CHAPTER III

METHODOLOGY

In this chapter the methodology engineered in the selection of subjects, selection of variables, pilot study, collection of data, the orientation procedures, tools used and statistical procedure have been presented.

The purpose of the study was to predict playing ability in handball from selected anthropometric, physical, physiological, psychological and performance variables of interuniversity men handball players.

3.1. SELECTION OF SUBJECTS

To achieve the purpose of the study, the investigator selected hundred inter university men handball players from different university teams participated in inter-university competitions held during the year 2007-2008 at Acharya Nagarjuna University, Guntur, Andhra Pradesh. The subjects selected were in the age group between 17 to 25 years.

.   All the subjects had participated in the inter-university handball tournaments. Only volunteer, healthy and physically fit subjects were selected for this study.

3.2 SELECTION OF VARIABLES

The researcher reviewed number of books, journals, research articles, coaching manuals and found that playing ability of a handball player may have relationship with selected anthropometric, physical, physiological, psychological and performance variables. Based on these observations, the investigator selected the following variables for this study

3.2.1 CRITERION VARIABLE

Playing ability in Handball

3.2.2 PREDICTOR VARIABLES

3.2.2.1 Anthropometric Variables

1. Height

2. Hand Span

3. Arm Length

4. Arm Girth

3.2.2.2 Physical Fitness Variables

1. Hand Grip Strength

2. Leg Strength

3. Speed

4. Endurance

5 Agility

3.2.2.3 Physiological Variables

1. Vital Capacity

2. Mean Arterial Blood Pressure

3. Resting Pulse Rate

4. Breath Holding Time

3.2.2.4 Psychological Variables

1. Anxiety

2. Aggression

3. Achievement Motivation

4. Self Confidence

**3.2.2.5 Performance Variables**

1. Passing

2. Jump Shot Right Wing

3. Jump Shot Left Wing

4. Shooting

3.3 RESEARCH DESIGN

A repeated measure research design was used with playing ability in handball as the criterion variable and selected the anthropometric, physical, physiological, psychological and performance variables as the predictor variables. The methodology adopted in this study is given in Figure 1 as flow chart.

FIGURE 1

Flow Chart Showing the Methodology adopted in the Study
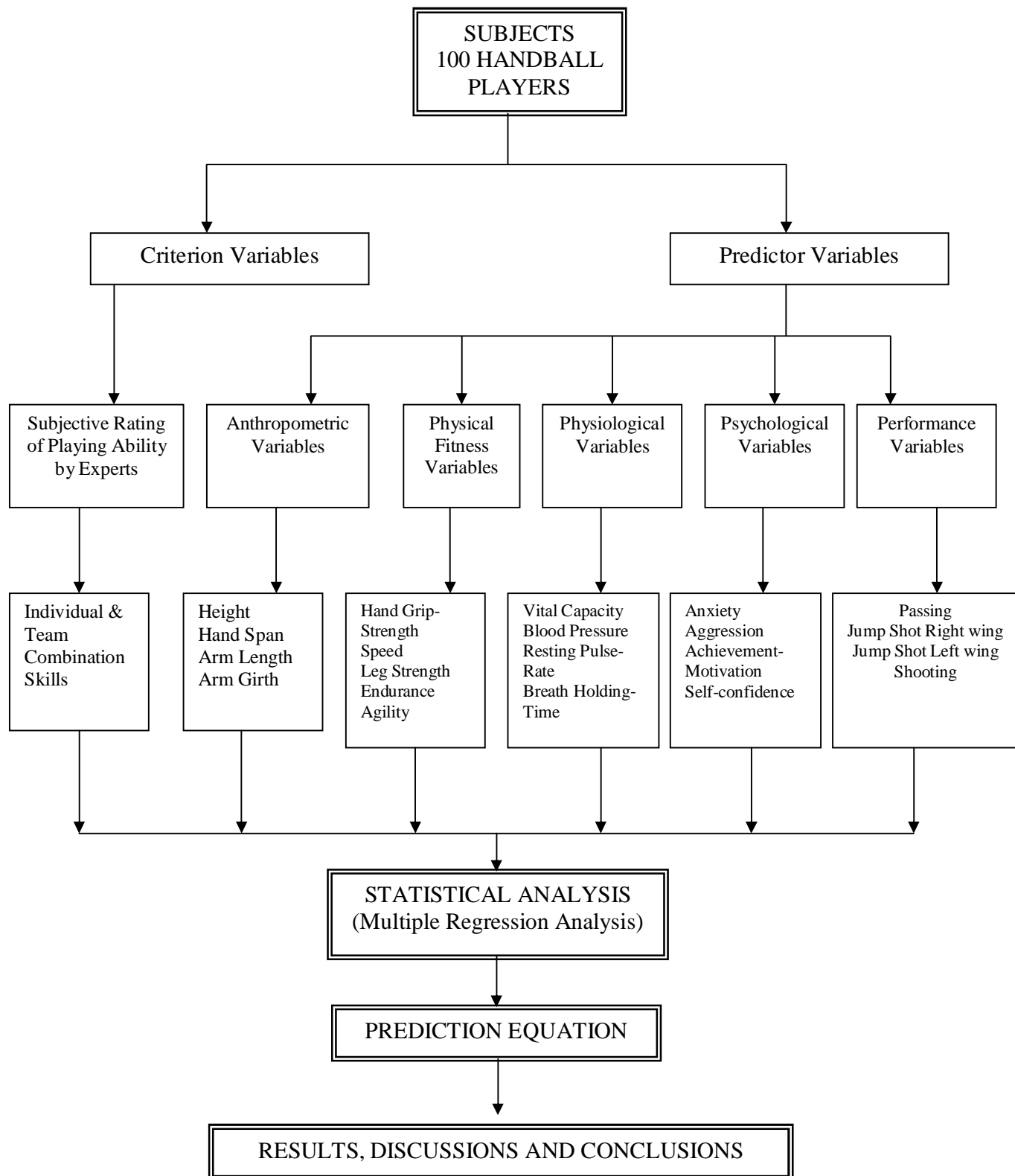
3.4 CRITERION MEASURES

