ratio in case of sedentary experimental and occasional experimental groups were 11.13 and 4.73 respectively, which were significant as the obtained values were greater than the t-value of 2.04 required for significance at 0.05 level. However in case of the comparisons between the pre-test and post-test means of sedentary control and occasional control groups the values of t-ratios were 1.82 and 1.48 respectively, which were not significant as the obtained values were lesser than the t-value of 2.04 required for significance at 0.05 level. The findings indicate that there was significant decrease in
total body weight from pre to post test data in case of the sedentary experimental and occasional experimental groups.

The pre-test and post-test means of the experimental and control groups in total body weight is graphically represented in figure 9.

The findings pertaining to the analysis of covariance for total body weight among the experimental and control groups are shown in table 17 and 18.

Table 17

<table>
<thead>
<tr>
<th>Groups</th>
<th>SV</th>
<th>df</th>
<th>SS</th>
<th>MSS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Means</td>
<td>73.20</td>
<td>71.77</td>
<td>67.07</td>
<td>73.67</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>73.67</td>
<td>Within</td>
<td>56</td>
</tr>
<tr>
<td>Post Means</td>
<td>71.53</td>
<td>71.37</td>
<td>65.83</td>
<td>73.33</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>73.33</td>
<td>Within</td>
<td>56</td>
</tr>
<tr>
<td>Adj. Post Means</td>
<td>69.83</td>
<td>71.02</td>
<td>70.05</td>
<td>71.14</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>71.14</td>
<td>Within</td>
<td>55</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

F_{0.05 (3,56)} = 2.76
Fig. 9. Pre and Post Test Means of the Experimental and the Control Groups in Total Body Weight.
Table 17 of analysis of covariance for total body weight among experimental and control groups indicates that the F-ratio for pre-test means was 2.35, which was not significant as it was lesser than the t-value of 2.76 required for significance at 0.05 level. The F-ratios for the post-test and adjusted post means were 2.93 and 10.52 respectively, both of which were significant as the obtained values were greater than the F value of 2.76 required for significance at 0.05 level. The results indicate that there were significant differences from pre to post test means among the experimental and control groups on total body weight.

To find out which of the paired adjusted final means differed significantly, the post-hoc test was applied and the comparisons of the paired adjusted final means and differences between means of the experimental and control groups are shown in table 18.
Table 18.
PAIRED ADJUSTED FINAL MEANS AND DIFFERENCES BETWEEN MEANS AMONG THE EXPERIMENTAL AND CONTROL GROUPS ON TOTAL BODY WEIGHT

<table>
<thead>
<tr>
<th>Group Means</th>
<th>Mean difference</th>
<th>Critical difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Experimental</td>
<td>69.83</td>
<td>1.19*</td>
</tr>
<tr>
<td>Sedentary Control</td>
<td>71.02</td>
<td></td>
</tr>
<tr>
<td>Occasional Experimental</td>
<td>70.05</td>
<td>0.22</td>
</tr>
<tr>
<td>Occasional Control</td>
<td>0.97*</td>
<td></td>
</tr>
<tr>
<td>69.83</td>
<td>1.31*</td>
<td></td>
</tr>
<tr>
<td>71.02</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>70.05</td>
<td>1.09*</td>
<td></td>
</tr>
</tbody>
</table>

Table 18 of difference between paired adjusted final means for total body weight between sedentary experimental and sedentary control was 1.19; between sedentary experimental and occasional control was 1.31; between sedentary control and occasional experimental was 0.97; and between occasional experimental and occasional control was 1.09, all of which were significant as all the obtained values were greater than the critical difference value of 0.58 required for significance at 0.05 level. The difference between the paired adjusted final means between sedentary experimental and occasional experimental group was 0.22; and between sedentary control and occasional control was
0.12, both of which were not significant as these values were lesser than the critical difference value of 0.58 required for significance at 0.05 level.

The paired adjusted final means of the experimental and control groups for total body weight is shown in figure 10.

The results pertaining to the t-ratio and analysis of covariance for fat weight is presented in tables 19 to 21.

