CHAPTER IV

RESULTS AND DISCUSSIONS

4.1 OVERVIEW

This chapter deals with the analysis of data collected from the samples under study. The purpose of the study was to find out the effect of functional training, grid training and combined training on selected performance related fitness components, and play performance among interschool football players among West Bengal. To achieve the purpose of the study, the investigator randomly selected 120 football players who had represented their schools in inter school level competitions in football from different schools in West Bengal. The age of subjects for the study was between 14 to 16 years. The selected subjects were divided into four groups, three experimental groups and control group consisting of 30 subjects in each group. The subjects were oriented on the purpose of the study and the usefulness in improving performance related fitness variables. All the subjects voluntarily participated in the study. The following variables were selected for this study.

Dependent Variables

Performance Related Fitness Components

1. Speed
2. Agility
3. Leg Explosive Power
4. Flexibility
5. Endurance
6. Upper body explosive power

**Play Performance Variables**

1. Overall Football Playing ability

**Independent Variables**

4. 12 weeks Functional Training
5. 12 weeks Grid Training
6. 12 weeks combined (Functional and Grid) training

Random group pre and post test research design was followed in this study. Experimental group I was assigned as functional training group and experimental II was assigned as Grid Training Group and Experimental Group III was assigned as combined training group and control group was not given any special treatment and were under strict supervision of the investigator. Prior to experimental treatment, all the subjects were measured of their performance related fitness components and play ability which formed pre test scores. After 12 weeks experiments to the experimental groups on respective training, all the four groups were tested on criterion variables selected, which
form post test scores. The difference between pre and post test scores was considered as the effect of respective experimental treatments.

4.2 TEST OF SIGNIFICANCE

This is the vital portion of thesis achieving the conclusion by examining the hypotheses. The procedure of testing the hypotheses was either by accepting the hypotheses or rejecting the same in accordance with the results obtained in relation to the level of confidence.

The test was usually called the test of significance since we test whether the differences among the four groups or within many groups scores were significant or not. In this study, if the obtained F-value were greater than the table value, the hypotheses were accepted to the effect that there existed significant difference among the means of the groups compared and if the obtained values were lesser than the required values, then the null hypotheses were accepted to the effect that there existed no significant differences among the means of the groups under study.

4.2.1 LEVEL OF SIGNIFICANCE

The subjects were compared on the effects functional training, grid training and combined training on selected performance related physical fitness and playing ability of inter school football players of West Bengal. The selected criterion variables were speed, agility, leg explosive power,
flexibility, endurance, upper body explosive power and playing ability in football. The analysis of covariance (ANCOVA) was used to find out the significant difference if any, among the groups on selected criterion variables separately. In all the cases, 0.05 level of confidence was fixed to test the significance, which was considered as appropriate.

4.3 COMPUTATION OF ANALYSIS OF COVARIANCE AND POST HOC TEST

4.3.1 RESULTS ON SPEED

The statistical analysis comprising of descriptive statistics means, standard deviation on the initial, final and adjusted means of football performance related fitness variable Speed due to functional training, grid training and combined training among inter school football players of West Bengal is presented in Table IV.
### Table IV

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO FUNCTIONAL TRAINING, GRID TRAINING AND COMBINED TRAINING ON PERFORMANCE RELATED FITNESS VARIABLE SPEED**

<table>
<thead>
<tr>
<th></th>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>SOV</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>Obtained F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre Test Mean</strong></td>
<td>7.78</td>
<td>7.83</td>
<td>7.73</td>
<td>7.83</td>
<td>B</td>
<td>0.21</td>
<td>3</td>
<td>0.07</td>
<td>0.28</td>
</tr>
<tr>
<td><strong>Std Dev</strong></td>
<td>0.43</td>
<td>0.37</td>
<td>0.53</td>
<td>0.56</td>
<td>W</td>
<td>30.17</td>
<td>116</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td><strong>Post Test Mean</strong></td>
<td>7.73</td>
<td>7.76</td>
<td>7.68</td>
<td>7.83</td>
<td>B</td>
<td>0.29</td>
<td>3</td>
<td>0.10</td>
<td>0.38</td>
</tr>
<tr>
<td><strong>Std Dev</strong></td>
<td>0.43</td>
<td>0.48</td>
<td>0.53</td>
<td>0.56</td>
<td>W</td>
<td>30.00</td>
<td>116</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td><strong>Adjusted Post Test Mean</strong></td>
<td>7.74</td>
<td>7.73</td>
<td>7.74</td>
<td>7.78</td>
<td>B</td>
<td>0.05</td>
<td>3</td>
<td>0.02</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>W</td>
<td>4.33</td>
<td>115</td>
<td>0.04</td>
<td></td>
</tr>
</tbody>
</table>

SOV: Source of Variance; B: Between; W: Within

Required $F_{(0.05), (df 3,116)} = 2.68$; Required $F_{(0.05), (df 3,115)} = 2.68$

Not Significant at 0.05 level of confidence

As shown in Table IV, the pre test mean on Speed of functional training group was 7.78 with standard deviation $\pm$ 0.43 pre test mean of grid training group was 7.83 with standard deviation $\pm$ 0.37, the pre test mean of combined training group was 7.73 with standard deviation $\pm$ 0.53, the pre test mean of control group was 7.83 with standard deviation $\pm$ 0.56. The obtained F ratio of 0.28 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.
The results presented in Table IV, the post test mean on Speed of functional training group was 7.73 with standard deviation ± 0.43 post test mean of grid training group was 7.76 with standard deviation ± 0.48, the post test mean of combined training group was 7.68 with standard deviation ± 0.48, the post test mean of control group was 7.81 with standard deviation ± 0.51. The obtained F ratio of 0.38 on post test means of the groups was not significant at 0.05 level as the obtained F value was lesser than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was insignificant difference in means of the groups after the experimental treatment.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Speed on functional training group was 7.74, grid training group was 7.73, combined training group was 7.74 and control group was 7.78. The obtained F value on adjusted means was 0.42. The obtained F value was lesser than the required value of 2.68 and hence it was accepted that there was insignificant differences among the adjusted means on the Speed of the subjects.

Since there was significant improvements were recorded, the results were not subjected to post hoc analysis.
The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 15.