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

1. Height was measured using Stadiometer and hand span, arm length and arm girth were measured using tape.**(Clarke and Clarke,1988)**

2. Hand Grip strength was measured using hand grip dynamometer. **(Clarke and Clarke,1988)**

3. Leg strength was measured through standing broad jump test**(Clarke and Clarke,1988)**

4. Speed was measured using 50 meters run test.**(Yobu, 1988)**

5. Endurance was measured through Cooper's 12 Minutes Run test **(Yobu, 1988)**

6. Agility was measured using shuttle run test. **(Yobu, 1988)**

7. Vital Capacity was measured using Spirometer. **(Clarke, 1976)**

8. Resting pulse rate was measured for by a period of one minute and recorded in beats per minute. **(Clarke, 1976)**

9. Mean Arterial Blood pressure was measured for by a period of one minute and recorded in beats per minute. It was measured by using Sphygmomanometer and stethoscope. **(Clarke, 1976)**

10. Breath Holding Time was measured manually using nose clip and stop watch. **(Clarke, 1976)**

11. Anxiety was measured through **Spielbergers (1976)** Trait Anxiety questionnaire

12. Aggression was measured through Questionnaire developed by **Buss & Perry (1992)**

13. Achievement motivation was measured through questionnaire developed by **Kamlesh (1992)**

14. Self Confidence was measured through questionnaire suggested by **Hardy and Nelson (1992).**

15. Performance variables, passing, jump shot right wing, jump shot left wing and shooting were measured using specific skill tests. **(Geetha, 2007)**

Table I shows the variables selected the tests and tools used for measurement and the unit of measurement.

Table I

Showing the Variables, Tests / Tools and the Unit of Measurement

S.No	Variables	Test / Tools Administered	Unit of Measurement
1	Height	Manual –Stadio Meter	Centimeters
2	Hand Span	Manual - Tape	Centimeter
3	Arm Length	Manual -Tape	Centimeter
4	Arm Girth	Manual - Tape	Centimeter
5	Hand Grip Strength	Hand Grip Dynamometer	Kilograms
6	Leg Strength	Standing Broad Jump	Meters
7	Speed	50 Meters Run	Seconds
8	Endurance	12 Minutes Run	Meters
9	Agility	Shuttle Run	Seconds
10	Vital Capacity	Spirometer	Milliliters
11	Resting Pulse Rate	Manual	Beats per Minute
12	Mean Arterial Blood Pressure	Sphygmomanometer	mm/Hg
13	Breath Holding Time	Manual Nose Clip	Seconds
14	Passing	Pass Test	Points
15	Jump Shot Right Wing	Jump Shot (R) Test	Points
16	Jump Shot Left Wing	Jump Shot (L) Test	Points
17	Shooting	Shooting Test	Points

S.No	Variables	Test / Tools Administered	Unit of Measurement
18	Anxiety	Questionnaire	Scores
19	Aggression	Questionnaire	Scores
20	Achievement Motivation	Questionnaire	Scores
21	Self Confidence	Questionnaire	Scores

3.5 PILOT STUDY

The investigator conducted a pilot study with ten players who were not subjects of the research study to determine the methods of testing, evaluate the competency of the investigator testing, recording the timings and scores and field equipments used in the present investigation.

3.6 RELIABILITY OF DATA

The reliability of the data was ensured by establishing the instrument reliability, subject reliability and tester's reliability.

