CHAPTER IV

ANALYSIS OF DATA AND RESULTS OF THE STUDY
The present chapter is devoted to the analysis, interpretation, presentation and discussion of the results. The successful research lies not only in the collection of facts, but to interpret, generalize and make inference of them. Analysis involves the breaking up of existing complex factors into simpler parts and then putting these together in new arrangements for purpose of interpretation of data. It is a difficult task to search truth from the raw data unless treated significantly with the help of statistical analysis. The data for the present study was obtained through purposive sampling of the subjects. The raw scores thus obtained were statistically analyzed to obtain the purpose of the study.

In this chapter the data gathered from the present study have been presented in a systematic and lucid manner. The analysis and interpretation of data follows the presentation with logical procedure related to the topic of the study. The analysis, presentation, interpretations and results of the data, collected during pilot study to extract the test items for skill test battery and the data collected on selected tests of skill test battery during main study, are presented as follows:
4.1 ANALYSIS, PRESENTATION AND INTERPRETATIONS OF THE DATA COLLECTED DURING PILOT STUDY

The data collected during pilot study, on twenty handball player and fourteen test items, was analyzed statistically to find out the most appropriate test items to be included in the handball skill test battery. The reliability, objectivity and validity of the test items were determined simultaneously. The data collected on tests was subjected to factor analysis utilizing the principal component method for the preliminary rotation and the possible source of variance among the variables was derived. Inter correlation matrix among the variables was obtained which was further subjected to factor analysis for extracting un-rotated and rotated factors and therefore, on the basis of factor loading, leaner regression was prepared to finalized the handball skill test battery for university players.

Preliminary statistics in the form of means and standard deviations for the variables of the pilot study are presented in table 4.1.
### TABLE 4.1

**MEAN AND STANDARD DEVIATION OF PILOT STUDY TEST ITEMS**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Test Item</th>
<th>Measuring Unit</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diagonal Defensive Movement</td>
<td>Seconds</td>
<td>7.92</td>
<td>.57247</td>
</tr>
<tr>
<td>2</td>
<td>Rectangular Defensive Movement</td>
<td>Seconds</td>
<td>7.01</td>
<td>.65413</td>
</tr>
<tr>
<td>3</td>
<td>20 Wall Pass</td>
<td>Numbers</td>
<td>10.20</td>
<td>1.196</td>
</tr>
<tr>
<td>4</td>
<td>10 Wall Pass</td>
<td>Numbers</td>
<td>9.50</td>
<td>1.357</td>
</tr>
<tr>
<td>5</td>
<td>22 Floor Pass</td>
<td>Numbers</td>
<td>18.45</td>
<td>3.000</td>
</tr>
<tr>
<td>6</td>
<td>15 Wall Pass</td>
<td>Numbers</td>
<td>39.35</td>
<td>4.771</td>
</tr>
<tr>
<td>7</td>
<td>Right Hand Dribble</td>
<td>Seconds</td>
<td>9.44</td>
<td>.67398</td>
</tr>
<tr>
<td>8</td>
<td>Left Hand Dribble</td>
<td>Seconds</td>
<td>9.03</td>
<td>.89747</td>
</tr>
<tr>
<td>9</td>
<td>20 High Dribble</td>
<td>Seconds</td>
<td>8.16</td>
<td>.73119</td>
</tr>
<tr>
<td>10</td>
<td>Zig-zag Dribble</td>
<td>Seconds</td>
<td>13.76</td>
<td>.50426</td>
</tr>
<tr>
<td>11</td>
<td>Front Shooting</td>
<td>Numbers</td>
<td>39.95</td>
<td>2.704</td>
</tr>
<tr>
<td>12</td>
<td>Penalty Shoot</td>
<td>Numbers</td>
<td>43.90</td>
<td>2.827</td>
</tr>
<tr>
<td>13</td>
<td>Turn off and Shoot</td>
<td>Numbers</td>
<td>43.00</td>
<td>4.155</td>
</tr>
<tr>
<td>14</td>
<td>Jump and Shoot</td>
<td>Numbers</td>
<td>19.40</td>
<td>3.251</td>
</tr>
</tbody>
</table>
4.1.1 RELIABILITY OF TEST ITEMS OF PILOT STUDY

The reliability of the test items was computed by applying Guttmann's split half method for calculating reliability.

The reliability coefficients of 14 test items have been presented in table 4.2.

**TABLE 4.2**

RELIABILITY OF PILOT STUDY TEST ITEMS BY GUTTMANN'S SPLIT HALF METHOD

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Test Item</th>
<th>'r'</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diagonal Defensive Movement</td>
<td>.78</td>
</tr>
<tr>
<td>2</td>
<td>Rectangular Defensive Movement</td>
<td>.91</td>
</tr>
<tr>
<td>3</td>
<td>20 Second Wall Pass</td>
<td>.50</td>
</tr>
<tr>
<td>4</td>
<td>10 meter Wall Pass</td>
<td>.83</td>
</tr>
<tr>
<td>5</td>
<td>15 meter Wall Pass</td>
<td>.64</td>
</tr>
<tr>
<td>6</td>
<td>22 meter Floor Pass</td>
<td>.95</td>
</tr>
<tr>
<td>7</td>
<td>Right-Hand Dribble</td>
<td>.99</td>
</tr>
<tr>
<td>8</td>
<td>Left-Hand Dribble</td>
<td>.94</td>
</tr>
<tr>
<td>9</td>
<td>15 meter High Dribble</td>
<td>.92</td>
</tr>
<tr>
<td>10</td>
<td>Zigzag Dribble</td>
<td>.84</td>
</tr>
<tr>
<td>11</td>
<td>Front Shooting</td>
<td>.65</td>
</tr>
<tr>
<td>12</td>
<td>Penalty Shoot</td>
<td>.88</td>
</tr>
<tr>
<td>13</td>
<td>Turn-off and Shoot</td>
<td>.58</td>
</tr>
<tr>
<td>14</td>
<td>Jump and Shoot</td>
<td>.97</td>
</tr>
</tbody>
</table>

