Chapter III

PROCEDURE

In this chapter selection of subjects, selection of criterion measures, criterion test to measure different variables and statistical procedures used have been presented. The purpose of the study was to prepare a prediction model of boxing performance on the basis of selected physical, physiological, anthropometric and psychological variables for Indian boxers.

SELECTION OF SUBJECTS

A total of 80 national level male boxers were selected as subjects for this study. All the players were in the age group of 18 to 35 years. The purposive method of research design was used to select 80 boxers from the 60th senior men national boxing championship held at Malleshwaram Urdu School, Bangalore, Karnataka in the year 2018. It was decided that eight boxers who would qualify for quarter final matches in each weight category will be selected as subjects for this study. Accordingly, eighty boxers i.e. eight boxers form each weight category who qualified for the quarter final matches of national championship were selected as subjects for the study.
SELECTION OF CRITERION VARIABLES

The criterion variables were selected on the basis of advice received from professionals in the field of physical education and boxing. The variables selected were as follows:-

1. **Physical fitness Variables**

   The following physical fitness variables were selected for this study:-
   
   1.1 Explosive Leg strength
   1.2 Running Speed
   1.3 Cardiovascular Endurance
   1.4 Agility

2. **Physiological Variables**

   The following physiological variables were selected for this study:
   
   2.1 Blood pressure
   2.2 Vital capacity
   2.3 Resting pulse rate
   2.4 Breath holding time

3. **Anthropometric Variables**

   The following anthropometric variables were selected for this study:-
   
   3.1 Height
   3.2 Weight
3.3 Arm length
3.4 Biceps girth

4. Psychological Variables

The following Psychological variables were selected for this study:

4.1 Anxiety
4.2 Aggression
4.3 Self confidence
4.4 Achievement motivation

RELIABILITY OF DATA

The reliability of data was established by finding out the reliability of instrument, tester reliability, subject reliability and reliability of physical fitness tests.

INSTRUMENT/EQUIPMENT RELIABILITY

The equipment’s used in the collection of data were all tested by the researcher before the collection of data. The equipment’s were highly calibrated and were supplied by most scientific firms in India. Thus the instruments were considered accurate enough for measuring the variables of the study.
TESTER RELIABILITY

The research scholar had practiced to use all the sophisticated equipments under the supervision of guide and was taught proper techniques to measure various variables. The researcher had measured all the variables on ten subjects randomly selected along with the expert. The coefficient of correlation was calculated between the data of expert and researcher. The coefficient of correlation value obtained is given in table no. 1: -
### TABLE-1

Reliability of criterion tests

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient of reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing Height in cm.</td>
<td>0.99*</td>
</tr>
<tr>
<td>Weight in Kg.</td>
<td>0.98*</td>
</tr>
<tr>
<td>Arm length in cm.</td>
<td>0.91*</td>
</tr>
<tr>
<td>Arm girth in cm.</td>
<td>0.99*</td>
</tr>
<tr>
<td>Leg strength</td>
<td>0.96*</td>
</tr>
<tr>
<td>Speed</td>
<td>0.87*</td>
</tr>
<tr>
<td>12 min. Cooper’s Run/Walk Test</td>
<td>0.92*</td>
</tr>
<tr>
<td>Agility</td>
<td>0.87*</td>
</tr>
<tr>
<td>Blood pressure (Systolic)</td>
<td>0.94*</td>
</tr>
<tr>
<td>Blood pressure (Diastolic)</td>
<td>0.92*</td>
</tr>
<tr>
<td>Vital capacity</td>
<td>0.93*</td>
</tr>
<tr>
<td>Resting pulse rate</td>
<td>0.94*</td>
</tr>
<tr>
<td>Breath holding time (Positive)</td>
<td>0.91*</td>
</tr>
<tr>
<td>Breath holding time (Negative)</td>
<td>0.90*</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level of confidence.
SUBJECT RELIABILITY

The reliability of subjects was established by ensuring their motivation level and their willingness to participate in the process of data collection. The subjects were assembled at one place and were explained the objectives of the study. The subjects were also requested to give their best performance and to answer the questions of psychological test in a most honest manner.

RELIABILITY OF PHYSICAL FITNESS TESTS

In order to measure physical fitness ability of boxers, the researcher had used different tests which are highly reliable and valid and are also widely used for measuring fitness components in the whole world.