3.6.1 INSTRUMENT RELIABILITY

Six electronic stop watches (Casio, Japan), non stretchable steel tapes, Wet Spirtometers, and Digital Heart Rate and Blood Pressure Machine (Made in Japan), were used in this study. The instruments were used from standard companies and their calibrations were accepted as reliable at par with international standards. The measurements were collected twice and correlated for reliability.

The intra class correlation coefficient obtained by test, retest method is presented in Table II.

Table II

The Reliability Coefficient of the Subjects in Anthropometric, Physical, Physiological, Psychological and Performance by Test and Retest Method

S.No	Test Items	Coefficient of Correlation
1	Height	0.96*
2	Hand Span	0.92*
3	Arm Length	0.91*
4	Arm Girth	0.93*
5	Hand Grip Strength	0.87*
6	Leg Strength	0.88*
7	Speed	0.89*
8	Endurance	0.87*
9	Agility	0.86*
10	Vital Capacity	0.88*
11	Resting Pulse Rate	0.86*
12	Mean Arterial Blood Pressure	0.91*
13	Breath Holding Time	0.85*
14	Passing	0.88*
15	Jump Shot Right Wing	0.88*
16	Jump Shot Left Wing	0.83*
17	Shooting	0.82*

Table value r = (0.01) (2,7) = 0.735
* Significant at 0.01 level

The validity and reliability of psychological questionnaires administered were already determined by the authors and they were accepted for this study as reliable.

3.6 2 TESTER'S RELIABILITY

The tester's competency was established together with reliability of test. To determine the reliability of the test, the performance of ten subjects were recorded twice under similar conditions by the investigator. This was done by the test and retest method on consecutive days. The repeated measurement of subjects was conducted on the selected predictor variables to determine reliability in an univariate situation.

3.6.3 RELIABILITY OF THE SUBJECTS

The co-efficient of Correlation in Table II also indicated the subject reliability because the same subjects were used under similar conditions by the same test. No motivation techniques were used at the time of the testing periods.

3.7 ORIENTATION OF THE SUBJECTS

In order to get the full co-operation from the subjects, the investigator explained to the subjects the purpose of the study, tests to be administrated and procedure to be followed in the administration of the test. Practice trials were conducted to help the subjects to understand the method of testing.

3.8 TEST ADMINISTRATION

The following tests were administered to measure the selected Anthropometrical, physical, physiological, psychological and performance variables.

3.8.1 CRITERIA FOR SUBJECTIVE RANKING

To determine the playing ability of the handball players, the selected subjects playing ability was assessed by three experts subjectively. Three qualified coaches who served as experts rated each individual handball player in the game situation. The individual and team performance related handball skills were selected as criteria for subjective ranking of handball playing ability by the experts. The criterion score were classified into two parts, viz., five individual skills (50 marks) and five situations where the individual player contributes to the team (50 marks) for a total of 100 marks (Table III). The average of the marks of the three experts was taken as the criterion score.

3.8.1 Individual Skills

The following individual skills were selected, namely, passing, dribbling, Field goals, throws and collection. Ten marks were awarded for each skill for a total of 50 marks.

Testing Arrangements

To determine the subjects playing ability in actual playing situation, the subjects were required to play in a regulation handball court.

Test Administration

The experts ranked the individual skills of the subjects in a six versus six playing situations. In this way twelve subjects were subjectively rated on the five individual skills.

Scoring

Three experts gave marks according to the playing ability of the subjects as detailed in table III   .

3.8.2 Individual's Contribution to the Team

The following individual contribution to the team were selected, namely, positional play, adapting the principles of play, fitness, awareness of the rules, violation, fouls of the game and situational awareness. Ten marks were awarded for each skill for a total of 50 marks (Table III).

Testing Arrangements

To determine the subjects playing ability in actual playing situation, the subjects were tested during actual game situation in matches organised by the investigator.

Test Administration

The experts ranked the individual contribution to the team in a six vs. six playing situation. In this way twelve subjects were subjectively rated on the five individual contribution to the team during match situations.

Scoring

Three experts gave marks according to the playing ability of the subjects for a total of 50 marks as shown in Table III

Table III

Criteria for Subjective Ranking of Handball Playing Ability.

Sl. No.	Variables	MARKS
I	**Individual Skills**	
	1. Dribbling	10
	2. Passing	10
	3. Shooting	10
	4. Throws	10
	5. Collection of ball	10
	Total	**50**
II	**Individual Contribution to Team**	
	1. Positional Play	10
	2. Adapting Principles of Play	10
	3. Awareness of the Rules	10
	4. Fitness	10
	5. Situational Awareness	10
	Total	**50**
	TOTAL (I + II)	**100**

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3.9 COLLECTION OF DATA

The method of data collected from the inter university handball players on selected anthropometrical, physical fitness, physiological, psychological and performance variables were explained below.