- Rounded to two places
It is evident from table 4.2 that the correlation coefficients for establishing reliability of Right Hand Dribbling (.99), Jump & Shoot (.97), 15 Meter Wall Pass (.95), Left-Hand Dribble (.94), 15 Meter High Dribbling (.92), and Rectangular Defensive Movement (.91) were very high and were highly significant at 0.1 level of confidence.

The reliability coefficient of Penalty Shoot was reported as .88, and 10 Meter Wall Pass reported as .83 which suits the requirement of the acceptance of reliability at 0.1 level of confidence.

All other test items produced the reliability coefficients above .44 acceptable at 0.05 level of confidence. The reason for Zigzag dribble test producing the lowest coefficient (.44) was justified as this skill test item required top class ball control ability under the stress of time. Though the coefficient of this test was quite significant at 0.05 level of confidence.

4.1.2 OBJECTIVITY OF TEST ITEMS OF PILOT STUDY

The test re-test method was employed to establish the objectivity of the pilot study test items as suggested by Cronbach's alpha reliability analysis. Twenty subjects were retested by a qualified coach after two days of the tests conducted by the investigator for establishing objectivity. The coefficient of correlation between test and retests were computed and are presented in table 4.3.
TABLE 4.3

OBJECTIVITY OF TEST ITEMS OF PILOT STUDY BY
CRONBHA'S ALPHA METHOD

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Test Item</th>
<th>‘r’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diagonal Defensive Movement</td>
<td>.76</td>
</tr>
<tr>
<td>2</td>
<td>Rectangular Defensive Movement</td>
<td>.76</td>
</tr>
<tr>
<td>3</td>
<td>20 Second Wall Pass</td>
<td>.82</td>
</tr>
<tr>
<td>4</td>
<td>10 Meter Wall Pass</td>
<td>.59</td>
</tr>
<tr>
<td>5</td>
<td>15 Meter Wall Pass</td>
<td>.86</td>
</tr>
<tr>
<td>6</td>
<td>22 Meter Floor Pass</td>
<td>.90</td>
</tr>
<tr>
<td>7</td>
<td>Right-Hand Dribble</td>
<td>.76</td>
</tr>
<tr>
<td>8</td>
<td>Left-Hand Dribble</td>
<td>.88</td>
</tr>
<tr>
<td>9</td>
<td>15 Meter High Dribble</td>
<td>.84</td>
</tr>
<tr>
<td>10</td>
<td>Zigzag Dribble</td>
<td>.74</td>
</tr>
<tr>
<td>11</td>
<td>Front Shooting</td>
<td>.82</td>
</tr>
<tr>
<td>12</td>
<td>Penalty Shoot</td>
<td>.77</td>
</tr>
<tr>
<td>13</td>
<td>Turn-off and Shoot</td>
<td>.88</td>
</tr>
<tr>
<td>14</td>
<td>Jump and Shoot</td>
<td>.82</td>
</tr>
</tbody>
</table>

- Rounded to two places.
The table 4.3 shows that the correlation coefficients of 22 Meter Floor Pass, Left-Hand Dribble, Turn-off and Shoot, 15 meter Wall Pass, Front Shooting and Jump and Shoot tests were very high reporting from .82 to as high as .90 and was highly significant at 0.1 level of confidence.

Penalty Shoot test produced a high correlation of .77 which was significant at 0.1 level of confidence.

Diagonal Defensive Movement, Rectangular Defensive Movement and Right-Hand Dribble resulted with similar coefficient of correlations of .76.

Zigzag Dribble reported coefficient of correlation of .74, which was significantly acceptable for establishing objectivity of the test item.

The lowest coefficient (.59) was found between test and retest of the 10 Meter Wall Pass test. Though the coefficient of this test was also quite significant at 0.05 level of confidence.

4.1.3 VALIDITY OF TEST ITEMS OF PILOT STUDY

The data collected for pilot study was subjected to Spearman's rank correlations for establishing the validity of the pilot study test items. Spearman's rank correlation method provided a measure of linear association between ranks assigned to subjects and their scores on test items, according to the quantity of their attributes.

The coefficient of rank correlation establishing the validity of the test items has been presented in the table 4.4.
TABLE 4.4

VALIDITY OF TEST ITEMS OF PILOT STUDY BY SPEARMAN'S RANK CORRELATION METHOD

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Test Item</th>
<th>‘r’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diagonal Defensive Movement</td>
<td>.79</td>
</tr>
<tr>
<td>2</td>
<td>Rectangular Defensive Movement</td>
<td>.81</td>
</tr>
<tr>
<td>3</td>
<td>20 Second Wall Pass</td>
<td>.40</td>
</tr>
<tr>
<td>4</td>
<td>10 Meter Wall Pass</td>
<td>.86</td>
</tr>
<tr>
<td>5</td>
<td>15 Meter Wall Pass</td>
<td>.59</td>
</tr>
<tr>
<td>6</td>
<td>22 Meter Floor Pass</td>
<td>.78</td>
</tr>
<tr>
<td>7</td>
<td>Right-Hand Dribble</td>
<td>.98</td>
</tr>
<tr>
<td>8</td>
<td>Left-Hand Dribble</td>
<td>.84</td>
</tr>
<tr>
<td>9</td>
<td>15 meter High Dribble</td>
<td>.94</td>
</tr>
<tr>
<td>10</td>
<td>Zigzag Dribble</td>
<td>.59</td>
</tr>
<tr>
<td>11</td>
<td>Front Shooting</td>
<td>.47</td>
</tr>
<tr>
<td>12</td>
<td>Penalty Shoot</td>
<td>.79</td>
</tr>
<tr>
<td>13</td>
<td>Turn-off and Shoot</td>
<td>.57</td>
</tr>
<tr>
<td>14</td>
<td>Jump and Shoot</td>
<td>.95</td>
</tr>
</tbody>
</table>

