CHAPTER -III

METHODOLOGY

The purpose of the present study was to find out the relationship of selected physical, anthropometrical and psychological variables with performance ability of male Kabaddi players. In this chapter the selection of the subjects, Sample size for the study, Selection of the variables, Tester competency, Subject reliability, Orientation of the subjects, General procedure of the test administration, Collection of data, Criterion Measures, Measurement of criterion variables, performance, Procedure of test administration, Design of study and Scoring, statistical techniques have been presented.

3.1 Selection of the Subjects :- The Subjects for the present study were male Kabaddi players of universities who had received regular training and participated in competitive Kabaddi game. The subjects were regular participants in the collegiate and university Kabaddi championships. They were drawn from different universities of Karnataka State who were rated as the best players by a panel of three expert coaches. The subjects were participants in the South-zone inter university Kabaddi championship held at Bharatidasan university, Tiruchi (Tamilnadu) during the year 2001.

3.2 Sample size of the Study :- The sample of the present study consisted of Seventy-five (75) male Kabaddi players in the age group of 18 to 25 years.

3.3 Selection of the variables for the Study :- After a thorough review of literature relevant to the game of Kabaddi found in books, journals, periodicals, and research articles besides detailed discussion with the experts and keeping in view feasibility of the study in terms of availability of equipment and the relevance of the variables to the present study, the following variables were selected.
Total performance of the selected subjects was rated by three experts subjectively on a ten point rating scale. This was the dependent variable for this study.

Independent Variables: The various independent variables selected for the present study are listed below:

1. Physical Variables:-
   (1) Speed
   (2) Agility
   (3) Power
   (4) Flexibility
   (5) Endurance

2) Anthropometrical Variables :-
   (6) Trunk length
   (7) Height
   (8) Weight
   (9) Arm length
   (10) Leg length

3) Psychological Variables :-
   (11) Aggression
   (12) Anxiety
   (13) Self - confidence

3.4 Instrument Reliability:- Stop watches, measuring tape, and weighing machine which were used to gather data for this study were obtained from standard firms. Data were collected thrice by using the said instruments. On all occasions, the instruments showed the same or very nearly same reading, and therefore the instruments were considered reliable.

a) Stop Watch
Name of Watch : Casio stop watch
Model Number : HS 30w – NIV
Manufacturing year : October 2003
Company : Casio India Company Pvt. Lt., New Delhi
b) Steel Measuring Tape
Name of Tape : Nivya (30 meters)
Company : Nivya
Manufacturing year : 2001

c) Weighing Machine
Company : Essae (Essac Teraoka Limited), Goa
Manufacturing year : 2001
Machine Number : 62150562730
Model : DS - 215

3.5. Tester Competency:- The tester competency was achieved by a pilot study. This was ensured by test and retest method. The performance of Seventy-five male Kabaddi players selected as subjects for the study on the chosen variables were recorded by the investigator.

3.6. Subject Reliability :- The correlation coefficient of test and re-test method of the physical variables were tabulated below.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Physical variables</th>
<th>r*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Speed</td>
<td>0.91</td>
</tr>
<tr>
<td>2</td>
<td>Agility</td>
<td>0.93</td>
</tr>
<tr>
<td>3</td>
<td>Power</td>
<td>0.89</td>
</tr>
<tr>
<td>4</td>
<td>Flexibility</td>
<td>0.90</td>
</tr>
<tr>
<td>5</td>
<td>Endurance</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Statistically significant at 5% level of significance.

3.7. Orientation of the Subject and General Procedure of Test Administration : All the subjects under the study were briefed about the purpose and importance of the present investigation, before the subjects were administered the different test items selected as physical variables and taking of anthropometrical measurements and assessing their status in psychological variables chosen for the study. Before recording the measurements of physical
and anthropometrical variables selected for the present study all the test items were demonstrated and explained to the selected subjects by the investigator himself. The subjects were also oriented to the test items. The subjects were allowed to practice the items to avoid the possible errors while performing the different test items. The test items were conducted and the measurements were taken under identical conditions. The administration of test items and recording of measurements were done by the investigator himself with the help of the experts in the field who were oriented about test administration, scoring and recording of measurements. The subjects were motivated to give their best performance in all the items in which they were tested for, and solicited to cooperate during the course of the test administration and recording of measurements.