3.9.1 Height

Objective

To measure height

Apparatus used

Stadiometer and Anthropometric rod

Test Description

Height will be measured by anthropometric rod. The subject stand erect bare footed on a plane horizontal surface against a wall with his heels, back of the shoulder and head touching the wall and stretch the body. Stretched upwards as much as possible without his heel leaving the ground. Than anthropometric rod is kept in front of the subject and the crossbar of the anthropometry is adjusted so that the lower edge touches the highest point of the subject's head. Height will be recorded in meters. **(Clark and Clark,1989)**

3.9.2 Hand Span

A hand is a unit of length measurement, originally based on the breadth of a male human hand and now standardized at 4 inches (about 10 cm).
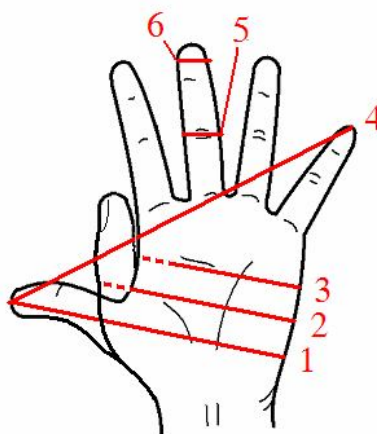
Objective

To measure hand span of the subject

Apparatus used

A flexible tape, paper and pencil to record the measurements

Test Description

As shown in Figure, the subject was asked to wide open his right hand and the hand span was measured from the tip of the thump to the tip of the little finger in a straight line. **(Clark and Clark,1989)**

Scoring

The hand span score was the distance between the thump tip to the little finger tip in a straight line.

3.9.3 Arm Length

Objective

To measure Arm Length

Apparatus used

Flexible Steel Tap, Rod, Pencil and Paper

Test Description

Reposition the end of the measuring tape to a spot about 5 inches from one end of the rod. The subject was asked to grasp the rod and to hold in his arm at about 45 degrees from the midline of the body The elbow must be extended fully during this measurement.

The arm length was the distance from the rod to the acromion process. The acromion process is the bone like protuberance at the edge of the shoulder

Care was taken the measurement was taken from the top of the rod. **(Clark and Clark,1989)**

Scoring

After taking several measurements, record on the fit kit sheet under corrected arm length of the subject was recorded.

3.9.4 Arm Girth

Objective

To measure the circumference of the upper arm girth.

Apparatus Used

Flexible measuring steel tape and score sheet.

Test Description

The upper arm girth was measured at the maximum circumference of the upper arm in a plane at right angle to its body axis. The measurement was taken to the nearest centimeter. **(Clark and Clark,1989)**

3.9.5 Handgrip Strength Test

Objective

The purpose of this test was to measure grip or forearm muscle strength.

Apparatus Used

Handgrip dynamometer

Test Description

The subject was asked to hold the dynamometer in the hand to be tested, with the arm at right angles and the elbow by the side of the body. The handle of the dynamometer was adjusted if required. The base should rest on first metacarpal (heel of palm), while the handle should rest on middle of four fingers. The subject squeezes the dynamometer with maximum isometric effort, which was maintained for about 5 seconds. No other body movement was allowed. (**Yobu, 1988**)

Score

Score was the record shown in the dynamometer in kilo grams. The score was taken to the nearest $1/100^{th}$ of a kilo gram.

3.9.6 Speed (50 Meters run)

Objective

To measure speed

Apparatus used

Clapper, running area, stop watch

Test Description

Two lines are marked apart 50 meters as starting and finish line. On the command of "Go" the subjects were asked to run as fast as possible across the finish

line to cover 50 meters area. The time will be recorded in $1/100^{th}$ of a second (**Yobu, 1988**)

Score

Score of the subject was the time taken from the start command to the subject crossed the 50 meters finish line, recorded in $1/100^{th}$ of a second.

3.9.7 Leg Strength (Standing Broad Jump)

Objective

To measure the leg strength.

Test Description

A demonstration of standing broad jump was given to a group of subjects to be tested. The subject was then asked to stand behind the starting line with the feet parallel to each other. He was instructed to jump as farther as possible by bending knee and swinging arms to take off for the broad jump in the forward direction. The subject was given two trials. (**Yobu, 1988**)

Scoring

The distance between the starting line and the nearest point of landing provided the score of the test. Best of the two trials was recorded as final score of the test.

3.9.8 Endurance

Objective

To measure cardio vascular endurance.