- Rounded to two places

The validity coefficients presented in table 4.4 indicates that Right-Hand Dribble (.98), Jump and Shoot (.95), and 15 Meter High Dribble test (.94) highly correlated were highly with experts' rankings and were significant at 0.1 level of confidence.
The coefficients of correlation between expert's rankings and ranks obtained by the subjects on 10 Meter Wall Pass (.86), Left Hand Dribble (.84) and Rectangular Defensive Movement (.81) were very high and were significant at 0.1 level of confidence.

The coefficients of correlation between Diagonal Defensive Movement (.79) Penalty Shoot (.79), with the experts' rankings were significant at 0.1 level of confidence.

The validity coefficients of 15 Meter Wall Pass (.59), Zigzag Dribble (.59), Turn-off and Shoot (.57); and 20 Second Wall Pass (.40) was low as compared to other test items. This indicated that these test items were not measuring the overall playing ability of the subjects under study as much as the other test items were measuring. Though these coefficients of correlations were quite significant at 0.05 levels of confidence and objectively validated the test item.

4.1.4 FACTOR ANALYSIS OF PILOT STUDY TEST ITEMS

The new innovation of specificity inspired the researcher to construct and standardize specific skill tests for handball players. For that purpose, investigator followed a traditional methodology of factor analysis to develop new measurement instrument and to examine the validity of tests or the measurement characteristics. The factor analysis simplified the description of data by reducing the number of necessary dimensions.

Among 14 variables a matrix of inter correlation was obtained which is presented in table 4.5. The extent of specificity for each test may be seen in communality estimate in 'h' column of table 4.6. Inter correlation matrix was further subjected to factor analysis for extracting un-rotated and rotated factors. The eigen
values for the successive components were computed and are presented in table 4.7. The scree test (catell) was applied to select the principal component for further rotation. The scree plot of the components is presented in figure 4.8. The scree test permitted the selection of four factors for rotation. The un-rotated matrix component is presented in table 4.9. The un-rotated factors were further rotated. Factor rotation is a process of manipulation or adjusting the factor axes to achieve a simpler and pragmatically more meaningful factor solution. The rotation matrix presented in table 4.10, was used for interpretations as recommended by Comrey (1973). Rotated component plot (Figure 4.1) made it easier to understand the movement of factors after rotation. The linear regression was prepared on the basis of factor loading to finalize test battery. The selected first four components with the loadings of the tests are reported in tables from 4.11 to 4.14.

4.1.5 INTER CORRELATION MATRIX

The factor analysis begins with matrix of correlation of coefficients between data variables that are being studied. The Pearson Product Moment Method earlier employed by Cumbee (1954), Barry and Cureton (1961) and Falls, Ismail, MaClead et al. (1965) was applied to the 14 test item data. The magnitude and directions of the test items were obtained. To simplify the matrix, the description and analysis of Intercorrelation matrix have been produced side by side. The descriptions have been restricted to the significant correlations only. The inter correlation matrix has been presented in table 4.5.
<table>
<thead>
<tr>
<th></th>
<th>Diagonal defensive Movement</th>
<th>Rectangular Defensive Movement</th>
<th>20 Second Wall Pass</th>
<th>10 Meter Wall Pass</th>
<th>22 Meter Floor Pass</th>
<th>15 Meter Wall Pass</th>
<th>Right Hand Dribble</th>
<th>Left Hand Dribble</th>
<th>15 High Dribble</th>
<th>Zigzag Dribble</th>
<th>Front Shooting</th>
<th>Penalty Throw</th>
<th>Turn off &amp; Shoot</th>
<th>Jump &amp; Shoot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagonal defensive Movement</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectangular defensive Movement</td>
<td>.71</td>
<td>1.000</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Second Wall Pass</td>
<td>-.56</td>
<td>-.36</td>
<td>1.000</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Meter Wall Pass</td>
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<td>-.80</td>
<td>.51</td>
<td>1.000</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 Meter Floor Pass</td>
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<td>-.78</td>
<td>.38</td>
<td>.44</td>
<td>1.000</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Meter Wall Pass</td>
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<td>-.78</td>
<td>.16</td>
<td>.75</td>
<td>.43</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right Hand Dribble</td>
<td>.84</td>
<td>.80</td>
<td>-.37</td>
<td>-.85</td>
<td>-.59</td>
<td>-.80</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left Hand Dribble</td>
<td>.50</td>
<td>.70</td>
<td>-.19</td>
<td>-.67</td>
<td>-.43</td>
<td>-.80</td>
<td>.804</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 High Dribbling</td>
<td>.83</td>
<td>.84</td>
<td>-.28</td>
<td>-.81</td>
<td>-.66</td>
<td>-.82</td>
<td>.940</td>
<td>.769</td>
<td>1.000</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Zigzag Dribble</td>
<td>.60</td>
<td>.42</td>
<td>-.55</td>
<td>-.64</td>
<td>-.22</td>
<td>-.56</td>
<td>.584</td>
<td>.543</td>
<td>.542</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front Shooting Penalty Throw</td>
<td>-.27</td>
<td>-.54</td>
<td>.16</td>
<td>.43</td>
<td>.41</td>
<td>.43</td>
<td>-.418</td>
<td>-.279</td>
<td>-.322</td>
<td>-.220</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn off &amp; Shoot</td>
<td>-.78</td>
<td>-.59</td>
<td>.33</td>
<td>.65</td>
<td>.51</td>
<td>.68</td>
<td>-.818</td>
<td>-.576</td>
<td>-.872</td>
<td>-.613</td>
<td>.220</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jump &amp; Shoot</td>
<td>-.46</td>
<td>-.54</td>
<td>.19</td>
<td>.46</td>
<td>.32</td>
<td>.61</td>
<td>-.562</td>
<td>-.569</td>
<td>-.515</td>
<td>-.641</td>
<td>.595</td>
<td>.448</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-.82</td>
<td>-.73</td>
<td>.42</td>
<td>.87</td>
<td>.46</td>
<td>.79</td>
<td>-.948</td>
<td>-.796</td>
<td>-.920</td>
<td>-.680</td>
<td>.290</td>
<td>.806</td>
<td>.557</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**TABLE – 4.5**