**Figure 15**

GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON SPEED
4.3.1.2 DISCUSSIONS ON SPEED

Due to the broad spectrum of physical characteristics necessary for success in field sports, especially in football, numerous training modalities have been utilized develop specific skills and playing performances. Hoffmann Jr JJ, et.al. (2013) outlined the benefits and general adaptations to three commonly used and effective conditioning methods: high intensity interval training, repeated sprint training, and small sided games (Gird training). Davids K, et.al. (2013) summarized research from an ecological dynamics program of work on team sports exemplifying how small-sided and conditioned games (SSCG) can enhance skill acquisition and decision-making processes during training. Almeida CH, et.al. (2013) and Sampaio JE, et.al. (2013) and similar other researches showed the effects of experience and small sided games on football players. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training implemented in addition to regular season practice and found functional training apart from improving selected performance related variables made participants active in regular season practice, competition, and strength and conditioning training over the course of the season. Reviews proved further scope for research in finding out the effects of functional training, grid training (small sided games) and combined training on selected football performance related fitness variable, such as Speed. The obtained results were statistically analysed and the results are discussed in this section.
The results presented in Table IV proved that there was no significant improvement on football performance related fitness variable Speed due to functional training, grid training and combined training as the obtained F value on post test means of 0.42 was lesser than the required table F value of 2.68. The results presented proved that there was no significant improvement in speed due to 12 weeks functional training, 12 weeks grid training and 12 weeks combined training and the formulated hypothesis that there would be significant difference among experimental groups in improving the performance related fitness variable Speed among inter school football players was rejected at 0.05 level. And the null hypothesis that there would be no significant difference due to functional training, grid training and combined training was accepted at 0.05 level.

As there was no significant improvement due to experimental treatments the formulated hypothesis that there would be significant differences among experimental groups, namely, functional training and grid training groups on selected performance related fitness variable, speed was rejected at 0.05 level and the null hypothesis was accepted.

Casamichana D., et.al. (2013) showed that drill regimen may affect physical responses during grid training (SSG). The resulting evidence suggested that the continuous grid training of different induced greater physical loads on players. Owen AL, et.al. (2012) documented that periodized
small sided games (grid training) training intervention was capable of improving elite-level soccer players' physical fitness characteristics. Grid training was able to develop physical characteristics in conjunction to technical and tactical elements of the game, within a relatively short period. Oliver GD, and Di Brezzo R, (2009) examined the effects of functional balance training and concluded should be added to any form of strength and conditioning program in an attempt to enhance program effectiveness. The findings of this study proved that performance related variables, and physical fitness variables would be improved due to grid training, and combined training of grid training and functional training. However, there were no specific findings to say that speed can be significantly altered due to functional training, grid training and combined training.
4.3.2.1 RESULTS ON AGILITY

The statistical analysis comprising of descriptive statistics means, standard deviation on the initial, final and adjusted means of football performance related fitness variable Agility due to functional training, grid training and combined training among inter school football players of West Bengal is presented in Table V.

Table V

**COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO FUNCTIONAL TRAINING, GRID TRAINING AND COMBINED TRAINING ON PERFORMANCE RELATED FITNESS VARIABLE AGILITY**

<table>
<thead>
<tr>
<th></th>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>SOV</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>Obtained F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test Mean</td>
<td>10.67</td>
<td>10.71</td>
<td>10.74</td>
<td>10.76</td>
<td>B</td>
<td>0.13</td>
<td>3</td>
<td>0.04</td>
<td>0.15</td>
</tr>
<tr>
<td>Std Dev</td>
<td>0.68</td>
<td>0.51</td>
<td>0.42</td>
<td>0.54</td>
<td>W</td>
<td>34.42</td>
<td>116</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>Post Test Mean</td>
<td>10.42</td>
<td>10.56</td>
<td>10.45</td>
<td>10.76</td>
<td>B</td>
<td>2.46</td>
<td>3</td>
<td>0.82</td>
<td>2.90*</td>
</tr>
<tr>
<td>Std Dev</td>
<td>0.58</td>
<td>0.54</td>
<td>0.42</td>
<td>0.54</td>
<td>W</td>
<td>32.82</td>
<td>116</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Adjusted Post Test Mean</td>
<td>10.46</td>
<td>10.57</td>
<td>10.44</td>
<td>10.75</td>
<td>B</td>
<td>1.80</td>
<td>3</td>
<td>0.60</td>
<td>17.57*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>W</td>
<td>3.93</td>
<td>115</td>
<td>0.03</td>
<td></td>
</tr>
</tbody>
</table>

SOV: Source of Variance; B: Between W: Within

Required \( F_{0.05}, (df 3,116) =2.68 \); Required \( F_{0.05}, (df 3,115) =2.68 \)

* Significant at 0.05 level of confidence

As shown in Table V, the pre test mean on Agility of functional training group was 10.67 with standard deviation \( \pm 0.68 \) pre test mean of grid training group was 10.71 with standard deviation \( \pm 0.51 \), the pre test mean of
combined training group was 10.74 with standard deviation ± 0.42, the pre test mean of control group was 10.76 with standard deviation ± 0.54. The obtained F ratio of 0.15 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The results presented in Table V, the post test mean on Agility of functional training group was 10.42 with standard deviation ± 0.58 post test mean of grid training group was 10.56 with standard deviation ± 0.54, the post test mean of combined training group was 10.45 with standard deviation ± 0.54, the post test mean of control group was 10.79 with standard deviation ± 0.49. The obtained F ratio of 2.90 on post test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was significant difference in means of the groups after the experimental treatment.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Agility on functional training group was 10.46, grid training group was 10.57, combined training group was 10.44 and control group was 10.75. The obtained F value on adjusted means was 17.57. The obtained F value was greater than the required value of 2.68 and hence it was
accepted that there was significant differences among the adjusted means on the Agility of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe’s Confidence Interval test. The results were presented in Table VI

Table VI
MULTIPLE COMPARISONS BETWEEN PAIRS OF ADJUSTED MEANS OF FUNCTIONAL, GRID AND COMBINED TRAINING GROUPS AND CONTROL GROUPS AND SCHEFFE’S POST HOC ANALYSIS ON AGILITY

<table>
<thead>
<tr>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>MEAN DIFF</th>
<th>C.I</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.46</td>
<td>10.57</td>
<td></td>
<td></td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>10.46</td>
<td></td>
<td>10.44</td>
<td></td>
<td>0.03</td>
<td>0.14</td>
</tr>
<tr>
<td>10.46</td>
<td></td>
<td></td>
<td>10.75</td>
<td>0.29*</td>
<td>0.14</td>
</tr>
<tr>
<td>10.57</td>
<td>10.44</td>
<td></td>
<td></td>
<td>0.13</td>
<td>0.14</td>
</tr>
<tr>
<td>10.57</td>
<td></td>
<td>10.75</td>
<td></td>
<td>0.18*</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>10.44</td>
<td>10.75</td>
<td></td>
<td>0.31*</td>
<td>0.14</td>
</tr>
</tbody>
</table>

* Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was
0.14. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Functional Training Group Vs Control Group (MD: 0.29)

Grid Training Group Vs Control Group (MD: 0.18)

Combined Training Group Vs Control Group (MD: 0.31)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

Functional Training Group Vs Grid Training Group (MD: 0.11)

Functional Training Group Vs Combined Training Group (MD: 0.03)

Grid Training Group Vs Combined Training Group (MD: 0.13)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 16.
Figure 16

GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON AGILITY
4.3.2.2 DISCUSSIONS ON AGILITY