CRITERION TESTS TO MEASURE DIFFERENT VARIABLES

By reviewing the literature and in consultation with professional experts the following criterion measures were applied to collect the data on selected criterion and predictor variables.

1. Leg strength was measured through standing broad jump test(Clarke and Clarke, 1988)\textsuperscript{62}

2. Speed was measured using 50 meters run test.(Yobu, 1988)\textsuperscript{63}


\textsuperscript{63}
3. Endurance was measured through Cooper’s 12 Minutes Run walk test (Yobu, 1988)\textsuperscript{64}

4. Agility was measured using shuttle run test. (Yobu, 1988)\textsuperscript{65}

5. Mean Arterial Blood pressure was measured by a period of one minute and recorded in beats per minute. It was measured by using Sphygmomanometer and stethoscope. (Clarke, 1976)\textsuperscript{66}

6. Vital Capacity was measured using dry Spirometer. (Clarke, 1976)\textsuperscript{67}

7. Resting pulse rate was measured by a period of one minute and recorded in beats per minute. (Clarke, 1976)\textsuperscript{68}

8. Breath Holding Time was measured manually using nose clip and stop watch in seconds. (Clarke, 1976)\textsuperscript{69}

9. Anxiety was measured through Spielbergers (1976) Trait Anxiety questionnaire.

10. Aggression was measured through Questionnaire developed by Buss & Perry (1992)\textsuperscript{70}

\textsuperscript{64}Ibid; 2
\textsuperscript{65}Ibid; 2
\textsuperscript{67}Ibid; 5
\textsuperscript{68}Ibid; 5
\textsuperscript{69}Ibid; 5
11. Achievement motivation will be measured through questionnaire developed by M.L. Kamlesh (1992)\textsuperscript{71}

12. Self Confidence was measured through questionnaire suggested by Hardy and Nelson (1992)\textsuperscript{72}

13. Height was measured using Stadiometer and hand span, arm length and arm girth was measured by using tape. (Clarke and Clarke, 1988)\textsuperscript{73}

14. Weight was measured by digital weighing machine.

15. Arm length was measured by steel tape.

16. Performance of the boxers was measured on the basis of scores in the bouts from quarter final matches in National and state level during bouts.

\textbf{ADMINISTRATION OF TESTS AND COLLECTION OF DATA}

The data on selected criterion variables was collected by using following standardized tests and laid down procedures:-


\textsuperscript{72}Hardy and Nelson, \textit{Sports Psychology}, Pune: VidyarthiGrihaPrakashan Publishers, (1992); P.157

\textsuperscript{73}Clarke, H. and Clarke, D.H. \textit{Application of Measurement in Physical Education}, (6th Ed.), (1988); p. 95
1.1 EXPLOSIVE LEG STRENGTH

**Purpose:** To measure explosive leg strength.

**Equipment:** Measuring tape and jumping pit.

**Procedure:** The subjects were made to stand behind the line for take-off. Before take-off the subject was clipped his knees and swing his arms backward he then jump forward, simultaneously extending his knees and swing his arms forward measurement will be taken from the mark closest to the take-off line to the inside edge of the take-off line. Take-off was being from both the feet simultaneously, jumping as forward as possible and landed on the feet. Three trails were permitted and best of the three score was taken in to account. The purpose is to measure the legs strength of the boxers.

1.2 RUNNING SPEED

**Purpose:** The aim of this test was to measure running speed.

**Equipment:** measuring tape or marked track, stopwatch, and Stop watch.
Procedure: The test involves running a single maximum sprint over 50 meters, with the time recorded. A thorough warm up should be given, including some practice starts and accelerations. Start from a stationary standing position, with one foot in front of the other. The front foot must be behind the starting line. Once the subject is ready and motionless, the starter gives the instructions "set" then "go." The tester should provide hints for maximizing speed and the participant should be encouraged to not slow down before crossing the finish line.

1.3 CARDIOVASCULAR ENDURANCE

Test: Coopers 12- minute Run/walk test.

Purpose: To Measure the cardiovascular Endurance of the subjects.

