PERCENTAGE CHANGE IN THE SELECTED SKINFOLD MEASUREMENTS OF MALE STUDENTS OF UNIVERSITY OF DELHI DUE TO PROGRESSIVE AND CONSTANT LOAD OF PHYSICAL TRAINING

Seema Kaushik
Assistant Professor, Department of Physical Education
Lakshmibai College, University of Delhi

Abstract

Skinfold measurements provide meaningful and consistent information about subcutaneous fat and its distribution. Physical activities in form of conditioning and/or training leads to various structural, functional and mechanical changes and numerous training programmes exist for the improvement of physical fitness. However, most of the studies are conducted on foreign soil with foreign population as sample, which may/may not be applicable to the Indian conditions. Moreover, there is not even a single training/conditioning programme that caters to the need of male students of University of Delhi with regard to various skinfold thickness measurements.

Hence, the present study aimed at studying the percentage change in selected skinfold measurements of male students of University of Delhi due to progressive and constant load of physical training.

The sample size for the study was 90 having three groups of male; 30 samples in each group (mean age = 20.04±0.49 years). The variables included triceps, sub-scapular, supra-iliac and calf skinfolds. The experimental design adopted for the study was multi-group repeated measure design. Three different groups were measured four times repeatedly at an interval of 6 weeks on completion of each of the three meso-cycles. Standard landmarks and protocols were followed to measure the selected variables. Mean, standard deviation and percentage were computed to analyze the data statistically. The study concluded that both the progressive and constant load of physical training bring changes in the skinfold thickness measurements of male students of University of Delhi.

Keywords—Constant Load, Progressive Load, Physical Training, Skinfold Measurements

INTRODUCTION

Skinfold measurements provide meaningful and consistent information about subcutaneous fat and its distribution [1]. This method is considered to be the oldest but still the most common method to determine a person’s body composition and body fat percentage. The test gives an estimation of the body fat by measuring skinfold thickness at specific locations on the body. The thickness of these folds is a measure of the fat under the skin, which is also called subcutaneous adipose tissue. [2]

Efficient performance is attained through a carefully planned programme of progressive training to improve coordination, eliminate unnecessary movements, accomplish results at minimum energy expenditure; and conditioning the muscle structure as well as circulation to withstand the intensive demands made upon them without harming or injuring [3]. The literature reflects that the physical activities in form of conditioning and/or training leads to various structural, functional and mechanical changes [4], [5], [6], [7], [8], [9]; and numerous training programmes exist for the improvement of physical fitness [10]; however, most of the studies are conducted on foreign soil with foreign population as sample, which may/may not be applicable to the Indian conditions. Moreover, there is not even a single training/conditioning programme that caters to the need of male students of University of Delhi with regard to various skinfold measurements.

Hence, the present study was aimed at studying the percentage change in the selected skinfold measurements of male students of University of Delhi due to progressive and constant load of physical training.
PROCEDURE

Sample
The study was conducted on ninety (90) male students of University of Delhi classified equally in three groups viz. (a) Progressive load of training or conditioning group coded as PLT (Mean Age=19.50±1.59 years); (b) Constant load of training or non-conditioning group coded as CLT (Mean Age=20.47±2.21 years); and (c) No load or control or sedentary group coded as NL (Mean Age=20.17±2.15 years). Collectively, mean age of the sample was 20.04±0.49 years. The randomly selected samples were fitness matched groups and maximum consideration was given to maintain their homogeneity.

Variables
Following variables were selected for the present study: triceps skinfold, sub-scapular skinfold, supra-iliac skinfold, and calf skinfold.

Experimental and Testing Protocol
The experimental design adopted for the study was multi-group repeated measure design. Three different groups were measured four times repeatedly at an interval of 6 weeks on completion of each of the three meso-cycles. The emphasized components during 18-weeks of training included flexibility and cardio-respiratory endurance during first meso-cycle (0-6 weeks); muscular endurance and strength during second meso-cycle (6-12 weeks); and speed and power/explosive strength during third meso-cycle (12-18 weeks). The load was progressively increased throughout the period of experimentation. The first group i.e. progressive load or conditioning group (PLT) was subjected to treatment-1 i.e. step-progression loading based conditioning programme of 18-weeks duration (45 minutes per day, 5-days a week) in addition to the load given to the second group, since it was a part of their common curriculum. The second group i.e. constant load or non-conditioning group (CLT) was subjected to treatment-2 which aimed at improving the general fitness to meet the professional preparation and curricular requirement of the students. The third group i.e. no load or control or sedentary group (NL) included those students of University of Delhi who did not participate in any sports or rigorous activity. They were also requested not to participate in any sports or to undergo training in yoga or meditation during the period of experimentation.

Collection of Data
Standard landmarks and measurement protocols were used to measure selected variables as described by various authors [11], [12].

Statistical Procedure
Mean and standard deviation were computed to provide a description of selected skinfold measurements; while percentage was computed to assess the change as the effect of conditioning programme on selected groups (progressive load, constant load or no load group) during different stages of training and testing.

