Chapter III

METHODOLOGY

The methodological aspects related to the present investigation have been described. The procedure and methods applied in selection of subjects and sample design, selection of variables, selection of tests, instrument reliability, reliability of data, orientation of the subjects, collection of data, test administration, experimental design and statistical technique are present in this chapter.

Selection of Subjects and Sample Design

The purpose of the study was to find out the vital capacity level and body mass index among six districts high school Kho-Kho and Kabaddi players of Hyderabad Karnataka region. To achieve the purpose of study total 600 subjects (Kho-Kho-300 and Kabaddi-300) were selected at randomly. The sample design is presented in the following table,

Selection of variables

The researcher had gone through the available literature and had discussions with various experts and with his guide before selecting variables. The availability of technique for the purpose of analysis, feasibility, reliability of the procedure and
the outcome were extensively taken care before finalizing the variables. After analysing the various factors associated with the present study, criterion variables vital capacity and body mass index were selected.

**Criterion Variables**

Each sport demands specific requirement of endurance capacity for successful performance, the importance of endurance capacity lies in the fact that in majority of the sports, it scores as the basis for good endurance. The vital capacity and body mass index were selected.

**Selection of Tests**

To measure the selected variables the respective tests are administered and represented in the table 1.

**Table 1**
**Variables and Tests**

<table>
<thead>
<tr>
<th>S. N</th>
<th>Variables</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vital Capacity</td>
<td>Forced Vital Capacity (FVC)</td>
</tr>
<tr>
<td>2.</td>
<td>Body mass index</td>
<td>Height and Weight</td>
</tr>
</tbody>
</table>

**Instrument Reliability**

In the present study standard equipments such as digital spirometer, weighing machine, stadiometer which are available in the anthropometry and physiology laboratory, Department
of Physical Education, Gulbarga University, Gulbarga were used.

**Reliability of the Data**

Test and retest method was followed in order to establish reliability of data by using 50 subjects at random. These ten subjects were tested twice by the same person under similar conditions. Johnson and Nelson’s intra-class co-efficient of correlation was used to find out the reliability of the data as suggested.

**Orientation of the Subjects**

The investigator explained the purpose of the study and the importance of the tests to the subjects in order to get their co-operation as well as to secure reliable data.

**Collection of Data**

The data on vital capacity were collected by administrating digital spirometer. The percent of body fat and body mass index were collected by measuring height and weight. The above said data were collected during the district high school Kho-Kho and Kabaddi matches in the Hyderabad Karnataka region.
Test Administration

The investigator has done pilot approach to the places of various districts of Hyderabad Karnataka region of Karnataka state where the district high school Kho-Kho and Kabaddi tournaments were organized. The investigator has collected the data related to present study in the following methods,

Vital Capacity

Purpose

To assess the vital capacity.

Equipment used

Digital Spirometer.

Procedure

Prepare the players for the Spirometry test. Remember, this is a player’s effort dependent test. First explain the procedure to the players, and then demonstrate the procedure to the players.

- Instruct the players to place the mouthpiece on top of their tongue, with their teeth and lips around the mouthpiece. Seal the outer part of the mouthpiece with their lips. Let the players get used to the feeling of breathing with the mouthpiece in their mouth to realize there is no resistance.
• When the players are ready, instruct the players to hold the handle close to their cheek, not in front of their mouth. Be sure that the players are not breathing through the mouthpiece when you start the test.

• Click on Start New Test - wait for the zeroing process – **DO NOT ALLOW AIRFLOW TO PASS THROUGH THE MOUTHPIECE DURING THIS PROCESS.** Wait for the Spirometry incentive display.

• When “Start When Ready” appears, instruct the players to take a full inspiration and to then place the mouthpiece in their mouth. Instruct the players to Blast out the air; try to achieve 80% in the first second.

• Encourage the players with verbal and body language to blast out fast and blast out long (try for 6 seconds).

• Coach them to Squeeze out the air until “Inhale Now” appears or a volume-time curve plateau is achieved.

• If a flow volume loop is required, the players must keep the mouthpiece in their mouth, and inhale deeply at the end of the expiration. Click the Stop button or press the ENTER key to conclude the test. Accept or Reject the test based on the player’s effort. Click on Yes to start another test, No to stop. Repeat steps 3 and 4 until the
appropriate number of tests has been performed. Try to obtain 3 accepted tests for the players.

