Chapter IV

ANALYSIS OF DATA AND RESULTS OF THE STUDY

The statistical technique that had been used for the systematic and meaningful analysis of collected data from Mussoorie International School in respect of four items of the Fit Youth Today test has been described in this chapter. The four test items of Fit Youth Today test were selected with a view to measuring the health related physical fitness components of obese children. The four test items were steady state jog, Bent knee curls ups, Sit and reach and Body composition\(^1\).

A total number of Eighty (80) students from Mussoorie International School were selected as subjects for the study. To identify obese children fat measurement was measured by research scholar using skinfold calliper. Four site measurements were taken i.e. biceps, triceps, subscapula and suprailliac. After taking their fat measurement it was compared with Durnin chart\(^2\) to find out the

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obese children. The students whose fat measurement was more than 30% of their fat percentage were selected as obese subjects for the study. Before starting the actual training programme to find out their health related physical fitness “Fit Youth Today Test” was administered to them. It was a pre-test for them. After measuring their “Fit Youth Today Test” performance in different items, actual training programme was given to them by the research scholar. The training programme consisted of four groups with twenty (20) subjects in each group. Group-A Brisk Walking, Group-B Jogging, Group-C Circuit training and Group-D Control group. Training programme was given to the subjects for sixteen (16) weeks. After sixteen weeks to find out the actual results again the post-test was conducted on them with the help “Fit Youth Today Test.”

**Analysis of Data**

Subjects participated in physical activity program and completed the pre-test and post-test programme testing. They met the necessary participation requirements of at least 5 days/week. For
Fit Youth Today Test body fat was measured by applying the formula by Slaughter³

\[
\text{i.e. } \%\text{fat} = (0.610 \times \text{sum of skin fold}) + 5.0
\]

In order to investigate and test the significance of difference if any, analysis of covariance was computed. The hypothesis was tested at .05 level of confidence⁴

**Table-1**

**Analysis of Covariance of Steady State Jog Test**

<table>
<thead>
<tr>
<th>Sources of variations</th>
<th>d.f</th>
<th>Sxx</th>
<th>ssy</th>
<th>ssxy</th>
<th>ssyx</th>
<th>mssyx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment group</td>
<td>4-1=3</td>
<td>370.199</td>
<td>437</td>
<td>400.836</td>
<td>1.02</td>
<td>0.34</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>80-4=75</td>
<td>364.11</td>
<td>427.4</td>
<td>399.17</td>
<td>10.3</td>
<td>0.137</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>734.30</td>
<td>864.4</td>
<td>800.006</td>
<td>11.3</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level of confidence.  

\[ F_{0.05} (3, 75) = 2.73 \]

\[ F_{yx} = 2.48 \]

Graph-1

Analysis of Covariance of Steady State Jog Test

- Significant at 0.05 level of confidence
- Tab F.05 (3, 75) 2.73

<table>
<thead>
<tr>
<th>df</th>
<th>ssx</th>
<th>ssy</th>
<th>ssxy</th>
<th>ssyx</th>
<th>mssyx</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>731</td>
<td>864.4</td>
<td>800.006</td>
<td>11.3</td>
<td>2.48</td>
</tr>
</tbody>
</table>

- Treatment group
- Error
- Total
It is evident from Table-1 and Graph-1 that $F_{yx}$ 2.48 is less than Tabulated $F_{.05}$ 2.73. It is concluded that all the treatments are equally effective on health related physical fitness components of obese children. On the basis of Table-1 and Graph-1 it may be concluded that there was a significant difference in the training programme on health related physical fitness components of obese children.

In order to find out which treatment is more effective, pairwise comparative analysis on adjusted means of post test had been computed by applying LSD.

**Table-2**

Comparative Analysis of Adjusted Means of Steady State Jog Test

<table>
<thead>
<tr>
<th>Brisk Walking</th>
<th>Jogging</th>
<th>Circuit Training</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-A</td>
<td>Group-B</td>
<td>Group-C</td>
<td>Group-D</td>
</tr>
<tr>
<td>2.44</td>
<td>2.47</td>
<td>2.56</td>
<td>2.06</td>
</tr>
</tbody>
</table>

CD at 5% level = 0.23

* Significant at 0.05 level of confidence. $\text{Tab } F_{.05} (3, 75)$ 2.73
Graph-2

Comparative Analysis of Adjusted Means of Steady State Jog Test

*Significant at 0.05 level of confidence.

Tab F .05 (3, 75) 2.73
Table-2 and Graph-2 shows that treatment C and B are equally effective and also treatment B and A are effective whereas treatment D is least effective. It is therefore concluded that if a choice has to be made out of three treatments A, B and C treatment C should be preferred.

In other words circuit training programme is the best way to see the effect on health related physical fitness components (Steady State Jog Test) of obese children.