Apparatus Used

A track with markings, Cones or Flags, stop watch

Test Description

Subjects could run individually or in groups of a dozen or more. When subjects ran in groups, they were paired. Flags or cones were fixed at every 50 meters distance. While 9 students ran the partners listened for the time to call out his partner's time when he crossed each cone, and then relay this time to the scorer. Students entered space running with periods of walking and were encouraged to pace themselves. When a group was running, the time was called out as each student crossed the Flag. The score was the distance covered by the subject in 12 minutes run . (**Yobu, 1988**)

Scoring

The distance covered by the subjects for 12 minutes was recorded in meters.

3.9.9 Agility

Objective

To measure the agility of the performer in running and changing direction

Apparatus used :

Stopwatch , measuring tape , 2 blocks of wood.

Test Description :

Two parallel lines were marked 10 meter apart as starting line and distal line Two blocks were placed behind the distal line at the time of start .The subject, on the signal go , ran to the blocks , picked up one returned to the starting line and placed the block behind the line .He repeated the same process with second block . (**Yobu, 1988)**

Scoring :

The score for each performer was the time required to complete 60 meter and recorded to nearest one tenth of a second.

3.9.10 Mean Arterial Blood pressure

Objectives

The purpose of this test was to measure mean arterial blood pressure at rest.

Apparatus used

Sphygmomanometer and stethoscope.

Test Administration

A sphygmomanometer and a stethoscope were used to measure blood pressure (systolic and diastolic).The subjects were asked to be in sitting position through out the study.

The left upper arm of the subjects was encircled by an inflatable rubber bag which was connected to pressure pump and manometer. By pumping air, the pressure in the bag was rapidly raised approximately to 200 mmHg. Which was sufficient to completely obliterate the brachial artery so that no blood comes through and the radial pulse disappeared. The pressure was then lowered to a point where the pulse could be felt by using a stethoscope, pulsating of the brachial artery at the bend of the elbow could be distinctly heard. At this particular point pressure shown on the dial was considered to be the systolic pressure.**(Clarke, 1976)**

The pressure on the brachial artery was then gradually reduced until the arterial pulse rate beats could be distinctly heard and particular point at which the sound disappeared was taken as the diastolic pressure.

Then these two measures put into the calculation, that is, mean arterial blood pressure, using the formula:

MAP = (Systolic + Diastolic Pressure)/2

3.9.11 Resting Pulse Rate

Resting pulse rate was measured by using the procedure prescribed below:

Objective

The purpose of this test was to record the number of heart beat per minute.

Apparatus Used

A stop watch (1/100 of a second) and a chair.

Test Description

The Resting Pulse rate of all the subjects was recorded in sitting position in the morning session. Before taking the Resting Pulse rate, the subjects were asked to sit in a chair inside a room and release for 20 minutes. To record the heart rate, finger tips were placed on the radial artery at the subjects wrist in such a manner that palpation was clear and the number of palpation was counted for one minute. **(Mathew, 1988)**

3.9.12 Vital Capacity

Objective

The purpose of this test was to find out the maximum quantity of air that can be expired after a full inspiration.

Apparatus Used

Wet Spiro meter, mouth pieces and nose clips.

Test Description

Vital capacity was measured by wet Spiro meter in liters. The Spiro meter was equipped with a good length of rubber hose. The Spiro meter was filled with water to within one inch of the top and water placed at a height where by all the subject can stand erect at the beginning of the test. The mouth piece was disinfected by an antiseptic solution after use by each subject. **(Mathew, 1988).**

The subjects were asked to take a deep breath for test. There after the fullest possible inhalation, the subject exhaled slowly and steadily bending forward over the hose till the air within his control was expelled.

Care was taken to prevent air from escaping either through nose or around the edges of mouth piece and was also ensured that a second breath was not taken by the subject during the test. Incase of doubt the test was repeated. Care was taken to lower the drum without spilling the water, each time after use.

3.9.13 Breath Holding Time

Objective

The purpose of this test was to measure the breath holding time.

Apparatus Used

For recording the breath holding time, a stop watch (1/10th of second) and nose clip were used.

Test Description

The subject was instructed to stand at ease and to inhale deeply after which he holds his breath for a length of time possible by him. A nose clip was placed on nose to avoid letting the air through nostrils. The duration from the time of holding his breath until the movement he let air out was clocked by using the stop watch to the nearest one tenth of a second as breath holding time. The co-operation of the subject to let out the air by opening the mouth was sought to clock the exact breath holding time.

Scoring

The time is recorded in seconds and the best of two trials were recorded **(Mathew, 1988).**

3.9.14 Anxiety

Anxiety was measured through the anxiety questionnaire. The anxiety questionnaire was designed to measure the degree of anxiety experience prior to the competition.