Due to the broad spectrum of physical characteristics necessary for success in field sports, especially in football, numerous training modalities have been utilized to develop specific skills and playing performances. Hoffman Jr. JJ, et.al. (2013) outlined the benefits and general adaptations to three commonly used and effective conditioning methods: high intensity interval training, repeated sprint training, and small sided games (Gird training). Davids K., et.al. (2013) summarized research from an ecological dynamics program of work on team sports exemplifying how small-sided and conditioned games (SSCG) can enhance skill acquisition and decision-making processes during training. Almeida CH et.al. (2013) and Sampaio JE, et.al. (2013) and similar other researches showed the effects of experience and small sided games on football players. Oliver GD, and Di Brezzo (2009) examined the effects of functional balance training implemented in addition to regular season practice and found functional training apart from improving selected performance related variables made participants active in regular season practice, competition, and strength and conditioning training over the course of the season. Reviews proved further scope for research in finding out the effects of functional training, grid training (small sided games) and combined training on selected football performance related fitness variable, such as Agility. The obtained results were statistically analysed and the results are discussed in this section.
The results presented in Table V proved that there was significant improvement on football performance related fitness variable Agility due to functional training, grid training and combined training as the obtained F value on post test means of 17.57 was greater than the required table F value of 2.68. The post hoc analysis in table VI proved that all the three experimental protocols improved performance related fitness variable Agility significantly compared to control group, and the formulated hypothesis that functional training, grid training and combined would have significant effect on football performance related fitness variable Agility was accepted at 0.05 level. The post hoc analysis proved that functional training, grid training and combined training were significantly better than control group and the formulated hypothesis that there would be significant difference among experimental groups in improving the performance related fitness variable Agility among inter school football players was accepted at 0.05 level. The results presented in Table VI proved that there was no significant difference among treatment groups and the formulated hypothesis that there would be significant difference among experimental groups in improving the performance related fitness variable Agility among inter school football players was rejected and the null hypothesis was accepted at 0.05 level.

Davies M.J., et.al. (2013) compared the agility demands of 4 small-sided games (SSGs) and evaluated the variability in demands and concluded SSG characteristics can influence agility-training demand, which can vary
considerably for individuals. Owen AL, et.al. (2012) documented that periodized small sided games (grid training) training intervention was capable of improving elite-level soccer players' physical fitness characteristics. Grid training was able to develop physical characteristics in conjunction to technical and tactical elements of the game, within a relatively short period. Oliver GD, and BI Brezzo R., (2009) examined the effects of functional balance training and concluded that functional training should be added to any form of strength and conditioning program in an attempt to enhance program effectiveness. The findings of this study proved that performance related variable agility was improved due to grid training, functional training and combined training of grid training compared and functional training compared to non interventional group and these findings are in agreement with the findings of Davis M.J., et.al. (2013), Owen AL, et.al. (2012) and , and Di Brezzo R. (2009).
4.3.3.1 RESULTS ON LEG EXPLOSIVE POWER

The statistical analysis comprising of descriptive statistics means, standard deviation on the initial, final and adjusted means of football performance related fitness variable Leg Explosive Power due to functional training, grid training and combined training among inter school football players of West Bengal is presented in Table VII.

Table VII

<table>
<thead>
<tr>
<th></th>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>SOV</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>Obtained F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test Mean</td>
<td>2.18</td>
<td>2.16</td>
<td>2.15</td>
<td>2.20</td>
<td>B</td>
<td>0.05</td>
<td>3</td>
<td>0.02</td>
<td>0.20</td>
</tr>
<tr>
<td>Std Dev</td>
<td>0.35</td>
<td>0.31</td>
<td>0.24</td>
<td>0.22</td>
<td>W</td>
<td>8.87</td>
<td>116</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Post Test Mean</td>
<td>2.30</td>
<td>2.27</td>
<td>2.28</td>
<td>2.20</td>
<td>B</td>
<td>0.18</td>
<td>3</td>
<td>0.06</td>
<td>0.82</td>
</tr>
<tr>
<td>Std Dev</td>
<td>0.35</td>
<td>0.30</td>
<td>0.24</td>
<td>0.22</td>
<td>W</td>
<td>8.59</td>
<td>116</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Adjusted Post Test Mean</td>
<td>2.29</td>
<td>2.28</td>
<td>2.31</td>
<td>2.17</td>
<td>B</td>
<td>0.32</td>
<td>3</td>
<td>0.11</td>
<td>27.17*</td>
</tr>
</tbody>
</table>

SOV: Source of Variance; B: Between  W: Within
Required $F_{0.05, (df 3,116)} = 2.68$; Required $F_{0.05, (df 3,115)} = 2.68$
* Significant at 0.05 level of confidence

As shown in Table VII, the pre test mean on Leg Explosive Power of functional training group was 2.18 with standard deviation $\pm$ 0.35 pre test
mean of grid training group was 2.16 with standard deviation ± 0.31, the pre test mean of combined training group was 2.15 with standard deviation ± 0.24, the pre test mean of control group was 2.20 with standard deviation ± 0.22. The obtained F ratio of 0.20 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The results presented in Table VII, the post test mean on Leg Explosive Power of functional training group was 2.30 with standard deviation ± 0.35 post test mean of grid training group was 2.27 with standard deviation ± 0.30, the post test mean of combined training group was 2.28 with standard deviation ± 0.30, the post test mean of control group was 2.20 with standard deviation ± 0.21. The obtained F ratio of 0.82 on post test means of the groups was significant at 0.05 level as the obtained F value was lesser than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups after the experimental treatment.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Leg Explosive Power on functional training group was 2.29, grid training group was 2.28, combined training group was 2.31 and
control group was 2.17. The obtained F value on adjusted means was 27.17. The obtained F value was greater than the required value of 2.68 and hence it was accepted that there was significant differences among the adjusted means on the Leg Explosive Power of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe’s Confidence Interval test. The results were presented in Table VIII.

<table>
<thead>
<tr>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>MEAN DIFF</th>
<th>C.I</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.29</td>
<td>2.28</td>
<td></td>
<td></td>
<td>0.01</td>
<td>0.05</td>
</tr>
<tr>
<td>2.29</td>
<td>2.31</td>
<td></td>
<td>2.17</td>
<td>0.12*</td>
<td>0.05</td>
</tr>
<tr>
<td>2.29</td>
<td>2.31</td>
<td>2.17</td>
<td></td>
<td>0.10*</td>
<td>0.05</td>
</tr>
<tr>
<td>2.28</td>
<td>2.31</td>
<td>2.17</td>
<td></td>
<td>0.13*</td>
<td>0.05</td>
</tr>
</tbody>
</table>

* Significant at 0.05 level.
The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 0.05. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Functional Training Group Vs Control Group (MD: 0.12)
Grid Training Group Vs Control Group (MD: 0.10)
Combined Training Group Vs Control Group (MD: 0.13)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

Functional Training Group Vs Grid Training Group (MD: 0.01)
Functional Training Group Vs Combined Training Group (MD: -0.02)
Grid Training Group Vs Combined Training Group (MD: -0.03)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 17.
Figure 17

GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON LEG EXPLOSIVE POWER

Scores in Meters

- Functional Trg Group
- Grid Trg Group
- Combined Trg Group
- Control Group

Pret Test Mean
Post Test Mean
Adjusted Post Test Mean
4.3.3.2 DISCUSSIONS ON LEG EXPLOSIVE POWER

