Effect of twelve weeks strength training on selected variables of body composition of female handball players

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Abstract
The study was conducted to compare the twelve of eight weeks strength training on various variables of body composition of female handball players. To obtain data for this study, the researcher had selected (N=40) female handball players of 18 to 24 years of age group (21.17 ± 2.37 years) to act as subject, among those 40 subjects 20 were selected as the controlled group and the rest of the 20 subjects were kept in the experimental group, the experimental group were given the treatment and the control group were told to carry out the normal routine. All the subjects, after having been briefed about the objective and protocol of the study, gave their consent and volunteered to participate in this study. Standard tests were used to measure the Body fat %, BMI, Impedance. The study concluded that there was no significant difference on the variables of body composition which was attributed to the fact of inequality of the age group, more about figure consciousness, influence of eating habits. It may also be due to small sample size.

Keywords: Body fat %, BMI, Impedance health related fitness, handball

Introduction
Sport performance is highly dependent on the health- and skill-related components of fitness (power, speed, agility, reaction time, balance, and Body Composition coordination) in addition to the athlete’s technique and level of competency in sport-specific motor skills. All fitness components depend on body composition to some extent. An increase in lean body mass contributes to strength and power development. Strength and power are related to muscle size. Thus, an increase in lean body mass enables the athlete to generate more force in a specific period of time. A sufficient level of lean body mass also contributes to speed, quickness, and agility performance (in the development of force applied to the ground for maximal acceleration and deceleration). Reduced nonessential body fat contributes to muscular and cardiorespiratory endurance, speed, and agility development. Additional weight (in the form of nonessential fat) provides greater resistance to athletic motion thereby forcing the athlete to increase the muscle force of contraction per given workload. As with other activities, handball is not a science, but science may help to improve the performance of handball. Efforts to improve handball performance often focus on techniques and tactics at the expense of physical fitness. During a full game, elite-level players run about 3-5 kilometers at an average intensity close to the anaerobic threshold (80-90% of maximal heart rate). Within this endurance context, numerous explosive bursts of activity are required, including jumping, kicking, tackling, turning, sprinting, changing pace, and sustaining forceful contractions to maintain balance and control of the ball against defensive pressure (Stolen et al. 2005).

Methodology
40 female handball players from L.N.I.P.E Gwalior were randomly selected as subjects for the study, 20 were kept in control group and 20 were kept in experimental group. Based on review of Literature, correspondence with the expert and scholar’s own understanding, the following variables: Body fat %, BMI, Impedance were selected as the purpose of the study.

Criterion measures
For the collection of data the body analyzer test was conducted on L.N.I.P.E female handball players, a total of 40 subjects were selected and out of them 20 were kept in experimental
group and 20 in control group, the experimental group were given the treatment. The following tests were administered:
1. The subjects were analyzed on TANITA Body composition analyzer SC-330ST machine, which is installed in the research laboratory of L.N.I.P.E Gwalior.
2. The prescribed strength training was given at the weight training hall of the department.

Administration of the test
The tests was conducted at L.N.I.P.E Gwalior, for the collection of data the test was conducted on 40 female handball players of L.N.I.P.E Gwalior, the training was given to the experimental group and the control group were told to carry out their normal daily routine The following tests will be also measured at Tanita

Findings
The findings measured Body composition variables i.e. percent body fat, body mass index & impedance after twelve weeks of strength training, the findings refers exclusively to the selected female handball players. The present sample that was tested on these variables are presented below and discussed in the following tables:

Table 1: Descriptive analysis of post test on BMI

<table>
<thead>
<tr>
<th>Treatment Groups</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>21.08</td>
<td>.128</td>
<td>20</td>
</tr>
<tr>
<td>Control</td>
<td>20.98</td>
<td>.128</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>21.03</td>
<td>1.74</td>
<td>40</td>
</tr>
</tbody>
</table>

In the Table I it can be seen that the mean and standard deviation of both the control group and experimental group. The mean and standard deviation of different post testing groups after adjustment have been shown in table 2:-

Table 2: Adjusted mean and standard error of experimental and control group in post testing

<table>
<thead>
<tr>
<th>Treatment Groups</th>
<th>Mean</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>21.08</td>
<td>.128</td>
</tr>
<tr>
<td>Control</td>
<td>20.98</td>
<td>.128</td>
</tr>
</tbody>
</table>

Further, adjusted means and standard deviation for BMI of both the groups during post testing is shown in table 2. These values are different from that of unadjusted values shown in table 1.