RESULTS AND DISCUSSION
The results have been presented in the tables 1 and 2 and illustrated vide Fig.-1 to 5.
Table-1
Descriptive Statistics of Selected Skinfold Measurements of Male Students of University of Delhi

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group Code</th>
<th>Test-1</th>
<th>Test-2</th>
<th>Test-3</th>
<th>Test-4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Triceps Skinfold (mm)</td>
<td>PLT 30</td>
<td>6.72</td>
<td>0.85</td>
<td>6.42</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>CLT 30</td>
<td>7.67</td>
<td>0.95</td>
<td>7.56</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>NL 30</td>
<td>8.11</td>
<td>0.97</td>
<td>8.52</td>
<td>1.13</td>
</tr>
<tr>
<td>Sub-scapular Skinfold (mm.)</td>
<td>PLT 30</td>
<td>9.43</td>
<td>1.17</td>
<td>8.99</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>CLT 30</td>
<td>10.66</td>
<td>1.47</td>
<td>10.39</td>
<td>1.52</td>
</tr>
<tr>
<td></td>
<td>NL 30</td>
<td>11.67</td>
<td>1.94</td>
<td>12.02</td>
<td>2.03</td>
</tr>
<tr>
<td>Supra-iliac Skinfold (mm.)</td>
<td>PLT 30</td>
<td>7.88</td>
<td>0.85</td>
<td>7.70</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>CLT 30</td>
<td>8.96</td>
<td>0.96</td>
<td>8.81</td>
<td>1.02</td>
</tr>
<tr>
<td></td>
<td>NL 30</td>
<td>9.38</td>
<td>1.27</td>
<td>9.70</td>
<td>1.37</td>
</tr>
<tr>
<td>Calf Skinfold (mm.)</td>
<td>PLT 30</td>
<td>9.42</td>
<td>1.92</td>
<td>8.94</td>
<td>1.83</td>
</tr>
<tr>
<td></td>
<td>CLT 30</td>
<td>10.45</td>
<td>2.09</td>
<td>10.15</td>
<td>2.06</td>
</tr>
<tr>
<td></td>
<td>NL 30</td>
<td>9.82</td>
<td>2.04</td>
<td>10.13</td>
<td>2.15</td>
</tr>
</tbody>
</table>

PLT = Progressive Load Training (Conditioning Group); CLT = Constant Load Training (Non-Conditioning Group); NL = No Load (Sedentary Group)

Fig.-1 : Comparison of Selected Skinfold Measurements of Male Students of University of Delhi

The analysis of data in table-1, illustrated vide Fig.-1 pertaining to the descriptive statistics of selected skinfold thickness measurements of male students of University of Delhi reveals that:

1. All the selected variables namely triceps, sub-scapular, supra-iliac and calf skinfolds observed similar trends.

2. The mean values observed a decreasing trend among the progressive training load or conditioning group (PLT) as well as among the constant training load or non-conditioning group (CLT); whereas, the no-load or sedentary group (NL) observed increasing trends, reflecting that the training reduces the skinfold thickness.
3. Based on combining all four values and dividing by number of tests describes that the mean values of selected variables of male students of University of Delhi are as follows:

a. Triceps Skinfold (7.47 mm.)
   - Progressive Load Training Group-6.29 mm.
   - Constant Load Training Group-7.4 mm.
   - No Load Group-8.73 mm.

b. Sub-scapular Skinfold (10.47 mm.)
   - Progressive Load Training Group-8.83 mm.
   - Constant Load Training Group-10.27 mm.
   - No Load Group-12.32 mm.

c. Supra-iliac Skinfold (8.72 mm.)
   - Progressive Load Training Group-7.53 mm.
   - Constant Load Training Group-8.71 mm.
   - No Load Group-9.93 mm.

d. Calf Skinfold (9.72 mm.)
   - Progressive Load Training Group-8.82 mm.
   - Constant Load Training Group-10.02 mm.
   - No Load Group-10.33 mm.

Table 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>% Change during Different Stages of Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0-6 wks</td>
</tr>
<tr>
<td>Triceps Skinfold</td>
<td>PLT</td>
<td>-4.46</td>
</tr>
<tr>
<td></td>
<td>CLT</td>
<td>-1.43</td>
</tr>
<tr>
<td></td>
<td>NL</td>
<td>5.06</td>
</tr>
<tr>
<td>Sub-scapular</td>
<td>PLT</td>
<td>-4.67</td>
</tr>
<tr>
<td>Skinfold</td>
<td>CLT</td>
<td>-2.53</td>
</tr>
<tr>
<td></td>
<td>NL</td>
<td>3.00</td>
</tr>
<tr>
<td>Skinfold</td>
<td>CLT</td>
<td>-1.67</td>
</tr>
<tr>
<td></td>
<td>NL</td>
<td>3.41</td>
</tr>
<tr>
<td>Calf Skinfold</td>
<td>PLT</td>
<td>-5.10</td>
</tr>
<tr>
<td></td>
<td>CLT</td>
<td>-2.87</td>
</tr>
<tr>
<td></td>
<td>NL</td>
<td>3.16</td>
</tr>
</tbody>
</table>
Fig.-2 : Percentage Change in the Triceps Skinfold of Male Students of University of Delhi during Different Stages of Training