**INTER-CORRELATION MATRIX OF FOURTEEN SKILL TEST ITEMS OF PILOT STUDY**
From the correlation matrix of 14 test items of pilot study (Table 4.5), it was derived that the test item 15 Meter High Dribble test had highest correlation with Right Hand Dribble test. The correlation between these two items was found to be .94, which was highly significant at 0.1 level of confidence.

The logical association was observed between 10 Meter Wall Pass test and Jump and Shoot test which reported correlation coefficient of .87.

The correlation between Diagonal Defensive Movement test and Right Hand Dribble test was considerably high at .84. Exactly same correlation was found between 15 Meter High Dribble test and Rectangular Defensive Movement test.

The next high correlation was found between 15 Meter High Dribble test and Diagonal Defensive Movement test. The Rectangular Defensive Movement test and Right Hand Dribble tests reported coefficient of correlation as high as .80. This implied that strength of the relationship between these two test items was quite significant at 0.1 level of confidence.

Statistically Significant correlation was derived between 15 Meter Wall Pass test and Jump and Shoot test i.e. 79 whereas 20 Meter High Dribble test had .76 coefficients of correlations with Left Hand Dribble test.

**4.1.6 COMMUNALITIES**

To know the extent of variance in each of the original test items, communalities were computed. The communalities estimate has been presented in table 4.6.
TABLE - 4.6
COMMUNALITIES ESTIMATES

<table>
<thead>
<tr>
<th>Test Item</th>
<th>$h^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagonal Defensive Movement</td>
<td>.86</td>
</tr>
<tr>
<td>Rectangular Defensive Movement</td>
<td>.90</td>
</tr>
<tr>
<td>20 Second Wall Pass</td>
<td>.91</td>
</tr>
<tr>
<td>10 Meter Wall Pass</td>
<td>.80</td>
</tr>
<tr>
<td>22 Meter Floor Pass</td>
<td>.86</td>
</tr>
<tr>
<td>15 Meter Wall Pass</td>
<td>.86</td>
</tr>
<tr>
<td>Right Hand Dribble</td>
<td>.93</td>
</tr>
<tr>
<td>Left Hand Dribble</td>
<td>.78</td>
</tr>
<tr>
<td>15 High Dribble</td>
<td>.97</td>
</tr>
<tr>
<td>Zigzag Dribble</td>
<td>.90</td>
</tr>
<tr>
<td>Front Shooting</td>
<td>.88</td>
</tr>
<tr>
<td>Penalty Shoot</td>
<td>.77</td>
</tr>
<tr>
<td>Turn off and Shoot</td>
<td>.84</td>
</tr>
<tr>
<td>Jump and Shoot</td>
<td>.94</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
- Rounded to two places.

The table 4.6 revealed that the extent of specificity of all test items was high ranging from .77 to .97. Communalities revealed that not much of the variance in the test items was accounted for by the extracted factors. Over 90% of the variance in Rectangular Defensive Movement test, 20 Second Wall Pass test, Right Hand Dribble test, Zigzag Dribble test and Jump and Shoot test was...
accounted for while 80% of the variance in 10 Meter Wall Pass test was accounted for.

4.1.7 EIGEN VALUES

Eigen value also known as 'Single Value Decomposition' provided a summary of the data structure represented by a symmetrical matrix obtained from correlations. The eigen values for the successive components are reported along with the percentage of variance and cumulative in table 4.7.

**TABLE 4.7**

EIGEN VALUES

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigen values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>8.881</td>
</tr>
<tr>
<td>2</td>
<td>1.258</td>
</tr>
<tr>
<td>3</td>
<td>1.095</td>
</tr>
<tr>
<td>4</td>
<td>1.042</td>
</tr>
<tr>
<td>5</td>
<td>.525</td>
</tr>
<tr>
<td>6</td>
<td>.437</td>
</tr>
<tr>
<td>7</td>
<td>.220</td>
</tr>
<tr>
<td>8</td>
<td>.208</td>
</tr>
<tr>
<td>9</td>
<td>.139</td>
</tr>
<tr>
<td>10</td>
<td>.093</td>
</tr>
<tr>
<td>11</td>
<td>.048</td>
</tr>
<tr>
<td>12</td>
<td>.024</td>
</tr>
<tr>
<td>13</td>
<td>.022</td>
</tr>
<tr>
<td>14</td>
<td>.008</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Table 4.7 shows all the factors extractable from the analysis along with their eigenvalues, the percent of variance attributable to each factor, and the cumulative variance of the factor and the previous factors. It can be interpreted that the first factor accounted for 63.536% of the variance, the second 8.987%, the third 7.521% and the forth 7.442%. All the remaining factors were not significant as their total eigenvalues were less than 1 required to be significant.