Table 19

SIGNIFICANCE OF DIFFERENCE BETWEEN THE PRE-TEST AND POST-TEST MEANS FOR FAT WEIGHT AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test Means</th>
<th>Post-test Means</th>
<th>Dm</th>
<th>σDm</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Experimental</td>
<td>15.77</td>
<td>13.41</td>
<td>2.36</td>
<td>0.22</td>
<td>10.73*</td>
</tr>
<tr>
<td>Sedentary Control</td>
<td>15.07</td>
<td>14.79</td>
<td>0.28</td>
<td>0.18</td>
<td>1.56</td>
</tr>
<tr>
<td>Occasional Experimental</td>
<td>13.85</td>
<td>12.81</td>
<td>1.04</td>
<td>0.24</td>
<td>4.33*</td>
</tr>
<tr>
<td>Occasional Control</td>
<td>15.17</td>
<td>15.07</td>
<td>0.10</td>
<td>0.11</td>
<td>0.91</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

\[ t_{0.05(29)} = 2.04 \]
Fig. 10. Paired Adjusted Final Means of the Experimental and Control Groups for Total Body Weight.
Table 19 of comparison of pre-test and post-test data on fat weight indicates that the t-ratio in case of sedentary experimental and occasional experimental groups were 10.73 and 4.33 respectively, which were significant as the obtained values were greater than the t-value of 2.04 required for significance at 0.05 level. However in case of the comparisons between the pre-test and post-test means of sedentary control and occasional control groups the values of t-ratios were 1.56 and 0.91 respectively, which were not significant as the obtained values were lesser than the t-value of 2.04 required for significance at 0.05 level. The findings indicate that there was significant decrease in fat weight from pre to post test data in case of the sedentary experimental and occasional experimental groups.

The pre-test and post-test means of the experimental and control groups in fat weight is graphically represented in figure 11.

The findings pertaining to the analysis of covariance for fat weight among the experimental and control groups are shown in tables 20 and 21.
Fig. 11. Pre and Post Test Means of the Experimental and the Control Groups in Fat Weight.
Table 20

ANALYSIS OF COVARIANCE FOR FAT WEIGHT AMONG THE
EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Sed Exp.</th>
<th>Sed Cont.</th>
<th>Occas Exp.</th>
<th>Occas Cont.</th>
<th>SV</th>
<th>df</th>
<th>SS</th>
<th>MSS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Means</td>
<td>15.77</td>
<td>15.07</td>
<td>13.85</td>
<td>15.17</td>
<td>Among</td>
<td>3</td>
<td>29.98</td>
<td>9.99</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Within</td>
<td>56</td>
<td>634.44</td>
<td>11.33</td>
<td></td>
</tr>
<tr>
<td>Post Means</td>
<td>13.41</td>
<td>14.79</td>
<td>12.81</td>
<td>15.07</td>
<td>Among</td>
<td>3</td>
<td>52.86</td>
<td>17.62</td>
<td>2.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Within</td>
<td>56</td>
<td>484.98</td>
<td>8.66</td>
<td></td>
</tr>
<tr>
<td>Adj. Post Means</td>
<td>12.75</td>
<td>14.73</td>
<td>13.79</td>
<td>14.82</td>
<td>Among</td>
<td>3</td>
<td>33.33</td>
<td>11.11</td>
<td>19.49*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Within</td>
<td>55</td>
<td>31.17</td>
<td>0.57</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

F_{0.05}(3, 56) = 2.76

The above table of analysis of covariance for fat weight among experimental and control groups indicates that the F ratios for pre-test and post-test means were 0.88 and 2.03 respectively, both of which were not significant as the obtained values were lesser than the F-value of 2.76 required for significance at 0.05 level. However, the F-ratio for adjusted post means was 19.49, which was significant as it was greater than the F-value of 2.76 required for significance at 0.05 level. The results indicate that there were significant differences from pre to post test means among the experimental and control groups on fat weight.
To find out which of the paired adjusted final means differed significantly, the post-hoc test was applied and the comparisons of the paired adjusted final means and differences between means of the experimental and control groups are shown in table 21.