Table-3

<table>
<thead>
<tr>
<th>Sources of Variations</th>
<th>d.f</th>
<th>Ssx</th>
<th>ssy</th>
<th>ssxy</th>
<th>ssyx</th>
<th>mssyx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment group</td>
<td>4-1=3</td>
<td>1233.3</td>
<td>179.0</td>
<td>1531.25</td>
<td>232.5</td>
<td>77.5</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>80-4=1=75</td>
<td>1003</td>
<td>15.26</td>
<td>1377</td>
<td>364.5</td>
<td>4.86</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>2236.3</td>
<td>3316</td>
<td>2908.25</td>
<td>596.9</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level of confidence. \( F_{0.05} (3, 75) = 2.73 \)

\( F_{yx} = 15.95 \)
Graph-3

Analysis of Covariance of Sit and Reach Test

- Treatment group
- Error
- Total

*d Significant at 0.05 level of confidence. Tab F.05 (3, 75) 2.73*
The analysis of covariance for the above Table-3 and Graph-3 signifies that all the training program are not equally effective to see the effect on health related physical fitness components of obese children because calculated \( F_{yx} \) is greater than \( F_{0.05} \) 2.73 therefore, on the basis of Table-3 it may be concluded that there was a significant difference in the training program on health related physical fitness components of obese children age group of 10 to 14 years.

To find out which training program is better on health related physical fitness components of obese children pair wise comparative analysis on adjusted means of post test had been computed by applying LSD.

### Table-4

**Comparative Analysis of Adjusted Means of Sit and Reach Test**

<table>
<thead>
<tr>
<th>Brisk walking</th>
<th>Jogging</th>
<th>Circuit Training</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-A</td>
<td>Group-B</td>
<td>Group-C</td>
<td>Group-D</td>
</tr>
<tr>
<td>4.19</td>
<td>5.583</td>
<td>5.662</td>
<td>4.151</td>
</tr>
</tbody>
</table>

*CD at 5% level = 1.39

*Significant at 0.05 level of confidence.*

\( F \) _0.05 (3, 75) = 2.73
**Comparative Analysis of Adjusted Means of Sit and Reach Test**

* Significant at 0.05 level of confidence.

Tab F .05 (3, 75) 2.73
The above Table-4 and Graph-4 reveals that treatment C and B are equally effective and also treatment B and A are equally effective whereas treatment D is least effective. It is there fore concluded that if a choice has to be made out of three treatments A, B, and C treatment C should be preferred.

In other words circuit training program is more effective on health related physical fitness components (Sit and Reach) of obese children.

Table-5

Analysis of Covariance of Bent knee Curl-ups

<table>
<thead>
<tr>
<th>Sources of variations</th>
<th>d.f</th>
<th>ssx</th>
<th>ssy</th>
<th>ssxy</th>
<th>ssyx</th>
<th>mssyx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment group</td>
<td>4-1 =3</td>
<td>221156</td>
<td>30910</td>
<td>25370.79</td>
<td>24710.19</td>
<td>8236.73</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>80-4-1=75</td>
<td>219144</td>
<td>28790</td>
<td>24178.09</td>
<td>26122.79</td>
<td>81.64</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>440301</td>
<td>59701</td>
<td>49548.87</td>
<td>50832.98</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level of confidence.  

Tab F .05 (3, 75)  

2.73  

F_{yx} =100.9
Graph-5

Analysis of Covariance of Bent knee Curl-ups

![Graph showing analysis of covariance with specific values for ssx, ssy, ssxy, ssyx, mssyx with significance level at 0.05 and tab F.05(3, 75) 2.73]
The analysis of covariance for the above Table-5 and Graph-5 shows $F_{xy} 100.9$ is greater than $F_{.05} 2.73$ which is concluded that all the training program are not equally effective to see the effect on health related physical fitness components of obese children. Therefore, on the basis of Table-5 it may be concluded that there was a significant difference in the training program on health related physical fitness components of obese children age 10 to 14 years.

To find out which training program is more effective on health related physical fitness components of obese children pair wise comparison analysis on adjusted means of post test had been computed by applying LSD.

**Table-6**

**Comparative Analysis of Adjusted Means of Bent knee Curl-ups**

<table>
<thead>
<tr>
<th>Brisk walking</th>
<th>jogging</th>
<th>Circuit training</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-A</td>
<td>Group-B</td>
<td>Group- C</td>
<td>Group-D</td>
</tr>
<tr>
<td>18.37</td>
<td>21.62</td>
<td>22.95</td>
<td>17.2</td>
</tr>
<tr>
<td>CD at 5% level = 5.71</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level of confidence.  

$F_{.05} (3, 75) = 2.73$
Graph-6

Comparative Analysis of Adjusted Means of Bent knee Curl-ups

- Brisk Walking
- Jogging
- Circuit Training
- Control
- CD at 5% level

* Significant at 0.05 level of confidence.

Tab F.05 (3, 75) 2.73
It is evident from Table-6 and Graph-6 that treatment C and B are equally effective and also treatment B and A are equally effective whereas treatment D is least effective. It is therefore concluded that if a choice has to be made out of three treatments A, B and C treatment C should be preferred.

In other words circuit training program is more effective on health related physical fitness components (bent knee curl ups) of obese children.