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. The complete questionnaire is scores as follows:

S.No	Response	Score of Positive statements	Score of Negative statements
1	Not at all	1	4
2	Some what	2	3
3	Moderately so	3	2
4	Very much	4	1

<u>Positive Statements</u>	1,2,5,8,10,11,15,16,19,20
<u>Negative Statements</u>	3,4,6,7,9,12,13,14,17,18

3.9.15 Aggression

Standardised **Buss & Perry (1992)** questionnaire for sporting aggression was used to scale the aggressiveness of Inter University Handball 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 hundred Men Handball Players.

Scoring

This inventory was scored with the help of the scoring key given below. The range of score was from 4 to 20. The higher the score the more aggressive the player.

S.No	Response	Score of Positive statements	Negative Statements
1	Extremely uncharacteristic of me	1	4
2	Somewhat uncharacteristic of me	2	3
3	Neither uncharacteristic nor characteristic of me	3	2
4	Some what characteristic of me	4	1
5	Extremely characteristic of me	5	

The two questions 9 and 16 with asterisk are reverse scored.

3.9.16 Achievement Motivation

Description

The standardized psychological tool devised by **Kamalesh, 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 ($\sqrt{}$) 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.

Scoring Key

1a, 2b, 3a, 4a, 5b, 6b,7b, 8b, 9b, 10a, 11a, 12a, 13a, 14b, 15b, 16a, 17a, 18a, 19b, 20a.

The items 1, 3, 4, 9, 10, 11,12,13,16,17,18 and 20 if the respondent answers 'a' he scores 2 points, if he answer 'b' he only gets zero point.

The items 2, 5, 6, 7, 8, 14, 15 and 19 if he respondent answers 'b' he scores 2 points, if he answer 'a' he only gets zero point.

3.9.17 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 disagree 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.

3.9.18 Passing Test

Objective

To measure the passing ability of the handball players

Apparatus used

Two handballs, Marked (as in Figure 2) Wall and Measuring Tape

Test Description

A one meter square was marked on a wall using chalk. The bottom line of the square shall be 1meter from the floor. A 3-meter square will be marked on the floor and 2.4 meters from the wall. The subject was asked to stand within the square. On whistle the subject was asked to pass the ball towards the marking in the wall. The subject was allowed five passes. Care was taken to pass the ball with one hand in an overhand motion and must hit the wall on the fly to count as a legal pass.(**Geetha, 2007**)

Figure 2

Field Markings for Pass Test
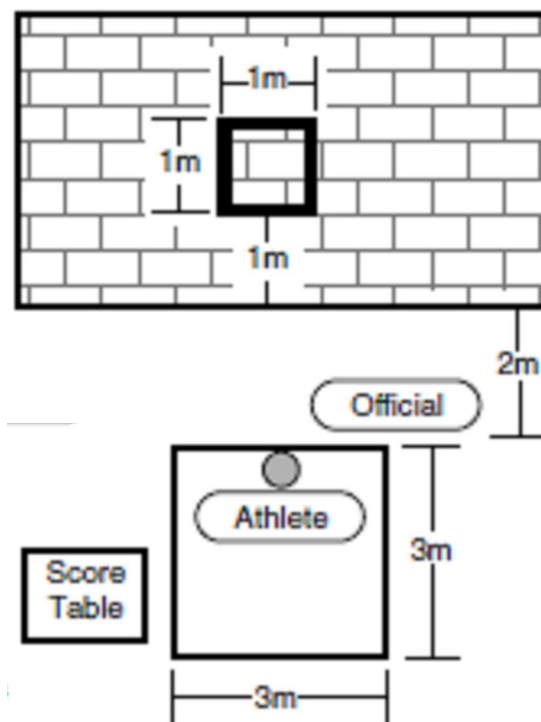
Scoring

The subject was awarded three points for hitting the wall inside the square. Two points were awarded for hitting the lines of the square and one point for hitting the wall on the fly not in or any part of the square.

The subject was awarded one point for catching the ball on the fly or one or more bounces while inside the 3-meter square. The sum of the points from all the five passes was the score of the subject in passing ability.

3.9.19 Shooting

Objective:

To assess the shooting ability of the handball players

Apparatus Used

Handballs, handball court and score sheet.

Test Description and Field Marking

The handball goal post was divided into nine targets as shown in Figure 3 using ropes. Thus the top and bottom right corner boxes were 75 cm x 50 cm, top and bottom left corner boxes were 75 cm x 50 cm; The top and bottom middle boxes were 150 cm x 50 cm. Left and right middle boxes measures 75 cm x 100 cm, while the middle box was 150 cm x 100 cm. (**Geetha, 2007**)

The respective boxes were assigned scores from 1 to 5 as shown in Figure 3.