- Click the Save Review button to save the test session and display the review screen. Use the review screen to review, edit the interpretation, print the results, and/or to initiate a Post-BD test.

**Scoring**

The best of the three trials was recorded as the test score.

**Cooper Normative data for VO2max (Vital Capacity)**

The VO2 max assessment is based on the Cooper VO2 max tables and comprises of the following grades: Very Poor, Poor, Fair, Good, Excellent and Superior.

**Male (values in ml/kg/min)**

<table>
<thead>
<tr>
<th>Age</th>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Excellent</th>
<th>Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-19</td>
<td>&lt;35.0</td>
<td>35.0-38.3</td>
<td>38.4-45.1</td>
<td>45.2-50.9</td>
<td>51.0-55.9</td>
<td>&gt;55.9</td>
</tr>
<tr>
<td>20-29</td>
<td>&lt;33.0</td>
<td>33.0-36.4</td>
<td>36.5-42.4</td>
<td>42.5-46.4</td>
<td>46.5-52.4</td>
<td>&gt;52.4</td>
</tr>
<tr>
<td>30-39</td>
<td>&lt;31.5</td>
<td>31.5-35.4</td>
<td>35.5-40.9</td>
<td>41.0-44.9</td>
<td>45.0-49.4</td>
<td>&gt;49.4</td>
</tr>
<tr>
<td>40-49</td>
<td>&lt;30.2</td>
<td>30.2-33.5</td>
<td>33.6-38.9</td>
<td>39.0-43.7</td>
<td>43.8-48.0</td>
<td>&gt;48.0</td>
</tr>
<tr>
<td>50-59</td>
<td>&lt;26.1</td>
<td>26.1-30.9</td>
<td>31.0-35.7</td>
<td>35.8-40.9</td>
<td>41.0-45.3</td>
<td>&gt;45.3</td>
</tr>
<tr>
<td>60+</td>
<td>&lt;20.5</td>
<td>20.5-26.0</td>
<td>26.1-32.2</td>
<td>32.3-36.4</td>
<td>36.5-44.2</td>
<td>&gt;44.2</td>
</tr>
</tbody>
</table>

**Body Mass Index**

**Measurement of Height**

**Purpose**

To measure the maximum height.

**Equipment Used**

Stadiometer.
**Procedure**

A stadiometer consisting of a sliding calibrated rod with hinged top piece was used for the purpose of measuring height of the subjects. Subjects without shoes and with minimum dress were asked to stand erect with the back against a support in anatomical standing position.

Care was taken so that upper surface was horizontal and not tilted and also pressure did not cause the subjects to slump or alter their position. The vertex was measured to the nearest centimeter as test score.

**Measurement of Weight**

**Purpose**

To measure the maximum weight.

**Equipment Used**

Weighing Machine.

**Procedure**

The subjects, with minimum clothing’s and without footwear were asked to stand on the platform of the weighing machine.

The test score was the digit on the eyepiece of the weighing machine and it was recorded in kilograms.
Body Mass Index

Calculation of BMI

BMI is calculated the same way for both adults and children. The calculation is based on the following formulas:

<table>
<thead>
<tr>
<th>Measurement Units</th>
<th>Formula and Calculation</th>
</tr>
</thead>
</table>
| Kilograms and meters (or centimeters) | Formula: weight (kg) / [height (m)]^2  
With the metric system, the formula for BMI is weight in kilograms divided by height in meters squared. Since height is commonly measured in centimetres, divide height in centimetres by 100 to obtain height in meters.  
Example: Weight = 68 kg, Height = 165 cm (1.65 m)  
Calculation: 68 ÷ (1.65)^2 = 24.98 |

3.9.2 (b) Body Mass Index standard norms categories

<table>
<thead>
<tr>
<th>BMI</th>
<th>Weight Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 18.5</td>
<td>Underweight</td>
</tr>
<tr>
<td>18.5 – 24.9</td>
<td>Normal</td>
</tr>
<tr>
<td>25.0 – 29.9</td>
<td>Overweight</td>
</tr>
<tr>
<td>30.0 and Above</td>
<td>Obese</td>
</tr>
</tbody>
</table>

Statistical Techniques

Descriptive, Paired t-test and One way-ANOVA statistical techniques were used to analyze the data.