4.1.8 SCREE TEST

For testing the number of components in correlation matrix, Cattell’s scree test was employed. This permitted the selection of four factors for rotation. The scree plot was extracted and is presented in figure 4.1.

FIGURE 4.1
SCREE PLOT
The figure 4.1 of scree test was used for determine the number of factors to retain. The point of interest was where the curve started to flatten. It was seen by observing the figure 4.1 that the curve began to flatten between factors 1 and 2. Therefore only three four factors having eigen value of more than 1 were retained for further analysis.

4.1.9 UN-ROTATED FACTOR LOADING

To observe the correlation between 14 test items and the factors, un-rotated component matrix was prepared. The loadings of test items on all the extracted factors can be observed from table 4.9.

**TABLE - 4.8**

UN-ROTATED COMPONENT MATRIX

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Original No.</th>
<th>Test Item</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1  2  3  4</td>
</tr>
<tr>
<td>1.</td>
<td>7.</td>
<td>Right Hand Dribble</td>
<td>-.95 -.00 -.09 -.11</td>
</tr>
<tr>
<td>2.</td>
<td>9.</td>
<td>15 Meter High Dribble</td>
<td>-.94 -.00 -.13 -.25</td>
</tr>
<tr>
<td>3.</td>
<td>14.</td>
<td>Jump and Shoot</td>
<td>.93 -.13 -.20 -.00</td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
<td>10 Meter Wall Pass</td>
<td>.88 -.10 .01 .06</td>
</tr>
<tr>
<td>5.</td>
<td>2.</td>
<td>Rectangular Defensive Movement</td>
<td>-.87 -.20 -.21 .21</td>
</tr>
</tbody>
</table>

Contd......
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Original No.</th>
<th>Test Item</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>1.</td>
<td>Diagonal Defensive Movement</td>
<td>-.86</td>
</tr>
<tr>
<td>7.</td>
<td>6.</td>
<td>15 Meter Wall Pass</td>
<td>.86</td>
</tr>
<tr>
<td>8.</td>
<td>12.</td>
<td>Penalty Shoot</td>
<td>.82</td>
</tr>
<tr>
<td>9.</td>
<td>8.</td>
<td>Left Hand Dribble</td>
<td>-.80</td>
</tr>
<tr>
<td>10.</td>
<td>10.</td>
<td>Zigzag Dribble</td>
<td>-.70</td>
</tr>
<tr>
<td>11.</td>
<td>13.</td>
<td>Turn-off and Shoot</td>
<td>.66</td>
</tr>
<tr>
<td>12.</td>
<td>5.</td>
<td>22 Meter Floor Pass</td>
<td>.65</td>
</tr>
<tr>
<td>13.</td>
<td>3.</td>
<td>20 Second Wall Pass</td>
<td>.47</td>
</tr>
<tr>
<td>14.</td>
<td>11.</td>
<td>Front Shooting</td>
<td>.47</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

- 4 components extracted.
- Rounded to two places.

The Varimax Kaiser normalization (1958) of the factors was done to extract the test items with high loadings on the four components.
The table 4.8 above revealed the loadings of the fourteen test items on the four factors extracted. The higher the absolute value of the loading, the more the factor contributed to the test item. The Jump and shoot test reported highest loading (.93) on factor one followed by 10 Meter Wall Pass (.89), 15 Meter Wall Pass (.86) and Penalty Shoot (.80) on factor 1. The loadings, that were less than 0.05, are not significant.

On factor 2, except for front shooting (.60) no other test item was significant at 0.05 level of confidence. The loadings that were less than 0.05 are not significant.

20 Second Wall Pass test reported to have a low loading on factor 3 but was significant at 0.05 level of confidence. No other test item reported to have loading of more then 0.05 level of confidence. The loadings that fell below 0.05 level of confidence are insignificant.

On factor 4, Turn-off and Shoot test had a marginal significance (.50) on un-rotated factor. The loadings, that were less than 0.05, are not significant for further analysis.

4.1.10 ROTATED FACTOR LOADING

The idea of rotation was to reduce the number factors on which the variables under investigation have high loadings. Rotation does not actually change anything but makes the interpretation of the analysis easier.
The rotated factor loadings have been presented in rotated component matrix in table 4.9.