**Table 21**  
**PAIRED ADJUSTED FINAL MEANS AND DIFFERENCES BETWEEN MEANS AMONG THE EXPERIMENTAL AND CONTROL GROUPS ON FAT WEIGHT**

<table>
<thead>
<tr>
<th></th>
<th>Group Means</th>
<th>Mean difference</th>
<th>Critical difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>Experimental</td>
<td>12.75</td>
<td>13.79</td>
</tr>
<tr>
<td>Sedentary</td>
<td>Control</td>
<td>14.73</td>
<td></td>
</tr>
<tr>
<td>Occasional</td>
<td>Experimental</td>
<td>12.75</td>
<td>14.82</td>
</tr>
<tr>
<td>Occasional</td>
<td>Control</td>
<td>13.79</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.98*</td>
<td>1.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.04</td>
<td>1.41</td>
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<tr>
<td></td>
<td></td>
<td>0.94</td>
<td>1.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.09</td>
<td>1.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.03</td>
<td>1.41</td>
</tr>
</tbody>
</table>

Table 21 of difference between paired adjusted final means for fat weight between sedentary experimental and sedentary control was 1.98; between sedentary experimental and occasional control was 2.07; both of which were significant as these values were greater than the critical difference value of 1.41 required for significance at 0.05 level. The differences between paired final means between sedentary experimental and occasional experimental was 1.04; sedentary control and occasional experimental was
0.94; sedentary control and occasional control was 0.09; and between occasional experimental and occasional control was 1.03 respectively, all of which were not significant as all the obtained values were lesser than the critical difference value of 1.41 required for significance at 0.05 level. The paired adjusted final means of the experimental and control groups for fat weight is shown in figure 12.

The results of the t-ratio and analysis of covariance for lean body weight are shown in tables 22 to 24.

Table 22

SIGNIFICANCE OF DIFFERENCE BETWEEN THE PRE-TEST AND POST-TEST MEANS FOR LEAN BODY WEIGHT AMONG THE EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test Means</th>
<th>Post-test Means</th>
<th>Dm</th>
<th>σDm</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Experimental</td>
<td>57.37</td>
<td>58.13</td>
<td>0.76</td>
<td>0.19</td>
<td>4.04</td>
</tr>
<tr>
<td>Sedentary Control</td>
<td>56.69</td>
<td>56.58</td>
<td>0.11</td>
<td>0.097</td>
<td>1.13</td>
</tr>
<tr>
<td>Occasional Experimental</td>
<td>53.18</td>
<td>53.06</td>
<td>0.12</td>
<td>0.12</td>
<td>1.00</td>
</tr>
<tr>
<td>Occasional Control</td>
<td>58.49</td>
<td>58.13</td>
<td>0.36</td>
<td>0.18</td>
<td>2.00</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

$t_{0.05(29)} = 2.04$
Fig. 12. Paired Adjusted Final Means of the Experimental and Control Groups for Fat Weight.
Table 22 of comparison of pre-test and post-test data on fat weight indicates that the t-ratio in case of sedentary experimental group was 4.04 which was significant as the obtained value was greater than the t-value of 2.04 required for significance at 0.05 level. However in case of the comparisons between the pre-test and post-test means of sedentary control, occasional experimental and occasional control groups the values of t-ratios were 1.13, 1.00 and 2.00 respectively, which were not significant as the obtained values were lesser than the t-value of 2.04 required for significance at 0.05 level. The findings indicate that there was significant decrease in lean body weight from pre to post test data in case of the sedentary experimental group.

The pre-test and post-test means of the experimental and control groups in lean body weight is graphically represented in figure 13.

The findings pertaining to the analysis of covariance for lean body weight among the experimental and control groups are shown in tables 23 and 24.
Fig. 13. Pre and Post Test Means of the Experimental and the Control Groups in Lean Body Weight.
Table 23
ANALYSIS OF COVARIANCE FOR LEAN BODY WEIGHT AMONG THE
EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Sed Exp.</th>
<th>Sed Cont.</th>
<th>Occas Exp.</th>
<th>Occas Cont.</th>
<th>SV</th>
<th>df</th>
<th>SS</th>
<th>MSS</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Means</td>
<td>57.37</td>
<td>56.69</td>
<td>53.18</td>
<td>Among</td>
<td>3</td>
<td>228.44</td>
<td>76.15</td>
<td></td>
<td>3.09*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Within</td>
<td>56</td>
<td>1376.5</td>
<td>24.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Means</td>
<td>58.13</td>
<td>56.58</td>
<td>53.06</td>
<td>Among</td>
<td>3</td>
<td>257.46</td>
<td>85.82</td>
<td></td>
<td>3.30*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Within</td>
<td>56</td>
<td>1454.87</td>
<td>25.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. Post Means</td>
<td>57.13</td>
<td>56.28</td>
<td>56.34</td>
<td>Among</td>
<td>3</td>
<td>9.14</td>
<td>3.05</td>
<td></td>
<td>8.71*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Within</td>
<td>55</td>
<td>19.43</td>
<td>0.35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level
F 0.05 (3,56) = 2.76