Due to the broad spectrum of physical characteristics necessary for success in field sports, especially in football, numerous training modalities have been utilized to develop specific skills and playing performances. Hoffmann Jr JJ, et.al. (2013) outlined the benefits and general adaptations to three commonly used and effective conditioning methods: high intensity interval training, repeated sprint training, and small sided games (Gird training). Davids K., et.al. (2013) summarized research from an ecological dynamics program of work on team sports exemplifying how small-sided and conditioned games (SSCG) can enhance skill acquisition and decision-making processes during training. Almeida C.H., et.al. (2013) and Sampaio JE, et.al. (2013) and similar other researches showed the effects of experience and small sided games on football players. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training implemented in addition to regular season practice and found functional training apart from improving selected performance related variables made participants active in regular season practice, competition, and strength and conditioning training over the course of the season. Reviews proved further scope for research in finding out the effects of functional training, grid training (small sided games) and combined training on selected football performance related fitness variable, such as Leg Explosive Power. The obtained results were statistically analysed and the results are discussed in this section.
The results presented in Table VII proved that there was significant improvement on football performance related fitness variable Leg Explosive Power due to functional training, grid training and combined training as the obtained F value on post test means of 27.17 was greater than the required table F value of 2.68. The post hoc analysis in table VIII proved that all the three experimental protocols, namely, functional training, grid training and combined training, improved performance related fitness variable Leg Explosive Power significantly compared to control group, and the formulated hypothesis that functional training, grid training and combined would have significant effect on football performance related fitness variable Leg Explosive Power was accepted at 0.05 level. The post hoc analysis proved that there was no significant difference among experimental groups and the formulated hypothesis that there would be significant difference among experimental groups in improving the performance related fitness variable Leg Explosive Power among inter school football players was rejected and the null hypothesis was accepted at 0.05 level.

Casimichana D, et.al. (2013) showed that drill regimen may affect physical responses during grid training (SSG). The resulting evidence suggested that the continuous grid training of different induced greater physical loads on players. Own AL, et.al. (2012) documented that periodized small sided games (grid training) training intervention was capable of improving elite-level soccer players' physical fitness characteristics including
strength and power. Grid training was able to develop physical characteristics in conjunction to technical and tactical elements of the game, within a relatively short period. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training and concluded should be added to any form of strength and conditioning program in an attempt to enhance program effectiveness. The findings of this study proved that performance related variable leg explosive power was improved due to grid training, functional training and combined training of grid training compared and functional training compared to non interventional group and these findings are in agreement with the findings of Casmichana D, et.al. (2013), Owen AL, et.al. (2012) and, Oliver GD, and Di Brezzo. (2009), as physical characteristics including strength and power was increased among the subjects, which was responsible to improved leg explosive power of the subjects.
4.3.4.1 RESULTS ON FLEXIBILITY

The statistical analysis comprising of descriptive statistics means, standard deviation on the initial, final and adjusted means of football performance related fitness variable Flexibility due to functional training, grid training and combined training among inter school football players of West Bengal is presented in Table IX.

Table IX

<table>
<thead>
<tr>
<th></th>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>SOV</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>Obtained F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test Mean</td>
<td>49.47</td>
<td>49.10</td>
<td>47.97</td>
<td>47.50</td>
<td>B</td>
<td>77.36</td>
<td>3</td>
<td>25.79</td>
<td>0.48</td>
</tr>
<tr>
<td>Post Test Mean</td>
<td>52.73</td>
<td>54.83</td>
<td>52.40</td>
<td>47.50</td>
<td>B</td>
<td>858.42</td>
<td>3</td>
<td>286.14</td>
<td>5.35*</td>
</tr>
<tr>
<td>Std Dev</td>
<td>8.27</td>
<td>6.97</td>
<td>9.17</td>
<td>6.42</td>
<td>W</td>
<td>6202.70</td>
<td>116</td>
<td>53.47</td>
<td></td>
</tr>
<tr>
<td>Adjusted Post Test Mean</td>
<td>51.85</td>
<td>54.29</td>
<td>52.90</td>
<td>48.47</td>
<td>B</td>
<td>552.25</td>
<td>3</td>
<td>184.08</td>
<td>22.66*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>W</td>
<td>934.42</td>
<td>115</td>
<td>8.13</td>
<td></td>
</tr>
</tbody>
</table>

SOV: Source of Variance; B: Between  W: Within

Required \( F_{0.05}, (df 3,116) = 2.68 \); Required \( F_{0.05}, (df 3,115) = 2.68 \)

* Significant at 0.05 level of confidence

As shown in Table IX, the pre test mean on Flexibility of functional training group was 49.47 with standard deviation ± 7.57 pre test mean of grid
training group was 49.10 with standard deviation ± 6.62, the pre test mean of combined training group was 47.97 with standard deviation ± 9.17, the pre test mean of control group was 47.50 with standard deviation ± 6.42. The obtained F ratio of 0.48 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The results presented in Table IX, the post test mean on Flexibility of functional training group was 52.73 with standard deviation ± 8.27 post test mean of grid training group was 54.83 with standard deviation ± 6.97, the post test mean of combined training group was 52.40 with standard deviation ± 6.97, the post test mean of control group was 47.53 with standard deviation ± 6.56. The obtained F ratio of 5.35 on post test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was significant difference in means of the groups after the experimental treatment.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Flexibility on functional training group was 51.85, grid training group was 54.29, combined training group was 52.90 and control group was 48.47. The obtained F value on adjusted means was 22.66.
The obtained F value was greater than the required value of 2.68 and hence it was accepted that there was significant differences among the adjusted means on the Flexibility of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe’s Confidence Interval test. The results were presented in Table X

Table X
MULTIPLE COMPARISONS BETWEEN PAIRS OF ADJUSTED MEANS OF FUNCTIONAL, GRID AND COMBINED TRAINING GROUPS AND CONTROL GROUPS AND SCHEFFE’S POST HOC ANALYSIS ON FLEXIBILITY

<table>
<thead>
<tr>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>MEAN DIFF</th>
<th>C.I</th>
</tr>
</thead>
<tbody>
<tr>
<td>51.85</td>
<td>54.29</td>
<td></td>
<td></td>
<td>2.44*</td>
<td>2.09</td>
</tr>
<tr>
<td>51.85</td>
<td></td>
<td>52.90</td>
<td>1.05</td>
<td>2.09</td>
<td></td>
</tr>
<tr>
<td>51.85</td>
<td></td>
<td></td>
<td>48.47</td>
<td>3.38*</td>
<td>2.09</td>
</tr>
<tr>
<td>54.29</td>
<td>52.90</td>
<td>1.39</td>
<td>2.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>54.29</td>
<td></td>
<td>48.47</td>
<td>5.82*</td>
<td>2.09</td>
<td></td>
</tr>
<tr>
<td>52.90</td>
<td></td>
<td>48.47</td>
<td>4.44*</td>
<td>2.09</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was
2.09. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Functional Training Group Vs Grid Training Group (MD: 2.44)  
Functional Training Group Vs Control Group (MD: 3.38)  
Grid Training Group Vs Control Group (MD: 5.82)  
Combined Training Group Vs Control Group (MD: 4.44)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