3.8. Collection of Data:- The data pertaining to the performance ability of University Male Kabaddi players who were the subjects for the present study (criterion measures) were gathered by adopting rating method. A panel of three expert coaches rated the subjects in various factors like skill, technique, and application of skill in the game situation. In the aspect of playing ability of players, competitive performances and the information available on their performance together with a view of other factors such as positional play, use of skills like toe touch ability, kicking ability, hand touch ability, supporting ability, catching ability etc., were assessed on ten point rating scale. The rating was subjective evaluation to predict the performance ability among kabaddi players. The selected physical variables, anthropometrical variables and psychological variables were measured and different test items selected for the study were administered as per the procedure and instructions in the literature available. The data for the present study were collected in numerical form from the coaches ratings. The unit of measurement in every test item had been explained below.
### 3.8.1 Physical variables

<table>
<thead>
<tr>
<th>Physical Variables</th>
<th>Test used to Measure</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>30mts run with standing start</td>
<td>In Secs</td>
</tr>
<tr>
<td>Agility</td>
<td>4 x 10 mts shuttle run</td>
<td>In Sec</td>
</tr>
<tr>
<td>Power – Leg</td>
<td>Standing broad jump</td>
<td>In Sec and Centimeters</td>
</tr>
<tr>
<td>explosive power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pull ups</td>
<td>Arm strength and endurance</td>
<td>By numbers</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Sit and Reach test</td>
<td>In Centimeters</td>
</tr>
<tr>
<td>Cardio Vascular</td>
<td>Thousand meter Run</td>
<td>In Secs</td>
</tr>
<tr>
<td>Endurance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.8.2 Anthropometrical Variables

<table>
<thead>
<tr>
<th>Anthropometrical variables</th>
<th>Equipment used to Measure</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trunk Length</td>
<td>Measuring Tape</td>
<td>Centimeters</td>
</tr>
<tr>
<td>Height</td>
<td>Stadiometer</td>
<td>Centimeters</td>
</tr>
<tr>
<td>Weight</td>
<td>Weighing machine</td>
<td>In kilograms</td>
</tr>
<tr>
<td>Arm Length</td>
<td>Measuring tape</td>
<td>Centimeters</td>
</tr>
<tr>
<td>Leg length</td>
<td>Measuring tape</td>
<td>Centimeters</td>
</tr>
</tbody>
</table>

### 3.8.3 Psychological variables

<table>
<thead>
<tr>
<th>Psychological variables</th>
<th>Test and Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>Rainer Martins Questionnaire – 1977</td>
</tr>
<tr>
<td>Aggression</td>
<td>Anand Kumar and Prem Shankar shulka Questionnaire – 1989</td>
</tr>
<tr>
<td>Self Confidence</td>
<td>Rekha Agnihotri Questionnaire - 1987</td>
</tr>
</tbody>
</table>

### 3.9 Criterion measure

Criterion measure selected for the present study was performance ability among Kabaddi players. The performance of players was evaluated individually by subjective rating during the competition in the following areas:

1. Toe touch ability
2. Kicking ability
3. Hand touch ability
4. Tactics (scoring rate)
5. Supporting ability
6. Catching ability
7. Positional play in defense
8. Control
9. Past and present achievement
10. General behavior

The estimation of performance ability was done on a Ten (10) point rating scale for each of the above factors by three experts. The rating scale had ten categories with each category scored from a minimum of one (1) point to a maximum of ten (10) points. The given criteria performance analysis chart was explained clearly and handed over to the experts to assess the performance of the kabaddi players. Thus the performance ability was estimated. The total score was divided by ten (10) to get each expert rater’s individual score on the rating scale. The average of three experts was the measure of criterion for each subject.