The above table of analysis of covariance for lean body weight among experimental and control groups indicates that the F ratios for pre-test, post-test and adjusted post means were 3.09, 3.30 and 8.71 respectively, all of which were significant as the obtained values were greater than F value of 2.76 required for significance at 0.05 level. The results indicate that there were significant differences from pre to post test means among the experimental and control groups on lean body weight. The paired adjusted final means and differences between means of the experimental and control groups are shown in table 24.
Table 24.
PAIRED ADJUSTED FINAL MEANS AND DIFFERENCES BETWEEN MEANS AMONG THE EXPERIMENTAL AND CONTROL GROUPS ON LEAN BODY WEIGHT

<table>
<thead>
<tr>
<th>Group Means</th>
<th>Mean difference</th>
<th>Critical difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>Sedentary</td>
<td>Occasional</td>
</tr>
<tr>
<td>Experimental</td>
<td>Control</td>
<td>Experimental</td>
</tr>
<tr>
<td>57.13</td>
<td>56.28</td>
<td>0.85*</td>
</tr>
<tr>
<td>57.13</td>
<td>56.34</td>
<td>0.79*</td>
</tr>
<tr>
<td>57.13</td>
<td>56.13</td>
<td>1.00*</td>
</tr>
<tr>
<td>56.28</td>
<td>56.34</td>
<td>0.06</td>
</tr>
<tr>
<td>56.28</td>
<td>56.13</td>
<td>0.15</td>
</tr>
<tr>
<td>56.34</td>
<td>56.13</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Table 24 of difference between paired adjusted final means for lean body weight between sedentary experimental and sedentary control was 0.85; between sedentary experimental and occasional experimental was 0.79; and between sedentary experimental and occasional control was 1.00, all of which were significant at 0.05 level as all the obtained values were lesser than the critical difference value of 0.44 required for significance at 0.05 level. The difference between sedentary control and occasional experimental, between sedentary control and occasional control, and between occasional experimental and occasional control were 0.06, 0.15 and 0.21 respectively, all of which were not significant as all the obtained values were lesser than the critical difference value of 0.44 required for significance at 0.05 level.

The paired adjusted final means of the experimental and control groups for lean body weight is shown in figure 13.
Discussion of Findings

The findings of the present study revealed variations in lipoproteins and body composition variables for the sedentary experimental and occasional experimental groups following the sixteen weeks aerobic training programme.

The study results showed significant reduction in total cholesterol for the sedentary experimental groups following the aerobic training programme. In case of the occasional experimental group also the magnitude of reduction in total cholesterol from pre to post test was greater than that of the control groups, however, it was not statistically significant.

Cholesterol synthesis and catabolism is primarily carried out by the liver. Cholesterol protein complexes circulate by way of lymphatic and veins, and back into the blood. Physical activity, by increasing metabolism, speeds up the process of excretion of cholesterol and also prevents synthesis of the cholesterol. Low density lipoprotein cholesterol (LDL-C) and high density lipoprotein cholesterol (HDL-C) have opposing functions in terms and catabolism of cholesterol. LDL-C assists in the synthesis of cholesterol and therefore increases circulating blood cholesterol. HDL-C takes cholesterol to the liver where it is changed to bile and eventually excreted. This is found to be body’s major method of reducing its cholesterol stores. The results of the study having shown an increase in HDL-C and a decrease in LDL-C have assisted in the speedy process of cholesterol excretion and lowering of circulating total blood cholesterol. Physical activity also results in a greater mobilization and alimentary assimilation of
cholesterol and thus lowers it in the blood. Moreover, it was observed that the initial cholesterol levels of the subjects in the present study were higher, which benefits a better lowering of total cholesterol.

The aerobic training programme with its intensity and duration must have had demands on the circulatory, respiratory and metabolic functions of the body, whereby benefiting in bringing about the above desirable changes in terms of blood cholesterol.