Table-7

Analysis of Covariance of Skinfold Thickness

<table>
<thead>
<tr>
<th>Sources of variations</th>
<th>d.f</th>
<th>ssx</th>
<th>ssy</th>
<th>ssxy</th>
<th>ssyx</th>
<th>mssyx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment group</td>
<td>4-1</td>
<td>67134.5</td>
<td>57434.5</td>
<td>16994.2</td>
<td>52479.5</td>
<td>17493.2</td>
</tr>
<tr>
<td>Means</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>80-4-1=75</td>
<td>66802.8</td>
<td>57049.7</td>
<td>16842.5</td>
<td>52800.33</td>
<td>704</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>133937.4</td>
<td>114483.3</td>
<td>33842.8</td>
<td>10527.83</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level of confidence.  

\( F_{yx} = 24.84 \)
Graph-7

Analysis of Covariance of Skinfold Thickness

* Significant at 0.05 level of confidence. Tab F .05 (3, 75) 2.73
The analysis of covariance for the above Table-7 and Graph-7 reveals that $F_{yx}$ 24.84 is greater than $F_{.05}$ 2.73, which concluded that all the treatments are not equally effective to see the effect on health, related physical fitness components of obese children. Therefore, on the basis of Table -7 it may be concluded that there was a significant difference in the training program on health related physical fitness components of obese children age 10 to 14 years.

To find out which training program is more effective on health related physical fitness components of obese children pair wise comparison analysis on adjusted means of post test had been computed by applying LSD.

Table-8

Comparative Analysis of Adjusted Means of Skinfold Thickness

<table>
<thead>
<tr>
<th>Brisk walking</th>
<th>jogging</th>
<th>Circuit training</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-A</td>
<td>Group-B</td>
<td>Group- C</td>
<td>Group-D</td>
</tr>
<tr>
<td>26.93</td>
<td>26.64</td>
<td>26.04</td>
<td>30.13</td>
</tr>
</tbody>
</table>

CD at 5% level = 16.78

* Significant at 0.05 level of confidence.

Tab $F_{.05}$ (3, 75) 2.73
Graph 8

Comparative Analysis of Adjusted Means of Skinfold Thickness

*Significant at 0.05 level of confidence. Tab F.05 (3, 75) 2.73
Table-8 and Graph-8 shows that treatment C and B are equally effective and also treatment B and A are equally effective whereas treatment D is least effective. Therefore it is concluded that if a choice has to be made out of three treatments A, B and C treatment C should be preferred.

In other words circuit training programme is more effective on health related physical fitness components of obese children, and also to reduce the fat percentage from the body.
Findings

In this section the analysis of data and results of the study have been described. After investigating the results, the calculated F ratio was found greater than the tabulated value. This shows that all the treatments were not equally effective. There was significant difference in the training programmes. To see the actual difference LSD was used. The LSD showed that circuit training programme was most effective to reduce that the fat percentage from the body and to increase the cardio respiratory efficiency, muscular strength, muscular endurance and flexibility, followed by jogging programme and brisk walking programme.

The jogging programme was less effective than the circuit training programme, but participation in jogging programme also reduced their body fat and increased their cardio respiratory efficiency, muscular strength, muscular endurance and flexibility. As a result of their participation five times per week in jogging training programme but it was less effective than the circuit training programme.
Brisk walking group also reduced their body fat and increased the cardio respiratory efficiency, muscular strength, muscular endurance and flexibility but improvement was less than circuit training and jogging training programme.

There was no improvement in the control group participants. Participants of control group programme increased their body fat and decreased their cardio respiratory efficiency, muscular strength and muscular endurance and flexibility as they did not take part in any of the training programs. They were continuing with their regular routine.

In other words circuit training was more effective to reduce the body fat and improve cardio respiratory efficiency, muscular strength, muscular endurance and flexibility followed by jogging and brisk walking.

**Discussion of Findings**

The findings reveal that there was a significant difference in all three training programme that is brisk walking, jogging and circuit training.
The significant difference show that circuit training programme is better than jogging and brisk walking programme to reduce the body fat percentage from the body and to increase the cardio respiratory efficiency, muscular strength, muscular endurance and flexibility. Jogging programme was also effective but its effect was less than circuit training programme. In the same way brisk walking programme was also effective but its effect was less than circuit training and jogging programme. In other words from the result of this study it is concluded that if a choice is given to an individual choose the programme for better results, circuit training training will be preferred followed by jogging and brisk walking. In other words circuit training programme was the best comparison of brisk walking and jogging walking programme.

The results of the present study support the findings of Leroy,5 Self6 as per as the effect of exercises on health related physical fitness components of obese children is concerned and the present

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5 Ball or, Dongles Leroy, Ph.D, "Weight Loss and Lean Body Weight Maintenance." Dissertation Abstracts International vol 47, 10 (10 April 1987) P: 3693-A.

study does support the findings of Charter and Phillips\textsuperscript{7} as per as the jogging programme is concerned.

**Discussion of Hypothesis**

On the basis of the results of the hypothesis stated that there may not be any significant difference on health related physical fitness components of obese children by virtue of the treatments of brisk walking, jogging and circuit training is rejected.