CHAPTER III

METHODOLOGY

Selection of subjects
Selection of variables
Description of questionnaires
Administration of tests
Reliability of data
Subject reliability
Collection of data
Statistical techniques
METHODOLOGY

This chapter describes the methodology and procedure adopted for the study. It includes selection of subjects, selection of variables, description of questionnaire, administration of tests, reliability of data, subject reliability, collection of data and statistical techniques employed.

SELECTION OF SUBJECTS

One hundred and forty one male volleyball players between the age group of 15-18 from 12 districts of Kerala state, who had participated in the Kerala state junior volleyball championship in the year 2006, were selected for this study. Research scholar sought permission from the coaches of the 12 districts namely, Eranakulam, Idukki, Kannur, Kasargod, Kollam, Kottayam, Kozhikode, Palakkad, Pathanamthitta, Thiruvanthapuram, Trissur and Wayanad to conduct the tests for the study. Before administering the tests the scholar held a series of meetings with the subjects and coaches and explained to them the objective of the study.

SELECTION OF VARIABLES

The research scholar made sincere efforts to review the related literature in the area of the present study. On the basis of variables,
keeping in view of the feasibility, the following anthropometric, physical performance and psychological variables were selected for the study.

I. Game proficiency in Volleyball

II. Anthropometric variables

   1. Height
   2. Weight
   3. Leg length
   4. Arm length
   5. Calf girth
   6. Thigh girth

III. Physical Performance Variables

   1. Acceleration ability
   2. Speed of movement
   3. Arm power
   4. Arm and shoulder strength
   5. Agility
   6. Back flexibility
   7. Leg power- Horizontal factor
   8. Leg power – Vertical factor
IV. Psychological variables

1) Incentive motivation

2) Mental skills

Establishing Reliability

The reliability of data was authenticated by establishing instrument reliability, tester competency and subject reliability.

Instrument reliability

The Anthropometric set, Stopwatches and Goniometre used in this study were obtained from the Faculty of Sports Science, Netaji Subhash National Institute of Sports, Bangalore. All these equipments were calibrated and thus accepted as accurate enough for the purpose of this study.

Tester competency

To ensure that the investigator was well versed in the techniques of measuring anthropometric variables, he had a number of training sessions under the senior scientific officer, Netaji Subhash National Institute of Spots, Bangalore. Investigator also completed training to learn the techniques and procedures of testing under experts concerned to other variables. After attaining training under experts in
the field, a sample of ten subjects were tested by the experts and the research scholar, separately and the scores were correlated which is presented in table 1.

**TABLE I**

**TESTER RELIABILITY COEFFICIENT OF TEST RETEST SCORES**

<table>
<thead>
<tr>
<th>SI.No.</th>
<th>Variables</th>
<th>Coefficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Height</td>
<td>0.923</td>
</tr>
<tr>
<td>2.</td>
<td>Weight</td>
<td>0.952</td>
</tr>
<tr>
<td>3.</td>
<td>Leg length</td>
<td>0.876</td>
</tr>
<tr>
<td>4.</td>
<td>Arm length</td>
<td>0.924</td>
</tr>
<tr>
<td>5.</td>
<td>Calf girth</td>
<td>0.892</td>
</tr>
<tr>
<td>6.</td>
<td>Thigh girth</td>
<td>0.912</td>
</tr>
<tr>
<td>7.</td>
<td>Acceleration ability</td>
<td>0.932</td>
</tr>
<tr>
<td>8.</td>
<td>Speed of movement</td>
<td>0.846</td>
</tr>
<tr>
<td>9.</td>
<td>Arm power</td>
<td>0.954</td>
</tr>
<tr>
<td>10.</td>
<td>Arm strength</td>
<td>0.947</td>
</tr>
<tr>
<td>11.</td>
<td>Agility</td>
<td>0.923</td>
</tr>
<tr>
<td>12.</td>
<td>Back flexibility</td>
<td>0.943</td>
</tr>
<tr>
<td>13.</td>
<td>Standing broad jump</td>
<td>0.948</td>
</tr>
<tr>
<td>14.</td>
<td>Sergeant Jump</td>
<td>0.934</td>
</tr>
</tbody>
</table>

N= 10, significant at 0.05 level, tab r (8) = 0.765
From the table it is evident that very high correlations ranging from 0.954 to 0.876 were obtained for variables, thus establishing the competency of the tester to administer the tests.

**SUBJECT RELIABILITY**

Subject reliability was established by test retest method whereby consistency of results were obtained by product moment correlation. Data collected from randomly selected sample of ten subjects by test retest was correlated and coefficients of correlation obtained are presented in table 2.