Functional Training Group Vs Combined Training Group (MD: 1.05)  
Grid Training Group Vs Combined Training Group (MD: 1.39)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 18.
Figure 4

GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON FLEXIBILITY

Scores in Centimeters

<table>
<thead>
<tr>
<th>Group</th>
<th>Pret Test Mean</th>
<th>Post Test Mean</th>
<th>Adjusted Post Test Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional Trg Group</td>
<td>49.47</td>
<td>52.73</td>
<td>51.85</td>
</tr>
<tr>
<td>Grid Trg Group</td>
<td>49.1</td>
<td>54.83</td>
<td>54.29</td>
</tr>
<tr>
<td>Combined Trg Group</td>
<td>52.4</td>
<td>52.9</td>
<td>52.4</td>
</tr>
<tr>
<td>Control Group</td>
<td>47.97</td>
<td>48.47</td>
<td>47.87</td>
</tr>
</tbody>
</table>

Legend:
- □ Pret Test Mean
- ■ Post Test Mean
- □ Adjusted Post Test Mean
**4.3.4.2 DISCUSSIONS ON FLEXIBILITY**

Due to the broad spectrum of physical characteristics necessary for success in field sports, especially in football, numerous training modalities have been utilized to develop specific skills and playing performances. Hoffmann Jr JJ, et.al. (2013) outlined the benefits and general adaptations to three commonly used and effective conditioning methods: high intensity interval training, repeated sprint training, and small sided games (Gird training). Davids K., et.al. (2013) summarized research from an ecological dynamics program of work on team sports exemplifying how small-sided and conditioned games (SSCG) can enhance skill acquisition and decision-making processes during training. Almeida CH, et.al. (2013) and Sampaio JE, et.al. (2013) and similar other researches showed the effects of experience and small sided games on football players. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training implemented in addition to regular season practice and found functional training apart from improving selected performance related variables made participants active in regular season practice, competition, and strength and conditioning training over the course of the season. Reviews proved further scope for research in finding out the effects of functional training, grid training (small sided games) and combined training on selected football performance related fitness variable, such as Flexibility. The obtained results were statistically analysed and the results are discussed in this section.
The results presented in Table IX proved that there was significant improvement on football performance related fitness variable Flexibility due to functional training, grid training and combined training as the obtained F value on post test means of 22.66 was greater than the required table F value of 2.68. The post hoc analysis in table X proved that all the three experimental protocols improved performance related fitness variable Flexibility significantly compared to control group, and the formulated hypothesis that functional training, grid training and combined would have significant effect on football performance related fitness variable Flexibility was accepted at 0.05 level. The post hoc analysis proved that functional training was superior than grid training in improving agility and there was no significant difference between functional training and combined training; and grid training and combined training and the formulated hypothesis that there would be significant difference among experimental groups in improving the performance related fitness variable Flexibility among inter school football players was accepted at 0.05 level.

Owen AL, et.al. (2012) documented that periodized small sided games (grid training) training intervention was capable of improving elite-level soccer players' physical fitness characteristics including strength and power. Grid training was able to develop physical characteristics in conjunction to technical and tactical elements of the game, within a relatively short period. Kiesel K, Pliský P, and Bulter R. (2011) determined if an off-season
intervention program was effective in improving Functional Movement and found fundamental movement characteristics do change with a standardized intervention. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training and concluded should be added to any form of strength and conditioning program in an attempt to enhance program effectiveness. The findings of this study proved that performance related variable flexibility was improved due to grid training, functional training and combined training of grid training compared and functional training compared to non interventional group. Further, it was found that grid training was significantly better than functional training. These findings are in agreement with the findings of Owen AL, et.al. (2012), Kiesel K., Plisky P., and Butler R. (2011), Oliver GD, and Di Brezzo R. (2009), as physical characteristics including flexibility was increased among the subjects.
4.3.5.1 RESULTS ON ENDURANCE

The statistical analysis comprising of descriptive statistics means, standard deviation on the initial, final and adjusted means of football performance related fitness variable Endurance due to functional training, grid training and combined training among inter school football players of West Bengal is presented in Table XI

Table XI

<table>
<thead>
<tr>
<th></th>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>SOV</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>Obtained F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre Test Mean</strong></td>
<td>157.57</td>
<td>154.70</td>
<td>159.30</td>
<td>155.97</td>
<td>B</td>
<td>357</td>
<td>3</td>
<td>119</td>
<td>0.54</td>
</tr>
<tr>
<td><strong>Std Dev</strong></td>
<td>12.72</td>
<td>15.27</td>
<td>11.70</td>
<td>16.85</td>
<td>W</td>
<td>25373</td>
<td>116</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td><strong>Post Test Mean</strong></td>
<td>148.57</td>
<td>147.67</td>
<td>150.13</td>
<td>155.97</td>
<td>B</td>
<td>1466</td>
<td>3</td>
<td>489</td>
<td>2.14</td>
</tr>
<tr>
<td><strong>Std Dev</strong></td>
<td>14.29</td>
<td>13.84</td>
<td>11.70</td>
<td>16.85</td>
<td>W</td>
<td>26549</td>
<td>116</td>
<td>229</td>
<td></td>
</tr>
<tr>
<td><strong>Adjusted Post Test Mean</strong></td>
<td>147.96</td>
<td>149.59</td>
<td>148.00</td>
<td>157.41</td>
<td>B</td>
<td>1824</td>
<td>3</td>
<td>608</td>
<td>10.21*</td>
</tr>
</tbody>
</table>

SOV: Source of Variance; B: Between  W: Within

Required $F_{0.05, (df 3,116)} = 2.68$; Required $F_{0.05, (df 3,115)} = 2.68$

* Significant at 0.05 level of confidence

As shown in Table XI, the pre test mean on Endurance of functional training group was 157.57 with standard deviation ± 12.72 pre test mean of
grid training group was 154.70 with standard deviation ± 15.27, the pre test mean of combined training group was 159.30 with standard deviation ± 11.70, the pre test mean of control group was 155.97 with standard deviation ± 16.85. The obtained F ratio of 0.54 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The results presented in Table XI, the post test mean on Endurance of functional training group was 148.57 with standard deviation ± 14.29 post test mean of grid training group was 147.67 with standard deviation ± 13.84, the post test mean of combined training group was 150.13 with standard deviation ± 13.84, the post test mean of control group was 156.60 with standard deviation ± 16.20. The obtained F ratio of 2.14 on post test means of the groups was not significant at 0.05 level as the obtained F value was lesser than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was significant difference in means of the groups after the experimental treatment.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Endurance on functional training group was 147.96, grid training group was 149.59, combined training group was 148.00
and control group was 157.41. The obtained F value on adjusted means was 10.21. The obtained F value was greater than the required value of 2.68 and hence it was accepted that there was significant differences among the adjusted means on the Endurance of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe’s Confidence Interval test. The results were presented in Table XII