3.10. MEASUREMENT OF CRITERION VARIABLE

3.10.1. Physical Variables
1. Speed - Measured to nearest 1/10th of seconds
2. Agility - Measured in seconds
3. Power - Measured in meters
4. Pull-ups - The correct pull-ups were counted in numbers
5. Flexibility - Measured in centimeters
6. Endurance - Measured in minutes and seconds

3.10.2. Anthropometrical Variables
1. Trunk Length - Measured in centimeters
2. Height - Measured in centimeters
3. Arm Length - Measured in centimeters
4. Leg Length - Measured in centimeters
5. Weight - Measured in kilograms

3.10.3. Psychological Variables

1. Anxiety
2. Aggression
3. Self confidence

The scoring of the Questionnaire was done according to the key provided for each questionnaire.

3.11. PERFORMANCE

The Performance of Kabaddi playing ability of the subjects was estimated through subjective evaluation of three expert coaches of the game on a 10 points rating scale as per which the subjects were playing matches.

3.12. PROCEDURE OF ADMINISTRATION OF TESTS:

The following tests were administered as per the description and instructions given in the literature to measure the selected physical variables, anthropometrical variables and psychological variables. The same have been described below.

3.13. PROCEDURE OF TESTS AND MEASURES

Physical variables:

3.13.1. Speed: 30 meters run from standing start

Equipment: Two stop watches

Test Administered

The subject started from a standing bent over position no commands were given. Instead the watch was started when the subjects back foot contacted the ground forward of the standing line. The watch was stopped when the subjects torso passed the finish line. The subject was instructed to go all out from the start.¹

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Photo No.1. Analysis of Performance by Experts

Photo No.1a. Analysis of Performance by Experts
Photo No.2. Measuring Speed of the Subject = 30 meters Standing Start
Scoring

Time elapsed from start to finish was recorded in seconds. Fraction of seconds, if any, was not considered.

3.13.2. Agility : 4 X 10 yards shuttle run
Purpose : To determine the agility of the subject
Equipment : Stop watch.

Test Administered
Ten yards of distance was marked by two parallel lines of 5 meters each. The subject stood behind one of the lines which served as the starting line. On the signal “go” the subject ran faster to the other line and touched it with one hand, turned 180° and came back to starting line, touched it with any hand and again turned 180° and repeated it for a total of four times.²

Scoring
The time taken by the subject to complete the course of 4 X 10 yards was recorded to the nearest 1/100th of the second as the score of the subject.

3.13.3. Power : Standing Broad jump
Purpose : To measure the power of the legs while jumping forward
Facility and equipment : Out door jumping pit with take off board and measuring tape.

Test Administered
The Subject with feet apart stood behind the take off line which was marked on the back of the jumping pit. The subject dipped at knee, arms backward and leaped forward to land inside the pit. Measurement from the point of part of the body touching the pit to the nearest point on the take off line was measured and recorded.³

Photo No.3. Measuring Agility of the Subject = 4 x 10 meters Shuttle Run
Photo No. 4. Standing Broad Jump - Measuring Leg Explosive Power
Scoring

The measurement was recorded in meters and whole centimeters. Three trials were given and best out of three trials was considered for the subject.

3.13.4 Arm Strength Endurance : Pull Ups
Purpose : To measure the strength endurance of shoulders girdle muscles.
Facility and Equipment : A wooden bar approximately 1 ½ inches in diameter was fixed at convenient height horizontally.

Test Administered

The bar was adjusted to such a height that a person can group and hang free while feet off the floor. The subject was required to raise his body until his chin was over the bar. After each chin up, he returned to a fully extended arms hanging position. Palms faced inward throughout the exercise. The exercise was repeated as many times as possible.

Instruction

While testing the subjects the following instructions were given. (a) Not to lift knees or kick (b) Return to the hang position with the arms fully straight (c) Not to swing or snap the way up.4

Scoring

One point was scored each time the subject completed a correct pull-up. The partial credit was not allowed, and, only one trial was permitted, unless, it was obvious that the subject did not follow the instructions on his first trial.

3.13.5 FLEXIBILITY : Sit and Reach Test
Purpose : To measure the flexibility of low back (Trunk)
Facility and Equipments

The test equipment was a specially constructed box with a measuring scale, in which 23 centimeters was set at level of the feet.