The final results of ANCOVA have been shown in table 3:-

Table 3: ANCOVA table for the post test data on BMI

<table>
<thead>
<tr>
<th>Source</th>
<th>Type I Sum of squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test on BMI</td>
<td>107.178</td>
<td>1</td>
<td>107.178</td>
<td>326.203</td>
<td>.008</td>
</tr>
<tr>
<td>Treatment group</td>
<td>.101</td>
<td>1</td>
<td>.101</td>
<td>.898</td>
<td>.329</td>
</tr>
<tr>
<td>Error</td>
<td>12.157</td>
<td>37</td>
<td>.329</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>17809.78</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The final results of ANCOVA have been shown in table 3:

Table 4: Post hoc comparison of adjusted means of the data on BMI obtained in post hoc measurement.

<table>
<thead>
<tr>
<th>(I) Treatment Groups</th>
<th>(J) Treatment Groups</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>Control</td>
<td>.100</td>
<td>.181</td>
<td>.583</td>
</tr>
</tbody>
</table>

The p- value for mean difference between experimental and control group is 0.583. Since p-value is more than 0.05 and hence they are insignificant at 5% level. The mean and standard deviation of both groups during post testing have been shown in table 5:-

Table 5: Descriptive statistics of post test of fat percentage

<table>
<thead>
<tr>
<th>Treatment Groups</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>24.64</td>
<td>4.18</td>
<td>20</td>
</tr>
<tr>
<td>Control</td>
<td>25.13</td>
<td>4.09</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>24.88</td>
<td>4.09</td>
<td>40</td>
</tr>
</tbody>
</table>

The mean and standard deviation of different post testing groups after adjustment have been shown in table 6:-

Table 6: Adjusted mean and standard error of experimental and control group in post testing

<table>
<thead>
<tr>
<th>Treatment Groups</th>
<th>Mean</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>24.27</td>
<td>.088</td>
</tr>
<tr>
<td>Control</td>
<td>25.49</td>
<td>.088</td>
</tr>
</tbody>
</table>

Further, adjusted means and standard deviation for data on fat percentage of both the groups during post testing is shown in table 4. These values are different from that of unadjusted values shown in table 4.

The final results of ANCOVA have been shown in table 7:
Discussion of findings

From the findings it can be clearly inferred that there are no significant differences in the Body Composition variables i.e. BMI, but the study also showed that there was found significant on Body fat percent & Impedance after twenty weeks of strength training on the selected female handball players. The result of the study shows that there was significant difference on the variables of body composition which was attributed to the fact of inequality of the age group, more about figure consciousness, influence of eating habits except the B.M.I. It was hypothesized that the strength training would significantly improve the selected variables of body composition such as body fat percent, body mass index & Impedance but the body mass index was found to be insignificant and the body fat percent and impedance was found significant. The findings of the study showed that there was no significant improvement in selected variables of body composition such as body mass index after strength training, Hence on the basis of the results of the study, the hypothesis was rejected at 0.05 level of significance. For body mass index bit it was also accepted for body fat percent and impedance, hence there was significant differences among body fat percent and impedance.

Conclusion

In the light of the study undertaken certain limitation imposed by the experimental conditions, the scholar arrived at the following conclusion. Body mass index was not significantly improved due to the influence of strength training among the female handball players but Percentage of body fat & impedance were significantly improved so, the study concluded that there were significant difference on the variables of body composition which was attributed to the fact of inequality of the age group, more about figure consciousness.
consciousness, influence of eating habits except the body mass index. It may also be due to small sample size.

References
5. Farfel. Strength training in handball with a specific focus on highly trained players, 2015.