Figure 3

GRADATION OF HANDBALL COURT FOR ASSESSING
'SHOOTING ABILITY'

75cm	150 cm	75 cm	
5	2	5	50 cm
4	1	4	
4	2	4	50 cm

2M

3 M
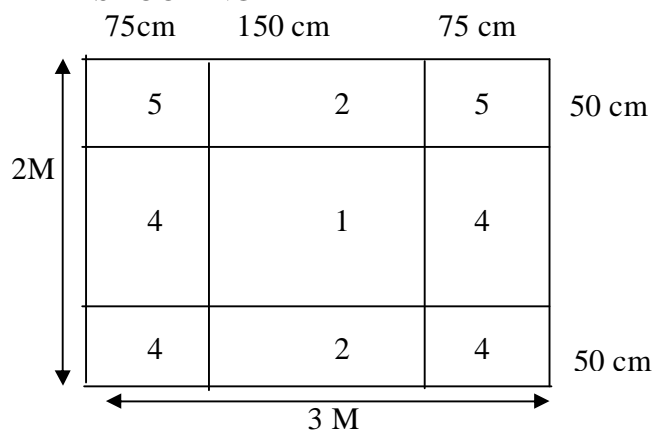
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Shooting Point

Scoring

Score was the total scored by the subject out of ten trials.

3.9.20 Jump Shot Test In Handball – Right Wing

Objective

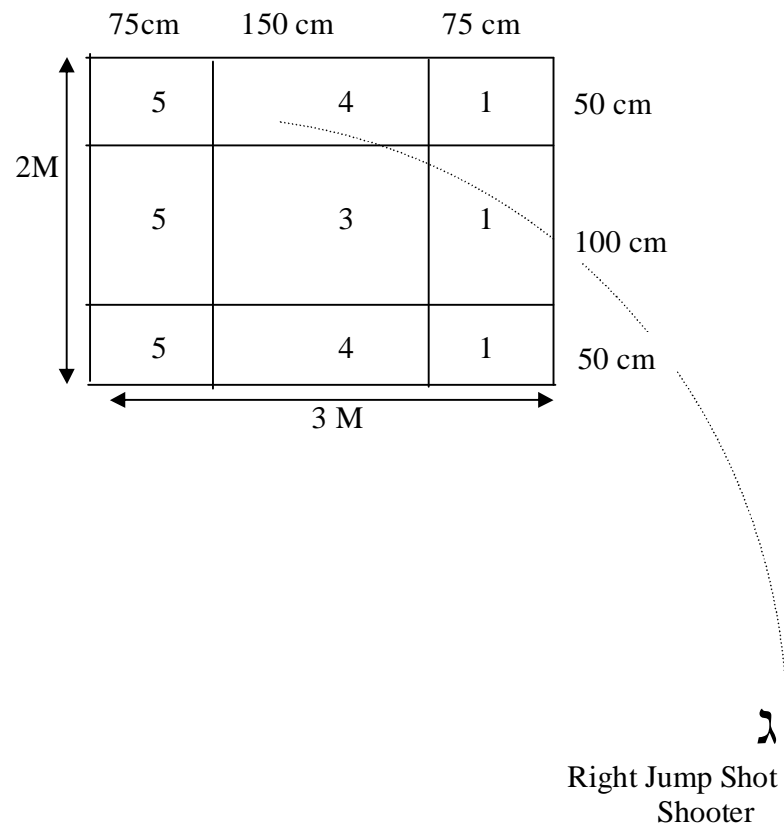To measure the jump shot ability of handball from right

Test Description

The goal area of was divided into six segments as shown in Figure 4 On signal the subject came to the position marked for jump shot shooting and shoots into

the goal post. The ball pierce into any one of the boxes and the scorer would award mark. The scoring were awarded to the respective boxes on the assumption that at the time of jump shot shooting from the right, the 'defender goal keeper' would guard the goal at the extreme left side of the goal post to block the ball. When the shooter shoots the ball from the left the goal keeper came to the right side of the goal post. (**Geetha, 2007)**

Scoring

Each subject would be given ten trials from right jump shot The total of the 10 trials would be the score of the subject, that is, his jump shot shooting performance