**TABLE 4.9**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Original No.</th>
<th>Test Item</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
<th>Component 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>15 Meter High Dribble</td>
<td>.89</td>
<td>-.14</td>
<td>-.11</td>
<td>-.38</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>Jump and Shoot</td>
<td>-.89</td>
<td>.32</td>
<td>.15</td>
<td>.15</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>Right-Hand Low Dribble</td>
<td>.85</td>
<td>-.23</td>
<td>-.21</td>
<td>-.32</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>15 Meter Wall Pass</td>
<td>-.83</td>
<td>-.00</td>
<td>.38</td>
<td>.14</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>Left Hand Dribble</td>
<td>.83</td>
<td>.00</td>
<td>-.28</td>
<td>-.07</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>Penalty Shoot</td>
<td>-.80</td>
<td>.29</td>
<td>.01</td>
<td>.21</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>10 Meter Wall Pass</td>
<td>-.71</td>
<td>.40</td>
<td>.26</td>
<td>.24</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Diagonal Defensive Movement</td>
<td>.65</td>
<td>-.51</td>
<td>-.05</td>
<td>-.40</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>Rectangular Defensive Movement</td>
<td>.62</td>
<td>-.14</td>
<td>-.37</td>
<td>-.59</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>20 Second Wall Pass</td>
<td>-.08</td>
<td>.92</td>
<td>.04</td>
<td>.23</td>
</tr>
<tr>
<td>11</td>
<td>10</td>
<td>Zigzag Dribble</td>
<td>.56</td>
<td>-.63</td>
<td>-.32</td>
<td>.25</td>
</tr>
<tr>
<td>12</td>
<td>11</td>
<td>Front Shooting</td>
<td>-.06</td>
<td>.04</td>
<td>.85</td>
<td>.38</td>
</tr>
<tr>
<td>13</td>
<td>13</td>
<td>Turn-off and Shoot</td>
<td>-.45</td>
<td>.17</td>
<td>.77</td>
<td>-.06</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
<td>22 Meter Floor Pass</td>
<td>-.32</td>
<td>.17</td>
<td>.16</td>
<td>.83</td>
</tr>
</tbody>
</table>

- Extraction Method: Principal Component Analysis.
- Rotation Method: Varimax with Kaiser Normalization.
- Rounded to two places.
Looking at the table 4.9, we can interpret that 15 Meter High Dribble test (.89) had the highest loading on factor 1 whereas Right Hand Dribble test (.85) and Left Hand Dribble test (.83) are also substantially loaded on Factor (Component) 1. One or all test items could be used for further analysis. 20 Second Wall Pass test is substantially loaded on Factor 2 and can be used for further analysis. The loading of all other items were either negative or below 0.05 level of significance. Hence, this test item can not be treated for further analysis.

Front Shooting test (.85) test and Turn-off and Shoot test (.77) are positively loaded on factor 3. One or both test items could be used for further analysis.

22 Meter Floor Pass test was the only item significantly loaded on factor 4 with a high loading of .83 and is worth consideration for the further analysis.

On the basis of the nature of the test items and their rotated loadings on the component, four factors were identified and were named appropriately. The significant loadings on all four factors are presented in tables from 4.10 to 4.13.

**TABLE – 4.10**

**FACTOR 1 – BALL CONTROL AND Dribbling ABILITY**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Original No.</th>
<th>Test item</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>9.</td>
<td>15 Meter High Dribble</td>
<td>.89</td>
</tr>
<tr>
<td>2.</td>
<td>7.</td>
<td>Right Hand Dribble</td>
<td>.85</td>
</tr>
<tr>
<td>3.</td>
<td>8.</td>
<td>Left Hand Dribble</td>
<td>.83</td>
</tr>
</tbody>
</table>

- Rounded to two places.
Table 4.10 indicated that the ball control and dribbling ability was measured by 15 Meter High Dribble, Right Hand Dribble and Left Hand Dribble tests as these items reported positive and high loadings on factor 1. To select minimum number of test items for the skills being measured, 15 Meter High Dribble with the highest loading (.89) on factor 1 was selected as the test item for test battery.

**TABLE - 4.11**

**FACTOR 2 - SHORT PASSING ABILITY**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Original No.</th>
<th>Test item</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>3.</td>
<td>20 Second Wall Pass</td>
<td>.92</td>
</tr>
</tbody>
</table>

- Rounded to two places.

Table 4.11 revealed that the only test items having positive and significant loading on factor 2 was 20 Second Wall Pass test. No other test item had significant loading on factor 2. Thus the 20 Second Wall Pass with a loading of .92 on factor 2 emerged as representative of Short Pass ability and was selected as the test item for test battery.
TABLE - 4.12

FACTOR 3 – SHOOTING ACCURACY

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Original No.</th>
<th>Test item</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>11.</td>
<td>Front Shooting</td>
<td>.85</td>
</tr>
<tr>
<td>2.</td>
<td>13.</td>
<td>Turn-off and Shoot</td>
<td>.77</td>
</tr>
</tbody>
</table>

- Rounded to two places.

It was concluded, by observing the test items with high loadings on factor 3, that the Shooting Accuracy was measured by Front Shooting and Turn-off and Shoot tests. These two test items emerged as representative of “shooting accuracy factor”. Keeping in view the purpose of the study, investigator was to select minimum number of test items for the skills being measured. Therefore, 15 Meter High Dribbling test item having the highest loading (.85) on factor 3 was selected as the test item for test battery.

TABLE - 4.13

FACTOR 4 – LONG PASSING ABILITY

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Original No.</th>
<th>Test item</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>5.</td>
<td>22 Meter Floor Pass</td>
<td>.83</td>
</tr>
</tbody>
</table>

- Rounded to two places.

The 22 Meter Floor Pass test emerged a true representative of “long passing ability”. No other test item had positive and
significant loading on factor 4; consequently, 22 Meter Floor Pass was selected as the test item for test battery.

4.1.11 RESULTS OF STATISTICAL ANALYSIS OF PILOT STUDY TEST ITEMS

The result of statistical treatment of pilot study data revealed that all the 14 test items devised by the investigator, with the help of experts, were reliable, objective and valid. On all test items, Factor analysis technique was applied as a data reduction or structure detection method to find out the number and nature of the dimensions of test items. Factor analysis technique reduced the number of test items and detected structure in the relationships between test items.