<table>
<thead>
<tr>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>MEAN DIFF</th>
<th>C.I</th>
</tr>
</thead>
<tbody>
<tr>
<td>147.96</td>
<td>149.59</td>
<td>148.00</td>
<td>157.41</td>
<td>1.63</td>
<td>5.65</td>
</tr>
<tr>
<td>147.96</td>
<td>148.00</td>
<td>157.41</td>
<td>9.44*</td>
<td>5.65</td>
<td></td>
</tr>
<tr>
<td>149.59</td>
<td>148.00</td>
<td>157.41</td>
<td>7.82*</td>
<td>5.65</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level.
The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 5.65. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

Functional Training Group Vs Control Group (MD: 9.44)

Grid Training Group Vs Control Group (MD: 7.82)

Combined Training Group Vs Control Group (MD: 9.40)

The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

Functional Training Group Vs Grid Training Group (MD: 1.63)

Functional Training Group Vs Combined Training Group (MD: 0.04)

Grid Training Group Vs Combined Training Group (MD: 1.59)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 19
Figure 19

GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON ENDURANCE
Due to the broad spectrum of physical characteristics necessary for success in field sports, especially in football, numerous training modalities have been utilized develop specific skills and playing performances. Hoffmann Jr JJ, et.al. (2013) outlined the benefits and general adaptations to three commonly used and effective conditioning methods: high intensity interval training, repeated sprint training, and small sided games (Grid training). Davids K, et.al. (2013) summarized research from an ecological dynamics program of work on team sports exemplifying how small-sided and conditioned games (SSCG) can enhance skill acquisition and decision-making processes during training. Almeida CH, et.al. (2013) and Sampaio JE, et.al. (2013) and similar other researches showed the effects of experience and small sided games on football players. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training implemented in addition to regular season practice and found functional training apart from improving selected performance related variables made participants active in regular season practice, competition, and strength and conditioning training over the course of the season. Reviews proved further scope for research in finding out the effects of functional training, grid training (small sided games) and combined training on selected football performance related fitness variable, such as Endurance. The obtained results were statistically analysed and the results are discussed in this section.
The results presented in Table XI proved that there was significant improvement on football performance related fitness variable Endurance due to functional training, grid training and combined training as the obtained F value on adjusted post test means of 10.21 was greater than the required table F value of 2.68. The post hoc analysis in table XII proved that all the three experimental protocols, namely, functional training, grid training and combined training improved performance related fitness variable Endurance significantly compared to control group, and the formulated hypothesis that functional training, grid training and combined would have significant effect on football performance related fitness variable Endurance was accepted at 0.05 level. The post hoc analysis proved that there was no significant difference among the experimental groups and the formulated hypothesis that there would be significant difference among experimental groups in improving the performance related fitness variable Endurance among inter school football players was rejected and the null hypothesis was accepted at 0.05 level.

Aguiar MV, et.al. (2013) identified the activity profiles of football small-sided games (SSG) formats (2-, 3-, 4-, and 5-a-side). The 2-a-side format presented the lowest number of sprints and the 3-a-side the highest and concluded coaches can use lower number of players (2- and 3-a-side) to increase cardiovascular effects but use higher number of players (4- and 5-a-side) to increase variability and specificity according to the
competition demands. Brandes M, et.al. (2012) found pronounced demands on the anaerobic energy supply in 2 vs. 2, whereas 3 vs. 3 and 4 vs. 4 remain predominantly on an aerobic level and differ mainly in the HR response and recommended using 3 vs. 3 for soccer-specific aerobic fitness training. Kiesel K. Plisky P, and Butler R. (2011) determined if an off-season intervention program was effective in improving Functional Movement and found fundamental movement characteristics do change with a standardized intervention. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training and concluded should be added to any form of strength and conditioning program in an attempt to enhance program effectiveness. The findings of this study proved that performance related variable endurance was improved due to grid training, functional training and combined training of grid training compared and functional training compared to non interventional group. These findings are in agreement with the findings of Aguiar MV, et.al. (2013), Brandes M, et.al. (2012), Kiesel K. Plisky P. and Butler R. (2011), Oliver GD, and Di Brezzo. (2009), as cardiovascular endurance and soccer specific aerobic fitness was increased among the subjects due to functional, grid and combined training protocol suggested in this study.
4.3.6.1 RESULTS ON UPPER BODY EXPLOSIVE POWER

The statistical analysis comprising of descriptive statistics means, standard deviation on the initial, final and adjusted means of football performance related fitness variable Upper body explosive power due to functional training, grid training and combined training among inter school football players of West Bengal is presented in Table XIII

Table XIII

COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO FUNCTIONAL TRAINING, GRID TRAINING AND COMBINED TRAINING ON PERFORMANCE RELATED FITNESS VARIABLE UPPER BODY EXPLOSIVE POWER

<table>
<thead>
<tr>
<th></th>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>SOV</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Squares</th>
<th>Obtained F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test Mean</td>
<td>4.57</td>
<td>4.61</td>
<td>4.72</td>
<td>4.29</td>
<td>B</td>
<td>3.06</td>
<td>3</td>
<td>1.02</td>
<td>0.54</td>
</tr>
<tr>
<td>Std Dev</td>
<td>1.37</td>
<td>1.07</td>
<td>1.24</td>
<td>1.35</td>
<td>W</td>
<td>220.59</td>
<td>116</td>
<td>1.90</td>
<td></td>
</tr>
<tr>
<td>Post Test Mean</td>
<td>4.68</td>
<td>4.66</td>
<td>4.88</td>
<td>4.29</td>
<td>B</td>
<td>5.60</td>
<td>3</td>
<td>1.87</td>
<td>0.98</td>
</tr>
<tr>
<td>Std Dev</td>
<td>1.35</td>
<td>1.20</td>
<td>1.24</td>
<td>1.35</td>
<td>W</td>
<td>220.20</td>
<td>116</td>
<td>1.90</td>
<td></td>
</tr>
<tr>
<td>Adjusted Post Test Mean</td>
<td>4.66</td>
<td>4.60</td>
<td>4.71</td>
<td>4.53</td>
<td>B</td>
<td>0.50</td>
<td>3</td>
<td>0.17</td>
<td>2.23</td>
</tr>
</tbody>
</table>

SOV: Source of Variance; B: Between  W: Within
Required $F_{0.05, \text{(df 3,116)}} = 2.68$;  Required $F_{0.05, \text{(df 3,115)}} = 2.68$
* Significant at 0.05 level of confidence

As shown in Table XIII, the pre test mean on Upper body explosive power of functional training group was 4.57 with standard deviation ± 1.37 pre
test mean of grid training group was 4.61 with standard deviation ± 1.07, the pre test mean of combined training group was 4.72 with standard deviation ± 1.24, the pre test mean of control group was 4.29 with standard deviation ± 1.35. The obtained F ratio of 0.54 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The results presented in Table XIII, the post test mean on Upper body explosive power of functional training group was 4.68 with standard deviation ± 1.35 post test mean of grid training group was 4.66 with standard deviation ± 1.20, the post test mean of combined training group was 4.88 with standard deviation ± 1.20, the post test mean of control group was 4.28 with standard deviation ± 1.33. The obtained F ratio of 0.98 on post test means of the groups was significant at 0.05 level as the obtained F value was less than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups after the experimental treatment.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Upper body explosive power on functional training group was 4.66, grid training group was 4.60, combined training
group was 4.71 and control group was 4.53. The obtained F value on adjusted means was 2.23. The obtained F value was lesser than the required value of 2.68 and hence it was accepted that there was no significant differences among the adjusted means on the Upper body explosive power of the subjects.