Photo No. 5. Pull ups - Measuring Arm Strength Endurance
Test Administered

The subject removed his shoes and sat in front of the test equipment with his feet flat against the end board. The knees were fully extended and the feet were kept at shoulder width apart. To perform the test, the subject extended both the arms forward.

Instruction

The subject was asked to reach forward, palms down along the measuring scale of the testing equipment. The subject was asked to reach repeatedly three consecutive times, and, on the fourth attempt, the maximum reach was held for one second and the distance of the maximum reach was recorded as the test score.

Scoring

The score measured to the nearest centimeter was the most distant point reached on the fourth attempt. The finger tips of both the hands were required to reach this point, if the reach of the two hands was uneven, the test was re administered.

3.13.6. CARDIOVASCULAR ENDURANCE: 1000 meters Running

Purpose : To measure the cardiovascular endurance.

Equipment : Clapper and Stop watch with memory

Test Administered

The subjects were divided into different groups consisting of ten subjects each on random basis. The test was administered to one group at a time. The subjects were asked to stand behind the starting line and when the signal (clapper sound) was given, the subject covered 1000 meters in the shortest possible time. The subjects were to maintain the tempo throughout the course of running.

Scoring

The time taken by each of the subjects to cover the distance was recorded in minutes and complete seconds.\(^5\)

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Photo No. 6. Measuring Cardio-Vascular Endurance – 1000 meters Run
ANTHROPOMETRIC MEASUREMENTS

3.13.7. TRUNK LENGTH

**Purpose**: To measure the length of the frontal trunk.

**Equipment**: Measuring tape

**Test Administered**

It measures the projective length calculated by subtracting height Symphysis from height Suprasternale. In the case of Symphysis height could not be taken then this measurement was determined by subtracting height, Iliospinale anterior from height Suprasternale. 20% of the measurement was added to get the correct measurement.  

**Scoring**

The score measured to the nearest centimeter.

3.13.8 HEIGHT

**Purpose**: To measure the standing height.

**Equipment**: Stadiometer.

**Test Administered**

The subject was asked to stand on the platform of stadiometer. The subject stood erect with his heel, buttocks, and upper back and back of the head making firm contact with the scale. Height was taken by placing a flat card board resting on highest point of the head.

**Score**

The height of the subject was read and recorded in whole centimeters.

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Photo No. 7. Measuring Trunk Length of the Subject

Photo No. 8. Measuring Height of the Subject
3.13.9 ARM LENGTH

**Purpose**
To measure the length of arm.

**Equipment**
Measuring tape.

**Test Administered**

The subject stood without any clothing on the Torso. The arm length was measured from the acromion process to the tip of the third finger.\(^8\)

**Score**

The length of arm was recorded in whole centimeter.

3.13.10 LEG LENGTH

**Purpose**
To measure the leg length of the subjects.

**Equipment**
Measuring tape

**Test Administered**

The subject wearing minimal dress exposing the greater Trochanter stood in bare feet. With a tape, the length of the leg was estimated from greater Tronchanter to the floor.\(^9\)

**Score**

The leg length was recorded in centimeters.

3.13.11. WEIGHT

**Purpose**
To measure the weight of the subjects.

**Equipment**
A weighing machine.

**Test Administered**

The weight of the subject was measured by using a weighing machine. While in minimum dress.\(^10\)

**Score**

The weight of the subject was recorded in kilograms. Fraction upto 500gms was allowed.

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\(^{8}\) Ibid. p.180
\(^{9}\) Ibid. p.180
\(^{10}\) Ibid. p.167
Photo No. 9. Measuring the Arm Length
Photo No. 10. Measuring Leg Length of the Subject

Photo No. 11. Measuring Body Weight of the Subject
3.13.12. ANXIETY

Sports competition anxiety test questionnaire (SCAT) developed by Rainer Martens to measure the degree of anxiety was administered to find out the anxiety level of Kabaddi players of different universities of Karnataka prior to the competition.