Figure 4

GRADATION OF HANDBALL COURT FOR ASSESSING
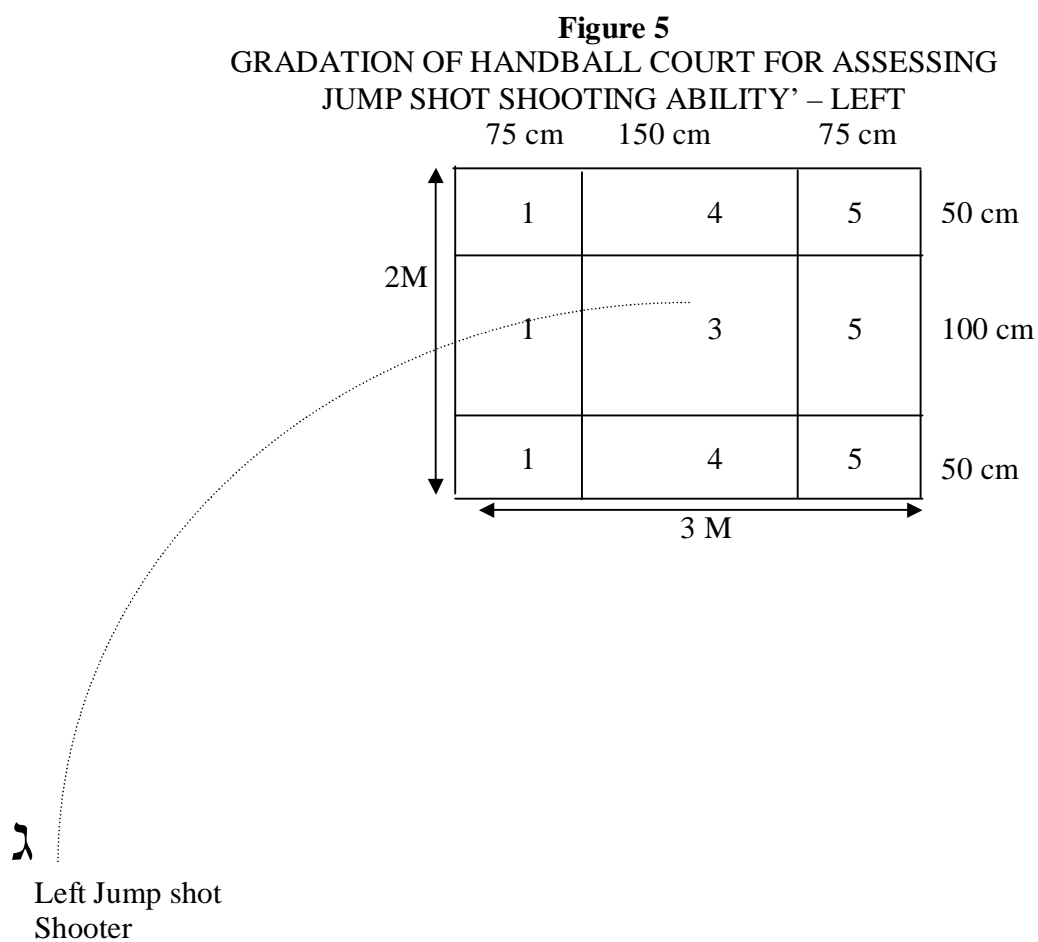'JUMP SHOT SHOOTING ABILITY' - RIGHT

75cm	150 cm	75 cm	
5	4	1	50 cm
5	3	1	100 cm
5	4	1	50 cm

2M

3 M

Right Jump Shot
Shooter

3.9.21 Jump Shot Test In Handball – Left Wing

Objective

To measure the jump shot ability of handball from left

Field Marking

The goal area of was divided into six segments as shown in Figure 5.

Figure 5
GRADATION OF HANDBALL COURT FOR ASSESSING
JUMP SHOT SHOOTING ABILITY' – LEFT

75 cm	150 cm	75 cm	
1	4	5	50 cm
1	3	5	100 cm
1	4	5	50 cm

2M

3 M

Left Jump shot
Shooter

Test Description

On signal the subject came to the position marked for jump shot shooting and shoots into the goal post. The ball pierce into any one of the boxes and the scorer would award mark. The scoring were awarded to the respective boxes on the assumption that at the time of jump shot shooting from the left, the 'defender goal keeper' would guard the goal at the extreme right side of the goal post to block the ball. When the shooter shoots the ball from the left the goal keeper came to the left side of the goal post. (**Geetha, 2007**)

Scoring

Each subject would be given ten trials from left jump shot The total of the 10 trials would be the score of the subject, that is, his jump shot shooting performance

3.10 STATISTICAL ANALYSIS

The obtained data were analyzed statistically using the prediction equation. The Multiple Regression method as detailed by **Thomas and Nelson (1990)** was used. The SPSS PC (version 10.1) was used to determine the predictive equation.

The prediction formula resulting from multiple regression is basically an extension of the two variable regression model, $Y = a+bx$. In this research study there are twenty one predictor variables and hence the following statistical regression

equation was used. The background regression method was used for the selection of variables **(Thomas and Nelson, 1990**).

$$Y' = a + b_1x_1 + b_1x_1 + \ldots\ldots b_nx_n$$

Where Y' = Y Predictor

a = Constant

b_1, b_2 = Beta weights for predictor variables

x_1, x_2 = predictor variables