**TABLE 2**

**SUBJECT RELIABILITY COEFFICIENT OF TEST RETEST SCORES**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Variables</th>
<th>Coefficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acceleration ability</td>
<td>0.909</td>
</tr>
<tr>
<td>2.</td>
<td>Speed of movement</td>
<td>0.895</td>
</tr>
<tr>
<td>3.</td>
<td>Arm power</td>
<td>0.914</td>
</tr>
<tr>
<td>4.</td>
<td>Arm strength</td>
<td>0.843</td>
</tr>
<tr>
<td>5.</td>
<td>Agility</td>
<td>0.876</td>
</tr>
<tr>
<td>6.</td>
<td>Back flexibility</td>
<td>0.923</td>
</tr>
<tr>
<td>7.</td>
<td>Standing broad jump</td>
<td>0.948</td>
</tr>
</tbody>
</table>

N = 10, Significant at 0.05 level, tab r (8) = 0.765
From the table 2 it is evident that very high correlations ranging from 0.948 to 0.843 were obtained for variables, thus establishing the subject reliability.

**COLLECTION OF DATA**

The data were collected by administering various tests for the chosen variables. The tests were administered one day before the 34th Kerala State Junior Volleyball Championship.

**Anthropometric variables – Test Administration**

While performing the tests to find out anthropometric measurements the investigator followed all the standardised procedures and equipments. The procedures adopted were described in brief.

**1. Standing Height:**

The subject was made to stand erect, feet together with buttocks, upper back, and rear of the head in contact with the wall scale. As the scholar brought the scale on to the subject’s vertex, the subject was instructed to take a deep breath and stretch up to his full height. Height was recorded to the nearest half of a centimeter.
2. **Body Weight:**

The subject stood on the standard electronic weighing machine exerting equal pressure on both feet without any movement thereafter, and the weight was recorded to the nearest half a kilogram. The subject was allowed minimum possible clothing at the time of measurement.

3. **Leg Length:**

The examiner placed his hand approximately six inches below the subject’s waist and asked the subject to swing the legs back and forth slowly and lift it outwards. By palpation the examiner could locate the head of the femur which enter the pelvic girdle. The height of the head of the femur from the floor while standing erect was recorded with the help of the tape to the nearest half centimeter as score.

4. **Arm length:**

The subject was asked to stand at ease with equal weight on both the feet and with hands hanging freely. Arm length is measured from acromion process to the tip of the third finger. The examiner recorded the score to the nearest half centimeter.
5. Thigh girth:

The subject wearing only underwear is asked to stand at ease with equal weight on both feet. The middle of the thigh is marked by a horizontal line dividing the distance between the trochanterion and the lateral and lower most point on the lateral condyle of femur, in equal two parts. The steel tape is wrapped around the thigh at the level of the horizontal line and the circumference is measured by keeping the steel tape in a horizontal direction and touching gently thigh surface all around.

6. Calf girth

The steel tape is wrapped horizontally around the naked lower leg of the subject at the maximal bulge of the calf muscle. With slight up and down movements of the steel tape keeping it in a horizontal direction, the maximal circumferential measurement gives the value of calf circumference.

Physical Performance – Test Administration

The physical performance variables were measured by using standardised field tests and employing standardised test procedures and equipments. The test administration is explained here.
1. **50 Metre dash:**

The purpose of the test is to measure the acceleration ability of the subjects. A marked flat ground suitable for running and an electronic stop watch is required to perform the test. The athlete takes standing stance on the starting line. On the signal to start he runs through the end line away and does not slow down or stop until crossing the line. The tester stands on the end line with a stop watch in hand. Upon the initial movement of the athlete, the tester starts the stop watch. As the athlete crosses the finish line, the tester stops the stop watch. The best of three attempts is recorded. Time is recorded to nearest 0.01 second.

2. **Two hand Medicineball put (6 lbs):**

The objective of the test is to measure the power of the arms and shoulder girdle. A 6 lbs medicine ball, marking material (chalk or tape), small rope, chair and a measuring tape is needed for this test. From a sitting position in a straight back chair, the performer holds the ball in both hands with the ball drawn back against the hands with the ball drawn back against the chest under the chin. He then pushes the ball upward and outward for maximum distance. The rope is placed around the performer’s chest and held taut to the rear by a partner in
order to eliminate rocking action during the push. The performer's effort should be primarily with the arms. The distance of the best of three trials measured to the nearest centimeter is recorded as the score. One practice trial may be taken before scoring.

3. Sit and reach test:

The test is used to measure the flexibility of lower back and leg (hamstring muscle). Sit and reach test apparatus is used to administer the test. The subject was asked to remove his/her shoes and sit on the floor with feet against a wall to prevent it from sliding. The subject fully extended the legs, with the feet about shoulder width apart, the tester held the subject's knee to ensure the nonbending of knee, his arms forward with hands placed on top of each other bending forward along the measuring maximal position for 1-2 second on the fourth trial. The maximum distance reached was recorded to the nearest to half a centimetre.

4. Pull ups:

To measure the strength endurance of the arms and shoulder girdle this test was employed. The subject was made to hang on a horizontal bar with palm facing forward. The subject was asked to pull his body upward by bending the elbows until the chin reached the bar
and then back to the initial stage. This continued for a maximum number of times without swinging the body. The number correctly done pull ups were recorded as score.