Equipment: Stop watch, standard 400 Meter Track marked at every 10 meter

Procedure: Cooper’s 12-minute run /walk test\textsuperscript{74} was used to the measure the cardio respiratory endurance. For this, the 400-meter track was marked into eight divisions of 50 m each. The runner was started behind line, upon the starting signal, run/ or walk as

\textsuperscript{74} Berry L. And Johnson “Practical Measurement for Evaluation in Physical Education” \textit{Third Edition 1988 Surjit Publication} pp.184
many laps as possible around the track within the 12-minute. The spotter maintained a count of each lap, and when the signal to stop was given, they immediately run to the spot at which their runners were at the instant when the whistle was blown.

**Scoring:** The distance covered by the subjects in 12 minute run/walk recorded in meters as the score of the subjects.

**1.4 AGILITY**

**Purpose:** To measure agility ability.

**Equipment**

**Equipment:** Wooden blocks, Marker cones, Measurement tape and Stopwatch.

**Procedure:** This test requires the person to run back and forth between two parallel lines as fast as possible. Set up two lines of cones 30 feet apart or use line markings, and place two blocks of wood or a similar object behind one of the lines. Starting at the line opposite the blocks, on the signal "Ready? Go!" the participant runs to the other line, picks up a block and returns to place it behind the starting line, then returns to pick up the second block, then runs with it back across the line.
Scoring: Two or more trails may be performed, and the quickest time is recorded. Results are recorded to the nearest tenth of a second.

(2) PHYSIOLOGICAL VARIABLES

2.1 BLOOD PRESSURE

Purpose: To measure the systolic and diastolic blood pressure.

Equipment: Sphygmomanometer and stethoscope.

Procedure: To take a blood pressure reading, you need to be relaxed and comfortably seated, with your arm well supported. Alternatively, you can lie on an examination couch.

A cuff that inflates is wrapped around your upper arm and kept in place with Velcro. A tube leads out of the cuff to a rubber bulb. Another tube leads from the cuff to a reservoir of mercury at the bottom of a vertical glass column. Whatever pressure is in the cuff is shown on the mercury column. The mercury was held within a sealed system – only air travels in the rubber tubing and the cuff. Air is then blown into the cuff and increasing pressure and tightening is felt on the upper arm. The researcher was puts a stethoscope to your arm and listens to the pulse while the air is slowly let out again. The systolic pressure is measured when the doctor first hears the pulse. This sound was slowly become more
distant and finally disappears. The diastolic pressure is measured from the moment the doctor is unable to hear the sound of the pulse.

**Scoring:** The blood pressure is measured in terms of millimeters of mercury (mmHg).

### 2.2 RESTING PULSE RATE

**Purpose:** To test the pulse rate variability as a measure of fitness and predictor of stress and illness.

**Equipment:** Stopwatch and finger pulse sensors.

**Procedure:** Resting pulse should be measured first thing in the morning with your fingers and a stopwatch. Put your middle and index finger to either your radial artery on your wrist or your carotid artery in your neck. Once you find your pulse, count how many beats occur in 20 seconds, and multiply this number by 3.

### 2.3 VITAL CAPACITY

**Purpose:** To measure lung capacity.

**Equipment:** Dry spirometer

**Procedure:** For testing the vital capacity, dry spirometer was used. The subjects was asked to take breath two or three deep breaths and then after the deepest possible inspiration. He/she placed
his/her mouth on the nozzle of the spirometer and expired with full force. Care was taken that the air exhales from the mouth only. The reading in the dial gives vital capacity of the subjects in liters.

**Scoring:** The amount of expired air was read directly from the scale and that was score for vital capacity.

### 2.4 POSITIVE BREATH HOLDING CAPACITY

**Purpose:** To measure the positive breath holding capacity.

**Equipment:** Stop watch and nose clip

**Procedure:** The subjects were asked to sit comfortably. The subjects were asking to inhale air deeply and hold exhaling. Tester start taking time till subject is able to stop its breath. While taking the test, the nose of the subject was clipped by a nose clip.

**Scoring:** Positive breath holding capacity was measured manually with the help of stopwatch and recorded in seconds.

### 2.5 NEGATIVE BREATH HOLDING CAPACITY

**Purpose:** To measure the negative breath holding capacity.

**Equipment:** Stop watch and Nose clip
**Procedure:** The subjects were asking to sit comfortably. The subjects were asking to exhale air completely and hold inhaling. Tester start taking time till subject is able to stop its breath. While taking the test, the nose of the subject was clipped by a nose clip.