The results of factor analysis technique extracted the 4 test items out of 14, best suited to measure the skill ability of the handball players.

Each test measures something specific to itself, which can be seen in the communality estimate of the test items. Tests with low communalities indicated that these abilities were not covered in the test battery and therefore did not deserve to be taken into the test battery. Factor analysis helped in determining the minimum number of basic source of variance, which could economically account for the prevalence of variance among test items utilizing the Pearson Product Moment Method of correlation.

While constructing the test battery, the investigator took into consideration the values of factor loadings through factor analysis. It was found that 4 factors were sufficient to account for all the common variance in a battery of tests. Therefore, 4 test items for
the original 14 were substituted without sacrificing essential information. The idea was to retain one or more original tests those provide the best measure of each factor. On the basis of statistical analysis of the data of the first phase of the study, the research scholar under the guidance of his supervisor selected four test items namely 15 Meter High Dribble, 20 Second Wall Pass, Turn-off and Shoot and 22 Meter Floor Pass.

Results revealed that all the four test items of the newly constructed test battery covered all the skill components of handball and were true measures of handball skill ability of the handball players. Therefore four test items measuring basic skills of handball playing ability were selected for standardizing the skill test battery for handball players.

These test items were of highest values on their respective factors and were also related to the specific skill requirement of the handball players.

Though, Right Hand Dribble (.85) and Left Hand Dribble (.83) had also reported high and significant loadings at 0.05 levels, the 15 Meter High dribbling test with highest loading (.89) on factor 1 was selected as the test item for skill test battery.

The turn off Shoot test with a significant loading of .77 was left and Front Shooting test with higher loading of .85 on the rotated factor 3 was selected for test battery.

Only one test each on factor 2 and 4 had significant loadings and measured two different passing skills of handball. Hence both these tests namely 20 Second Wall Pass and 22 Meter Floor Pass
were selected as the test items for skill test battery for university level handball player.

The test items selected on the basis of factor analysis have been mentioned along with factors they measure in table 4.14.

TABLE 4.14
TEST BATTERY FOR THE CONSTRUCTION OF HANDBALL SKILL TEST

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Test Item</th>
<th>FactorMeasured</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>15 Meter High Dribble</td>
<td>Dribbling</td>
</tr>
<tr>
<td>2.</td>
<td>20 Second Wall Pass</td>
<td>Speed Passing</td>
</tr>
<tr>
<td>3.</td>
<td>Front Shooting</td>
<td>Shooting Accuracy</td>
</tr>
<tr>
<td>4.</td>
<td>22 Meter Floor Pass</td>
<td>Long Passing</td>
</tr>
</tbody>
</table>

4.2 ANALYSIS, PRESENTATION AND INTERPRETATIONS OF THE DATA COLLECTED DURING MAIN STUDY

In the final stage the data was collected for main study on 110 subjects for the development of norms. The reliability and objectivity of the selected test items was determined simultaneously. The T-scale was used to prepare norms for handball skill test battery for university handball players. The analysis logical.
4.2.1 RELIABILITY OF THE TEST BATTERY BY TEST-RETEST METHOD

The magnitude of a test-retest reliability coefficient tends to be larger when the interval between initial test and retest is short rather than long. Therefore the test-retest method was employed to compute the reliability of four test items of handball skill test battery. 110 subjects were tested on all the four test items by the investigator himself. Data collected was statistically analyzed by applying Cronbach's alpha reliability analysis and high coefficients of correlation were derived thereby establishing the reliability of the test items. The retests were conducted after the gap of two days.

The reliability coefficients of test retest are presented in table 4.15.

**TABLE 4.15**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Test Item</th>
<th>‘r’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>15 Meter High Dribbling</td>
<td>.76</td>
</tr>
<tr>
<td>2.</td>
<td>20 Seconds Wall Pass</td>
<td>.73</td>
</tr>
<tr>
<td>3.</td>
<td>Front Shooting</td>
<td>.81</td>
</tr>
<tr>
<td>4.</td>
<td>22 Meter Floor Pass</td>
<td>.83</td>
</tr>
</tbody>
</table>

From the table 4.15, it can be observed that 15 Meter high dribbling test, devised with a purpose to measure the ability of the subject in high dribbling, came out with a reliability coefficient of .76 which is quite significant at 0.05 levels of confidence and gives a good reason for its inclusion in the test battery.
20 Seconds Wall Pass reported a correlation of .73. This implies that this test item had a significant reliability.

Front Shooting resulted in .81 coefficient of correlation thereby establishing the reliability of the test item and justified its inclusion in the test battery.

22 Meter Floor Pass produced reliability coefficient of .83 and substantiated its inclusion in test battery.

Because the same test was applied on both occasions, error due to different samples of test items did not reflect in the reliability coefficients of correlation.

4.2.2 RELIABILITY OF THE TEST BATTERY BY SPLIT-HALF METHOD

The Guttmann’s split-half method was used to compute the reliability of the extracted test items. The test scores of the same subjects were divided into two halves by applying even-odd method of splitting a set of scores. The reliability coefficient of split-half method has been presented in table 4.16.