Fig.-3 : Percentage Change in the Sub-scapular Skinfold of Male Students of University of Delhi during Different Stages of Training
It is clearly evident from the analysis of data in table-2, illustrated vide Fig-2, 3, 4 and 5 depicting the percentage change in the selected skinfold measurements of male students of University of Delhi during different stages of training i.e. zero to 6 weeks, zero to 12 week, and zero to 18 weeks as well as intermittent stages of training i.e. 6 to 12 weeks, 6 to 18 weeks, and 12 to 18 weeks that:

Regarding triceps skinfold, the following changes were observed:
1. The progressive training load group observed a reduction in the triceps skinfold thickness, which was highest after 18 weeks of training (12.20%); followed by 0-12 weeks (8.93%); 6-18 weeks (8.10%); 6-12 weeks (4.67%); 0-6 weeks (4.46%); and 12-18 weeks (3.59%).
   a. The constant training load group also observed a reduction in the triceps skinfold thickness, which was highest after 18 weeks of training (7.17%); followed by 6-18 weeks (5.82%); 0-12 weeks (5.48%); 6-12 weeks (4.10%); 12-18 weeks (1.79%); and 0-6 weeks (1.43%).
   b. The no load or sedentary group observed an increase in the triceps skinfold thickness, which was highest after 18 weeks (15.29%); followed by 0-12 weeks (10.23%); 6-18 weeks (9.74%); 0-6 weeks (5.06%); 6-12 weeks (4.93%); and 12-18 weeks (4.59%).

2. Regarding sub-scapular skinfold, the following changes were observed:
   a. The progressive training load group observed a reduction in the sub-scapular skinfold thickness, which was highest after 18 weeks of training (12.09%); followed by 0-12 weeks (8.59%); 6-18 weeks (7.79%); 0-6 weeks (4.67%); 6-12 weeks (4.12%); and 12-18 weeks (3.83%).
   b. The constant training load group also observed a reduction in the sub-scapular skinfold thickness, which was highest after 18 weeks of training (6.94%); followed by 6-18 weeks (5.07%); 6-12 weeks (4.52%); 0-6 weeks (2.60%); and 12-18 weeks (2.53%).
   c. The no load or sedentary group observed an increase in the sub-scapular skinfold thickness, which was highest after 18 weeks (10.80%); followed by 0-12 weeks (8.65%); 6-18 weeks (7.57%); 6-12 weeks (5.49%); 0-6 weeks (3.00%); and 12-18 weeks (1.97%).

3. Regarding supra-iliac skinfold, the following changes were observed:
   a. The progressive training load group observed a reduction in the supra-iliac skinfold thickness, which was highest after 18 weeks of training (9.26%); followed by 0-12 weeks (7.14%); 6-18 weeks (6.22%); 6-12 weeks (4.03%); and 0-6 weeks (2.28%).
   b. The constant training load group also observed a reduction in supra-iliac skinfold thickness, which was highest after 18 weeks of training (5.47%); followed by 0-12 weeks (3.91%); 6-18 weeks (3.86%); 6-12 weeks (2.27%); and 12-18 weeks (1.67%).
   c. The no load or sedentary group observed an increase in the supra-iliac skinfold thickness, which was highest after 18 weeks (11.94%); followed by 0-12 weeks (8.25%); 6-12 weeks (8.00%); 0-6 weeks (4.43%); 12-18 weeks (3.65%); and 0-6 weeks (3.41%).

4. Regarding calf skinfold, the following changes were observed:
   a. The progressive training load group observed a reduction in the calf skinfold thickness, which was highest after 18 weeks of training (11.04%); followed by 0-12 weeks (9.34%); 6-18 weeks (6.26%); 0-6 weeks (5.10%); 6-12 weeks (4.47%); and 12-18 weeks (1.87%).
   b. The constant training load group also observed a reduction in the calf skinfold thickness, which was highest after 18 weeks of training (8.33%); followed by 6-18 weeks (5.62%); 0-12 weeks (5.36%); 12-18 weeks (3.13%); and 0-6 weeks (2.87%).
   c. The no load or sedentary group observed an increase in the calf skinfold thickness, which was highest after 18 weeks (10.08%); followed by 0-12 weeks (7.64%); 6-18 weeks (6.71%); 6-12 weeks (4.34%); 0-6 weeks (3.16%); and 12-18 weeks (2.27%).
CONCLUSION

1. Both the progressive as well as constant load of training brings reduction in the skinfold thickness measurements; however, the rate of decrease is much sharper in the progressive load of training as compared to constant or moderate load of training.

2. Lack of training or sedentary lifestyle attributes to increase in all the selected sites of skinfold thicknesses.

3. Even 6-weeks of training can bring changes in the skinfold thickness measurements, but the rate of reduction is increased with an increase in the duration as well as intensity of physical training.

4. Further study on a much longer duration is recommended so as to ascertain, up to what extent the skinfold thicknesses are reduced and when the change is sustained or maintained.

REFERENCES