**Scoring:** Negative breath holding capacity was measured manually with the help of stopwatch and recorded in seconds.

**(3) ANTHROPOMETRIC VARIABLES**

**3.1 STANDING HEIGHT**

**Equipment:** - Stadiometer

**Procedure:** The subject were made to stand erect, feet together with buttocks, upper back and rear of the head in content with the wall scale. As the scholar brought the scale on to the subject’s vertex, the subjects were instructed to take a deep breath and stretch up to his full height. The height was recorded to the nearest half a centimeter.75

**3.2 BODY WEIGHT**

**Equipment:** - Weighing machine (either lever balance or portable weighing scale).

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Procedure: The subject were standing on the weighing machine exerting equal pressure on both feet without any movement thereafter subject was asked to stand at the center of the platform with equal pressure on both feet with a minimum possible clothing, and the weight was recorded to the nearest half a kilogram. The subjects were allowed minimum possible clothing at the time of measurement.76

3.3 ARM LENGTH

Equipment- Measuring Tape

Procedure: The subject stands with the arms hanging loosely by the side of the body, fingers outstretched. A measurement is made from the acromial (lateral edge of the acromion process, e.g. bony tip of shoulder) to the tip of the little finger. Measurement is made on the right side, following the anthropometric standard, though a measurement of either side would be assumed to be the same in most cases.

3.4 BICEPS Girth

Equipment: Measuring Tape

**Procedure:** This girth measurement is usually taken on the right side of the body. The arm is raised to a horizontal position in the sagittal (forward) plane, with the elbow at about 45 degrees. The subject maximally contracts the biceps muscle, and the largest circumference is measured. When recording, you need to make sure the tape is not too tight or too loose, is lying flat on the skin, and is kept vertical. The maximal girth is not always obvious, and the tape may need to be moved along to find the point of maximum circumference.

**4) PSYCHOLOGICAL VARIABLES**

**4.1 ANXIETY**

Anxiety was measured by the anxiety questionnaire. The anxiety questionnaire was designed to measure the degree of anxiety.

It was developed by Spielberger (1976). Spielbergers Trait Anxiety questionnaire was given to all subjects. Twenty items were adopted from Spielbergers trait Anxiety questionnaire for this investigation.
**Scoring:** -

The scoring of the questionnaire was done by following instruction given by Spielbergers.

### 4.2 AGGRESSION

Standardized Buss & Perry (1992) questionnaire for sporting aggression was used to scale the aggressiveness of National Boxing players. The test consists of 29 questions with five levels of responses. The level changes from extremely uncharacteristic to extremely characteristics. The respondents were made to encircle the appropriate number which suited their attitude. The scale was revalidated by administering the questionnaire on eighty men and women Boxing Players.

**Scoring**

This inventory was scored with the help of the scoring key and following instruction given by the Buss & Perry.

### 4.3 ACHIEVEMENT MOTIVATION

The standardized psychological tool devised by Kamlesh, M.L (1996) was used to quantify the sports achievement motivation of players. This inventory consists of 20 statements. Each statement
has two responses. Among the two responses the most appropriate one is correct response. The respondents made a tick mark (√) on any one of the two responses that fits to them best.

**Scoring:-**

This inventory was scored with the help of a scoring key. The correct statement was given two marks and incorrect statement was given zero. The total score constitutes the achievement motivation score. The larger score higher the achievement motivation.

**4.4 SELF-CONFIDENCE**

Standard Hardy and Nelson (1992) questionnaire for self confidence was used to scale the self confidence level. The test consists of four questions with six levels of responses. The level of changes from strongly disagrees to strongly agree. The respondents were made to encircle the appropriate number which suited their attitude. The scale was revalidated by administering the questionnaire on 100 Inter University Men Handball Players.

**Scoring**

This scoring range of this questionnaire was 4 to 24. The higher score indicate the high level of self-confidence.
The raw data pertaining to physical fitness variables is presented in appendix A, whereas raw data of physiological variables is presented in appendix B. The raw data pertaining to anthropometric variables is given in appendix C and the raw data of psychological variables is given in appendix D. The performance of the boxers during their matches being evaluated by judges is given in appendix E. The questionnaires being used to measure psychological attributes i.e. anxiety, aggression, self confidence and achievement motivation are given in appendix F, G, H and I respectively.

**STATISTICAL ANALYSIS**

The obtained data was analyzed with the help of descriptive statistics and Regression analysis. The data was analyzed with statistical software i.e. SPSS (19 Version).