**TABLE – 4.16**

**RELIABILITY OF HANDBALL SKILL TEST BATTERY BY SPLIT-HALF METHOD**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Test Item</th>
<th>'r'</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>15 Meter High Dribble</td>
<td>.96</td>
</tr>
<tr>
<td>2.</td>
<td>20 Seconds Wall Pass</td>
<td>.86</td>
</tr>
<tr>
<td>3.</td>
<td>Front Shooting</td>
<td>.92</td>
</tr>
<tr>
<td>4.</td>
<td>22 Meter Floor Pass</td>
<td>.94</td>
</tr>
</tbody>
</table>

129
The reliability coefficient derived by split-half method presented in table 4.16 indicates coefficient of correlation of .96 for 15 Meter High Dribble test, .86 for 20 Seconds Wall Pass test, .92 for Front Shooting test and .94 for 22 Meter Floor Pass. The reliability coefficients of all the four handball skill test battery items were highly significant at 0.1 level of confidence.

4.2.3 MEAN AND STANDARD DEVIATIONS OF TEST BATTERY ITEMS

The tests were administered to statistical treatment and mean and standard deviation were computed. The details of descriptive statistics are given in table 4.17.

Table - 4.17

DESCRIPTIVE STATISTICS

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Meter High Dribble</td>
<td>7.74</td>
<td>.63</td>
</tr>
<tr>
<td>20 Second Wall Pass</td>
<td>10.68</td>
<td>2.14</td>
</tr>
<tr>
<td>Front Shooting</td>
<td>40.99</td>
<td>2.77</td>
</tr>
<tr>
<td>22 Meter Floor Pass</td>
<td>20.25</td>
<td>3.10</td>
</tr>
</tbody>
</table>

- Rounded to two places
4.2.4 NORMS FOR UNIVERSITY LEVEL HANDBALL PLAYERS

After establishing reliability of the test battery items, Norms for all the four test items of skill test battery were prepared for assessing the handball playing ability of the university level handball players and are presented in Table 4.18.

**TABLE 4.18**

**T-SCALES FOR HANDBALL SKILL TEST BATTERY**

<table>
<thead>
<tr>
<th>Variables</th>
<th><strong>15 Meter High Dribbling test (in seconds)</strong></th>
<th><strong>20 Meter Wall Pass test (in numbers)</strong></th>
<th><strong>T- Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>10.26</td>
<td>21.38 up</td>
<td>100</td>
</tr>
<tr>
<td>90</td>
<td>9.63</td>
<td>19.24</td>
<td>90</td>
</tr>
<tr>
<td>80</td>
<td>9.00</td>
<td>17.10</td>
<td>80</td>
</tr>
<tr>
<td>70</td>
<td>8.37</td>
<td>14.96</td>
<td>70</td>
</tr>
<tr>
<td>60</td>
<td>7.74</td>
<td>12.82</td>
<td>60</td>
</tr>
<tr>
<td>50</td>
<td>7.11</td>
<td>10.68</td>
<td>50</td>
</tr>
<tr>
<td>40</td>
<td>6.48</td>
<td>8.54</td>
<td>40</td>
</tr>
<tr>
<td>30</td>
<td>5.65</td>
<td>6.40</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>5.02</td>
<td>4.26</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>4.39 up</td>
<td>2.12</td>
<td>10</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>7.11</strong></td>
<td><strong>10.68</strong></td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td><strong>S.D.</strong></td>
<td><strong>.63</strong></td>
<td><strong>2.24</strong></td>
<td><strong>S.D.</strong></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>110</td>
<td>110</td>
<td><strong>N</strong></td>
</tr>
</tbody>
</table>

Continued.................
T-SCALES FOR HANDBALL SKILL TEST BATTERY

Variables (3-4)

<table>
<thead>
<tr>
<th>T-Score</th>
<th>Front Shooting test (in numbers)</th>
<th>22 Meter Floor Pass test (in numbers)</th>
<th>T-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>54.84 <strong>up</strong></td>
<td>35.75 <strong>up</strong></td>
<td>100</td>
</tr>
<tr>
<td>90</td>
<td>52.07</td>
<td>32.65</td>
<td>90</td>
</tr>
<tr>
<td>80</td>
<td>49.30</td>
<td>29.55</td>
<td>80</td>
</tr>
<tr>
<td>70</td>
<td>46.53</td>
<td>26.45</td>
<td>70</td>
</tr>
<tr>
<td>60</td>
<td>43.76</td>
<td>23.35</td>
<td>60</td>
</tr>
<tr>
<td>50</td>
<td>40.99</td>
<td>20.25</td>
<td>50</td>
</tr>
<tr>
<td>40</td>
<td>38.22</td>
<td>17.15</td>
<td>40</td>
</tr>
<tr>
<td>30</td>
<td>35.45</td>
<td>14.05</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>32.68</td>
<td>10.95</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>29.91</td>
<td>7.85</td>
<td>10</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>40.99</td>
<td>20.25</td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td><strong>S.D.</strong></td>
<td>1.77</td>
<td>3.10</td>
<td><strong>S.D.</strong></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>110</td>
<td>110</td>
<td><strong>N</strong></td>
</tr>
</tbody>
</table>

In Table 4.18, the T scale norms based upon S.D. values reveal that for the first test item (15 Meter High Dribble) the highest score was 10.26 Seconds. The 50th T score was 7.11 Seconds whereas the 10th T score value was 4.39 Seconds. For the second test item (20 Meter Wall Pass) the highest score was 21.38 and the 50th T score was 10.68 points. The 10th T score was 2.12 Points.

Table reveals that for the third test item (Front Shooting) the highest score was 54.84 Points. The 50th T score was 40.99 Points whereas the 10th T score value was 29.91 Points. For the fourth test item (22 Meter Floor Pass) the 100th score was 35.75 Points and the 50th T score was 20.25 Points. The 10th T score was 7.85.