The test consisted of (SCAT) 15 statements. Likert system was followed to elicit responses. Each statement consisted of three responses such as hardly ever, some times and often. Out of fifteen questions five were spurious questions which had been added to the questionnaire to diminish response bias towards the actual test items. The subjects were instructed to make tick (✓) mark on any one of the responses to each item according to how they generally felt in competitive sports situation. The purpose of the study was clearly explained to them so that there was no ambiguity among the subjects regarding the efforts which they had to put for the successful completion of the Investigation. The SCAT questionnaire was distributed to the Kabaddi players and the directions were read by the researcher at a dictation speed to make the subject understandable about what they are exactly required to do.

Scoring

The completed questionnaire were scrutinized by the investigator to ensure that the subject responded to every item and there was no item left unanswered. The items 2, 3, 5, 8, 9,12,14 and 15 were worded in such a manner that they were scored according to the following key.

<table>
<thead>
<tr>
<th>Score</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hardly ever</td>
</tr>
<tr>
<td>2.</td>
<td>Some times</td>
</tr>
<tr>
<td>3.</td>
<td>Often</td>
</tr>
</tbody>
</table>
In case of items 6 and 11 scoring was carried out according to

<table>
<thead>
<tr>
<th>Score</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Often</td>
</tr>
<tr>
<td>2.</td>
<td>Some times</td>
</tr>
<tr>
<td>3.</td>
<td>Hardly ever</td>
</tr>
</tbody>
</table>

However spurious questions, that is 1, 4, 7, 10 and 13 were not scored out as suggested by Rainer Martens\(^\text{11}\). Scores obtained by each subject on each statement were added up which represented an individual's total score on sport competitive anxiety. The inventory was scored with the help of the scoring key. A separate scoring method was followed for positive and negative statements. The scores obtained for both positive and negative statements were added. The range of scores was 15 to 45 points. The higher the score, the higher was the anxiety level. The subject responded to every statement and there was no item left unanswered.

### 3.13.13. AGGRESSION

The aggression questionnaire inventory developed by Anand Kumar and Prem Shankar\(^\text{12}\) was administered to each subject to estimate the aggression level of Kabaddi players. The aggression questionnaire inventory consisted of 25 items in which 13 items were keyed “YES” and rest of 12 were keyed “NO”. The statements which had keys “YES” were 1, 4, 5, 6, 9, 12, 14, 16, 18, 21, 22, 24, 25 and the statements which were keyed “NO” were 2, 3, 7, 8, 10, 11, 13, 15, 17, 19, 20, and 23. The higher the score, the higher was the aggression level.

**Scoring**

One point was awarded for right answer. For each item the score was “1”. The maximum score was “25” and minimum score was “0”.

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Photo No. 12. Research Scholar explaining the Questionnaire to the Subjects
3.13.14 SELF-CONFIDENCE

Self confidence inventory (ASCI) questionnaire developed by Agnihotri\(^{13}\) was administered to estimate self confidence of Kabaddi players selected as subjects. The ASCI Questionnaire was administered to all the subjects to measure self confidence. All the statements were adopted for this investigation.

Scoring Key

The subjects were instructed to make tick (✓) mark on any one of the responses to each item according to how they generally felt in competitive sports situation. The purpose of the study was clearly explained to them so that there was no ambiguity among the subjects regarding the efforts which they had to put for the successful completion of the Investigation. The ASCI questionnaire was distributed to the Kabaddi players who were selected as subjects and the direction were read by the researcher at a dictation speed to make the subjects understand about what they were exactly required to do. The inventory could be scored by hand. A score of one was awarded for a response indicating lack of Self-confidence, that is, making cross (✗) to wrong response to item numbers 2, 7, 23, 31, 40, 41, 43, 44, 45, 53, 54, 55 and 56 for making cross (✗) to right response to the rest of the items (the true answers were 1, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39, 42, 46, 47, 48, 49, 50, 51, 52). The lower the score the higher be the level of Self-confidence and visa versa.

3.14. DESIGN OF THE STUDY AND STATISTICAL TECHNIQUE

The purpose of the present investigation was to estimate the performance ability (dependent variable) of male kabaddi players from among the selected physical, anthropometrical and psychological variables. (independent variables/study variables). The focus of the study was to determine the possible predictors of performance ability of kabaddi players through the selected physical, anthropometrical and psychological variables. To accomplish the purpose of the study multiple regression analysis was applied.