Since insignificant improvements were recorded, the results were not subjected to post hoc analysis using Scheffe’s Confidence Interval test.

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 6.
Figure 6

GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON UPPER BODY EXPLOSIVE POWER
4.3.6.2 DISCUSSIONS ON UPPER BODY EXPLOSIVE POWER

Due to the broad spectrum of physical characteristics necessary for success in field sports, especially in football, numerous training modalities have been utilized to develop specific skills and playing performances. Hoffmann Jr. JJ, et.al. (2013) outlined the benefits and general adaptations to three commonly used and effective conditioning methods: high intensity interval training, repeated sprint training, and small sided games (Gird training). Davids K., et.al. (2013) summarized research from an ecological dynamics program of work on team sports exemplifying how small-sided and conditioned games (SSCG) can enhance skill acquisition and decision-making processes during training. Almeida CH, et.al. (2013) and Sampaio JE, et.al. (2013) and similar other researches showed the effects of experience and small sided games on football players. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training implemented in addition to regular season practice and found functional training apart from improving selected performance related variables made participants active in regular season practice, competition, and strength and conditioning training over the course of the season. Reviews proved further scope for research in finding out the effects of functional training, grid training (small sided games) and combined training on selected football performance related fitness variable, such as Upper body explosive power. The obtained results were statistically analysed and the results are discussed in this section.
The results presented in Table XIII proved that even though there was small improvement in upper body explosive power among the subjects due to functional training, grid training and combined training, these improvements were not statistically significant on football performance related fitness variable Upper body explosive power as the obtained F value on post test means of 2.23 was lesser than the required table F value of 2.68. Hence formulated hypothesis that functional training, grid training and combined would have significant effect on football performance related fitness variable Upper body explosive power was rejected and the null hypothesis was accepted at 0.05 level. The results further proved that the formulated hypothesis that there would be significant difference among experimental groups in improving the performance related fitness variable Upper body explosive power among inter school football players was rejected and the null hypothesis was accepted at 0.05 level.

Casamichana D, et.al. (2013) showed that drill regimen may affect physical responses during grid training (SSG). The resulting evidence suggested that the continuous grid training of different induced greater physical loads on players. Owen AL, et.al. (2012) documented that periodized small sided games (grid training) training intervention was capable of improving elite-level soccer players' physical fitness characteristics including strength and power. Grid training was able to develop physical characteristics in conjunction to technical and tactical elements of the game, within a
relatively short period. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training and concluded should be added to any form of strength and conditioning program in an attempt to enhance program effectiveness. The findings of this study proved functional training, grid training and combined training failed to significantly alter upper body explosive power did not agree with the above previous studies. These findings proved that though there were small increases in upper body explosive power of the subjects, the increase was not significant mainly due to the fact that the functional training and grid training were focused to improve lower body strength and power.

4.3.7.1 RESULTS ON PLAYING ABILITY

The statistical analysis comprising of descriptive statistics means, standard deviation on the initial, final and adjusted means of football Playing Ability due to functional training, grid training and combined training among inter school football players of West Bengal is presented in Table XIV
Table XIV

COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO FUNCTIONAL TRAINING, GRID TRAINING AND COMBINED TRAINING ON FOOTBALL PLAYING ABILITY

<table>
<thead>
<tr>
<th></th>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>SOV</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>Obtained F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test Mean</td>
<td>65.97</td>
<td>60.00</td>
<td>67.87</td>
<td>62.25</td>
<td>B</td>
<td>1137</td>
<td>3</td>
<td>379</td>
<td>2.40</td>
</tr>
<tr>
<td>Std Dev</td>
<td>13.52</td>
<td>9.99</td>
<td>16.06</td>
<td>10.32</td>
<td>W</td>
<td>18319</td>
<td>116</td>
<td>158</td>
<td></td>
</tr>
<tr>
<td>Post Test Mean</td>
<td>71.67</td>
<td>69.00</td>
<td>72.67</td>
<td>62.25</td>
<td>B</td>
<td>2516</td>
<td>3</td>
<td>839</td>
<td>6.84*</td>
</tr>
<tr>
<td>Std Dev</td>
<td>10.89</td>
<td>8.58</td>
<td>16.06</td>
<td>10.32</td>
<td>W</td>
<td>14223</td>
<td>116</td>
<td>123</td>
<td></td>
</tr>
<tr>
<td>Adjusted Post Test Mean</td>
<td>70.12</td>
<td>72.19</td>
<td>69.62</td>
<td>62.41</td>
<td>B</td>
<td>1637</td>
<td>3</td>
<td>546</td>
<td>23.27*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>W</td>
<td>2697</td>
<td>115</td>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05), (df 3,116)} = 2.68$; Required $F_{(0.05), (df 3,115)} = 2.68$
* Significant at 0.05 level of confidence

As shown in Table XIV, the pre test mean on Playing Ability of functional training group was 65.97 with standard deviation $\pm$ 13.52 pre test mean of grid training group was 60.00 with standard deviation $\pm$ 9.99, the pre test mean of combined training group was 67.87 with standard deviation $\pm$ 16.06, the pre test mean of control group was 62.25 with standard deviation $\pm$ 10.32. The obtained F ratio of 2.40 on pre test means of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.
The results presented in Table XIV, the post test mean on Playing Ability of functional training group was 71.67 with standard deviation ± 10.89, post test mean of grid training group was 69.00 with standard deviation ± 8.58, the post test mean of combined training group was 72.67 with standard deviation ± 8.58, the post test mean of control group was 61.00 with standard deviation ± 9.45. The obtained F ratio of 6.84 on post test means of the groups was significant at 0.05 level as the obtained F value was greater than the required table F value of 2.68 to be significant at 0.05 level. This shows that there was significant difference in means of the groups after the experimental treatment.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on Playing Ability on functional training group was 70.12, grid training group was 72.19, combined training group was 69.62 and control group was 62.41. The obtained F value on adjusted means was 23.27. The obtained F value was greater than the required value of 2.68 and hence it was accepted that there was significant differences among the adjusted means on the Playing Ability of the subjects.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe’s Confidence Interval test. The results were presented in Table XV.
## Table XV