In case of high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), very low density lipoprotein cholesterol (VLDL-C), and triglycerides, reciprocal changes were observed with an increase in HDL-C for both the experimental groups (significant increase in case of occasional experimental group), and decrease in VLDL-C, LDL-C, and triglycerides for both the experimental groups, though the magnitude of decrease was not statistically significant.

Although the association between regular endurance exercise and increased HDL-C and decreased triglycerides is now well established (Nieman, 1995), the exact mechanism explaining these changes remain unsolved. However, the interplay of three important enzyme: (i) lipoprotein lipase (LPL), (ii) hepatic lipase (HL), and (iii) lecithin: cholesterol acyltransferase (LCAT), contribute towards the HDL and triglyceride changes. HDL is found within the blood by the action of two key enzymes lipoprotein lipase and lecithin: cholesterol acyltransferase and taken out of circulation by the enzyme hepatic lipase. Physically active people tend to have higher LPL and LCAT, and lower HL activity levels. Aerobic exercise in fact can have upto double the normal LPL.
activity in muscle and adipose tissue. This allows working muscles to use more fatty acids for fuel. The endothelium based LPL functions as a mobiliser of free fatty acids FFA from endogenous triglyceride stores. Several studies have reported that endurance exercises have nearly double the capacity for triglyceride clearance from the blood than inactive people, which is associated with increased HDL production (Matson 1993, Adiputra 1992, Bauman and Owen 1991). The sixteen weeks duration of aerobic training on middle aged men must have mobilized FFA as a metabolic fuel from endogenous, exogenous as well as plasma triglyceride stores thereby showing decreased level of serum triglycerides (though the decrease was not statistically significant) levels as shown in the present study.

The findings of the study in terms of body composition have shown significant decrease in body weight and fat weight for both the experimental groups. Changes in body composition depends upon balance between caloric intake and caloric expenditure. When the body expends more energy than the energy intake through food, the body mechanism resorts to utilization of stored fat in order to compensate the negative energy balance. As such adaptation to increased physical activity, especially aerobic activity for a considerable period of time, obviously has a profound impact on metabolic process in tissue which finally results in changes in fat depot and lean body mass proportions.

Adaptation to aerobic training evokes metabolic changes and increased utilization of free fatty acids due to its improved oxidation of adipose tissue causing loss of subcutaneous and intramuscular fats. The fact that the results of the present study having
shown desirable changes in total body weight and fat weight signifies that the aerobic training protocol in the form of intensity, duration and frequency of training were demanding enough in producing desirable effects. Another reason which can be attributed for significant decrease in fat weight and the resultant decrease in total body weight can be to the already moderate obese nature of the subjects, especially in case of sedentary experimental group. When moderate obese men increase their physical activity, a state of negative energy balance is almost constantly produced, at least initially, which must produce a change in body weight, body composition, or both.

In case of lean body weight no significant changes were observed for the occasional experimental group, however, the sedentary experimental group showed significant increase in the lean body weight, which was quite more than expected. Probably, the totally inactive nature of the subjects when involved in a systematic training programme (though not a resistance training programme) might have toned up the muscles or even effecting slight hypertrophy of the muscles leading to increase in lean body weight.

The findings of the study in case of reduction in fat weight and total body weight are in consonance with the findings of Wilmore et al; (1970), Weltman, (1993) and Kumar (1995).
Discussion of Hypotheses

The hypothesis that there would be significant effect of aerobic training programme on lipoprotein profiles and body composition variables is accepted in case of total cholesterol, high density lipoprotein cholesterol, fat weight and lean body weight and total body weight, since significant changes were observed for these variables in either the sedentary or occasional experiment groups following the sixteen weeks aerobic training programme. The above hypothesis stands rejected in case of low density lipoprotein cholesterol, triglycerides and very low density lipoprotein cholesterol.

The hypothesis that there would be significant variations in lipoprotein profiles and body composition variables following the aerobic training programme between the sedentary middle aged men and occasional participants in physical activities is accepted only in case of lean body weight, where the sedentary experimental subjects showed significant increase in lean body weight as compared to occasional experimental group. In the lipoprotein profiles and other body composition variables, though both the groups showed differences from pre to post test values, there were no variations among the groups. Therefore the hypothesis that there would be significant variations between the sedentary subjects and occasional participants is rejected for all the lipoprotein variables and the body composition variables except in case of lean body mass.