5. Shuttle runs (4 x 9 m):

This test is used to measure the agility of the performer in running and changing direction. Marking tape, stop watch and two blocks of wood (2” x 2” x 4”) were needed to perform the test. The performer starts behind the starting line on the signal "go" and runs to the blocks, picks up one, returns to the starting line, and places block behind the line; he then repeats the process with second block. Two trials were allowed and rest is provided between the two trials. The score for each performer is the length of time required (to the nearest 10th of second) to complete the course. Record only the best trial.

6. Standing broad jump:

Standing broad jump is used to assess the horizontal component of the leg power. Sand pit and measuring tape is required for this test. The athlete straddles the tape measure, with his feet parallel and about shoulder width apart. The athlete performs a counter movement and jumps as far horizontally as possible. The floor at the athlete's heel is marked and the distance between the starting line and the marked is
measured as the jump distance. The best of the three trials is recorded to the nearest centimeter.

7. **Sargent jump Test**

   This test is used to assess the leg power of the players’. The equipments and space required is a room with a smooth wall, rub chalk and measuring tape. The athlete stands with his dominant shoulder approximately 6 inch from the wall, with both feet flat on the floor; he reaches as high as possible with his dominant hand and makes a chalk mark on the wall. This mark represents his reach. Without taking any step, the athlete reaches the highest point in the jump; the athlete reaches up with his dominant hand and makes a second chalk mark on the wall. The difference between the two marks is vertical is jump height. The best of three trials was recorded to the nearest centimeter.

**Nelson’s Speed of Movement Test**

   The subject was made to sit on a chair with the hands resting over the edge of a table placed in front. The palms were kept facing each other with the inside border of the little finger resting along two lines which were marked on the edge of the table 12 inches apart. The scholar held a stick near its top so that it hung midway between the
subject’s palms. After the preparatory command “ready” the stick was dropped and the subject stopped it as quickly as possible with an inward horizontal movement of arms. The average of the 10 trials was recorded as the final score. The distance score converted into time score by applying the following formulae:

$$\text{Time} = \frac{2 \times \text{Distance the stick falls}}{\text{Acceleration due to gravity}}$$

**ADMINISTRATION OF THE QUESTIONNAIRES**

The teams were requested to assemble a day before their match after dinner. Permission from the respected team members were sought in writing. The research scholar mentioned the purpose of their study and requested their cooperation in the completion of the study. A copy of the questionnaires along with the instructions was distributed to the players. They took time in going through the statements and their doubts were clarified. They were assured of complete confidentiality of the results of the study. The instructions were clearly conveyed to the subjects both in English and Malayalam.
DESCRIPTION OF QUESTIONNAIRES

Incentive motivation questionnaire

The questionnaire contained 70 statements. These questions measured the following aspects:

<table>
<thead>
<tr>
<th>Psychological Variables</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellence</td>
<td>1 8 15 22 29 36 43 50 57 64</td>
</tr>
<tr>
<td>Power</td>
<td>2 9 16 23 30 37 44 51 58 65</td>
</tr>
<tr>
<td>Stress</td>
<td>3 10 17 24 31 38 45 52 59 66</td>
</tr>
<tr>
<td>Independence</td>
<td>4 11 18 25 32 39 46 53 60 67</td>
</tr>
<tr>
<td>Success</td>
<td>5 12 19 26 33 40 47 54 61 68</td>
</tr>
<tr>
<td>Aggression</td>
<td>6 13 20 27 34 41 48 55 62 69</td>
</tr>
<tr>
<td>Affiliation</td>
<td>7 14 21 28 35 42 49 56 63 70</td>
</tr>
</tbody>
</table>

Scoring: The scoring was done in the following way:

1 = Never

2 = Seldom

3 = Often

4 = Always
Mental skills questionnaire

The questionnaire contained a total of 24 questions. These questions were categorized into 6 sub headings measuring six important aspects of the mental side of sport performance containing 4 questions each. The sub divisions were:

a) Imagery ability
b) Mental preparation
c) Self-confidence
d) Anxiety and worry management
e) Concentration ability
f) Relaxation ability

Scoring: The scoring was done in the following pattern:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<td>18</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
Establishing Game Proficiency:

The game proficiency in volleyball was established by a panel of experts in the game. The panel consists of five members and they were explained about the purpose of the study and the methodology. The panel set a 50 point scale to assess the playing ability. They observed all the matches during the championship and recorded the individual game proficiency of the players. The scores awarded by all the experts were collected and the lowest and highest scores on each individual player were avoided and the mean of the remaining three scores were recorded as the final score.

STATISTICAL TECHNIQUES

To determine the relationship between dependent variable and independent variables Pearson product moment correlation was used. The computation of multiple regression was also used for predicting a criterion variable from a set of predictors. Forward selection method of multiple regression was used to find out the predictor variable that has the highest correlation with the criterion variables which is entered into the equation first. The rest of the variables are entered into the equation depending on the contribution of each predictor.