MULTIPLE COMPARISONS BETWEEN PAIRS OF ADJUSTED MEANS OF FUNCTIONAL, GRID AND COMBINED TRAINING GROUPS AND CONTROL GROUPS AND SCHEFFE’S POST HOC ANALYSIS ON PLAYING ABILITY

<table>
<thead>
<tr>
<th>Functional Trg Group</th>
<th>Grid Trg Group</th>
<th>Combined Group</th>
<th>Control Group</th>
<th>MEAN DIFF</th>
<th>C.I</th>
</tr>
</thead>
<tbody>
<tr>
<td>70.12</td>
<td>72.19</td>
<td>2.07</td>
<td>3.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70.12</td>
<td>69.62</td>
<td>0.51</td>
<td>3.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70.12</td>
<td>62.41</td>
<td>7.72*</td>
<td>3.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72.19</td>
<td>69.62</td>
<td>2.57</td>
<td>3.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72.19</td>
<td>62.41</td>
<td>9.78*</td>
<td>3.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>69.62</td>
<td>62.41</td>
<td>7.21*</td>
<td>3.55</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence interval was 3.55. The following paired mean comparisons were greater than the required confidence interval and were significant at 0.05 level.

- Functional Training Group Vs Control Group (MD: 7.72)
- Grid Training Group Vs Control Group (MD: 9.78)
- Combined Training Group Vs Control Group (MD: 7.21)
The following paired mean comparisons were less than the required confidence interval and were not significant at 0.05 level.

Functional Training Group Vs Grid Training Group (MD: 2.07)

Functional Training Group Vs Combined Training Group (MD: 0.51)

Grid Training Group Vs Combined Training Group (MD: 2.57)

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 21.
Figure 21

GRAPH SHOWING PRE, POST AND ADJUSTED MEANS ON PLAYING ABILITY
4.3.7.2 DISCUSSIONS ON PLAYING ABILITY

Due to the broad spectrum of physical characteristics necessary for success in field sports, especially in football, numerous training modalities have been utilized to develop specific skills and playing performances. Hoffmann Jr JJ, et.al. (2013) outlined the benefits and general adaptations to three commonly used and effective conditioning methods: high intensity interval training, repeated sprint training, and small-sided games (Grid training). Davids K, et.al. (2013) summarized research from an ecological dynamics program of work on team sports exemplifying how small-sided and conditioned games (SSCG) can enhance skill acquisition and decision-making processes during training. Almeida CH et.al. (2013) and Sampaio JE, et.al. (2013) and similar other researches showed the effects of experience and small-sided games on football players. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training implemented in addition to regular season practice and found functional training apart from improving selected performance related variables made participants active in regular season practice, competition, and strength and conditioning training over the course of the season. Reviews proved further scope for research in finding out the effects of functional training, grid training (small sided games) and combined training on selected football performance variable, such as Playing Ability. The obtained results were statistically analysed and the results are discussed in this section.
The results presented in Table XIV proved that there was significant improvement on football Playing Ability due to functional training, grid training and combined training as the obtained F value on post test means of 23.27 was greater than the required table F value of 2.68. The post hoc analysis in table XV proved that all the three experimental protocols improved performance variable Playing Ability significantly, compared to control group, and the formulated hypothesis that functional training, grid training and combined would have significant effect on football performance variable Playing Ability was accepted at 0.05 level. The post hoc analysis proved that there was no significant differences among experimental groups and the formulated hypothesis that there would be significant difference among experimental groups in improving the Playing Ability among inter school football players was rejected and the null hypothesis was accepted at 0.05 level.

Fradua L, et.al. (2013) found it is possible to design small sided games with a more valid representation of the tactical conditions experienced in full-size matches and their use may improve the training effect of tactical aspects of match performance in soccer. Unnithan V, et.al. (2012) demonstrated that there was a moderate agreement between the more technically gifted soccer player and success during multiple small-sided games. Almeida CH, et.al. (2013) found significant differences in the development and finalization of
offensive sequences within 3 Vs 3 and 6 Vs 6 small-sided game formats.. C B H, et al. (2012) indicated that 3 vs. 3 non sport-specific Small Sided Games provide higher stimulus for aerobic fitness adaptation and technical improvement than 4 vs. 4 and 6 vs. 6 formats. Kiesel K, Plisky P, and Bulter R. (2011) determined if an off-season intervention program was effective in improving Functional Movement and found fundamental movement characteristics do change with a standardized intervention. Oliver GD, and Di Brezzo R. (2009) examined the effects of functional balance training and concluded should be added to any form of strength and conditioning program in an attempt to enhance program effectiveness.

Thus, the theoretical foundations laid proved that functional training, grid training with different format and combined functional and grid training contributes for development and finalization of offensive sequences and overall playing ability and the findings of this study are in agreement with the previous researches cited.
4.4 DISCUSSIONS ON HYPOTHESES

For the purpose of the study the following were hypothesized.

1. It was hypothesized that there would be significant effect on selected performance related fitness variables such as, speed, agility, leg explosive power, endurance, flexibility and upper body explosive power due to functional training, grid training and combined training among inter school football players in West Bengal.

2. It was hypothesized that there would be significant effect on overall playing ability due to functional training, grid training and combined training among inter school football players in West Bengal.

3. It was hypothesized that there would be significant improvement on selected performance related fitness variables such as speed, agility, leg explosive power, endurance, flexibility and upper body explosive power due to combined training than the isolated functional training and grid training.

4. It was hypothesized that there would be significant improvement on playing ability in football due to combined training than the isolated functional training and grid training.
The formulated hypothesis No. 1 stated that there would be significant effect on selected performance related fitness variables such as, speed, agility, leg explosive power, endurance, flexibility and upper body explosive power due to functional training, grid training and combined training among inter school football players in West Bengal. The results of the study proved that there was significant effect on performance related fitness variables, agility, leg explosive power, endurance and flexibility and the hypothesis was accepted for these variables. The results further proved that there was no significant effect on performance related variables, speed and upper body explosive power and the formulated hypothesis was rejected at 0.05 level for these two variables.

The formulated hypothesis No. 2 stated that there would be significant effect on overall playing ability due to functional training, grid training and combined training among inter school football players in West Bengal. The results presented in this study proved that there was significant effect on overall playing ability due to functional training, grid training and combined training and the formulated hypothesis was accepted at 0.05 level.

The formulated hypothesis No. 3 stated that there would be significant improvement on selected performance related fitness variables such as speed, agility, leg explosive power, endurance, flexibility and upper body explosive power due to combined training than the isolated functional training and grid
training. The results presented proved that there was no significant difference between combined training and isolated functional and grid training on selected performance related variables speed, agility, leg explosive power, endurance, flexibility and upper body explosive power of inter school football players, as such the formulated hypothesis was rejected at 0.05 level.

The formulated hypothesis No. 4 stated that there would be significant improvement on playing ability in football due to combined training than the isolated functional training and grid training. The result presented in this study proved that there was no significant difference between combined training and isolated functional training and grid training. Hence, the formulated hypothesis was rejected at 0.05 level.