CHAPTER – III

METHODOLOGY

In the methodology chapter selection of the subjects and variables, usage of experimental design and criterion measures followed by pilot study reliability of data, instruments, tester and subject, collection of data and the statistical technique administered have been explained.

3.1 SELECTION OF SUBJECTS

The purpose of the study was to predict the playing ability in Volleyball payers of intercollegiate level from selected kinanthropometric, motor fitness, psychological and game skill variables.

Investigator randomly selected two hundred intercollegiate level men Volleyball players from different colleges in all over Tamilnadu state, India. The subject were selected in the age group of 18 – 25 years. The subject selected for the study were winner/Runner up of the intercollegiate tournaments of the concerned university.

3.2 SELECTION OF VARIABLES

The investigator consulted professional in the field of physical education and sports coaching and reviewed various literature, books, journals, web sources and research papers which revealed the importance of kinanthropometric components, motor fitness, psychological aspects and game skills and playing ability for the all-round improvement of intercollegiate level Volleyball players. Taking into the consideration of criteria, feasibility, availability of testing procedures and tools and the

relevance of the variables of the study, the playing ability as criterion variables and forty eight predictor variables as per the following list were selected for this purpose.

3.2.1 Criterion Variable

1. Playing ability in Volleyball.

(It is assessed by experts in Volleyball, during the game playing situation)

3.2.2 Predictor Variables

I. Kinanthropometric variables.

i) To determine body size difference.

A. General body measurements:

1. Body weight.
2. Height.
3. Sitting Height.

B. Skeletal Diameters:

4. Biacromial Diameter (Shoulder Width).
5. Bicristal Diameter (Abdominal Width).
6. Bitrochantric diameter (Hip width).
7. Humerus Bicondylar width (Elbow width).
8. Wrist diameter.
9. Femur Bicondylar diameter (Knee width).
10. Ankle diameter.

C. Circumference:

11. Chest circumference.
12. Upper-Arm circumference.
13. Fore-Arm circumference.
14. Thigh circumference.
15. Calf circumference.

D. Skinfold measurements:

16. Biceps Skinfold width.
17. Triceps Skinfold width.
18. Fore-Arm Skinfold width.
19. Subscapular Skinfold width.

20. Suprailiac Skinfold width.
21. Thigh Skinfold width.
22. Calf Skinfold width.

ii) To determine body forms (Somatotyping).

23. Ectomorph.
24. Endomorph.
25. Mesomorph.

II. Motor Fitness variables.

26. Muscular Strength.
27. Muscular Endurance.
28. Cardio-Vascular Endurance.
29. Flexibility.
30. BMI.
31. Power.
32. Speed.
33. Agility.
34. Balance.
35. Reaction Time.

III. Psychological variables.

36. Self-Awareness.
37. Empathy.
38. Effective Communication.
39. Interpersonal relationships.
40. Creative Thinking.
41. Critical Thinking.
42. Decision Making.
43. Problem Solving
44. Coping with Emotions.
45. Coping with Stress.

IV. Game skill variables.

46. Service.
47. Pass.
48. Set.

3.3 EXPERIMENTAL DESIGN

A random group sampling experimental design was used with playing ability in Volleyball as the criterion variable and selected a toto of forty eight kinanthropometric, motor fitness, psychological and game skill variables as the predictor variables.

3.4 CRITERION MEASURES

Table I

S. No	Variables	Equipments/Test/Tools
1.	**Kinanthropometric variables**	
	General body measurements:	
	1. Body weight.	Weighing machine
	2. Stature/ Height.	Stadiometer
	3. Sitting Height.	Anthropometer rod
	Skeletal Diameters:	
	4. Biacromial Diameter.	Large sliding calliper.
	5. Bicristal Diameter.	
	6. Bitrochantric diameter.	
	7. Humerus Bicondylar width.	
	8. Wrist diameter.	
	9. Femur Bicondylar diameter.	
	10. Ankle diameter.	Small sliding calliper
	Circumference:	
	11. Chest circumference.	
	12. Upper-Arm circumference.	
	13. Fore-Arm circumference.	
	14. Thigh circumference.	
	15. Calf circumference.	Anthropometry flexible measuring tape (non - extendable).
	Skinfold measurements:	
	16. Biceps Skinfold width.	
	17. Triceps Skinfold width.	
	18. Fore-Arm Skinfold width.	
	19. Subscapular Skinfold width.	
	20. Suprailiac Skinfold width.	
	21. Thigh Skinfold width.	Harpenden Skinfold Calliper.
	22. Calf Skinfold width.	
	Somatotype	
	23. Endomorphy	
	24. Mesomorphy	Using Heath Carter (1967) Method of Somatotyping
	25. Ectomorphy	
2.	**Motor Fitness variables**	
	26. Muscular Strength.	Push Ups
	27. Muscular Endurance.	Sit-ups
	28. Cardio-Vascular Endurance.	HST test
	29. Flexibility.	Sit and Reach test

	30. BMI 31. Power. 32. Speed. 33. Agility. 34. Balance. 35. Reaction Time.	Weight in kg/height in m^2 Standing broad jump 50m run Shuttle run Stork and stand test Nelson hand reaction test
3.	**Psychological variables** 36. Self-Awareness. 37. Empathy. 38. Effective Communication. 39. Interpersonal relationships. 40. Creative Thinking. 41. Critical Thinking. 42. Decision Making. 43. Problem Solving 44. Coping with Emotions. 45. Coping with Stress.	Life Skills assessment scale By Radhakrishnan Nair, A., Subasree R & Sunitha Ranjan
4.	**Game skill variables** 46. Service. 47. Pass. 48. Set.	Russell-Lange Volleyball skill test. Russell-Lange Volleyball skill test. AAHPER Volleyball test.

3.5 PILOT STUDY

The investigator conducted a pilot study with twenty players who were not subjects of the research study to ascertain the techniques and procedures of testing, evaluate the competency of the investigator in recording the timings and scores field equipments and questionnaire used in the investigation.

3.6 RELIABILITY OF DATA

The reliability of the data of pertaining to criterion and predictor variables were proved by establishing the instrument reliability, subject reliability and tester's reliability.

3.7. INSTRUMENT RELIABILITY

Electronic weighing machine, stadiometer, large sliding caliper, small sliding caliper, stop watches, anthropometry steel tape (non-stretchable), Harpenden skinfold calliper, sit and reach box, steel scale, were used in this study. The instruments were

used from standard companies and their calibrations were accepted as reliable at par with international standards.

TABLE II

RELIABILITY COEFFICIENT OF THE SUBJECT IN KINANTHROPOMETRIC, MOTOR FITNESS, PSYCHOLOGICAL AND GAME SKILL VARIABLES BY TEST AND RE-TEST METHODS

S. No	variables	Co-efficient of correlation
1	Body weight	0.92*
2	Height	0.95*
3	Sitting Height	0.91*
4	Biacromial Diameter	0.94*
5	Bicristal Diameter	0.92*
6	Bitrochantric diameter	0.94*
7	Humerus Bicondyler width	0.91*
8	Wrist diameter	0.94*
9	Femur Bicondyler diameter	0.92*
10	Ankle diameter	0.90*
11	Chest circumference	0.95*
12	Upper-Arm circumference	0.92*
13	Fore-Arm circumference	0.93*
14	Thigh circumference	0.92*
15	Calf circumference	0.93*
16	Biceps Skinfold width	0.90*
17	Triceps Skinfold width	0.91*
18	Fore-Arm Skinfold width	0.92*
19	Subscapular Skinfold width	0.93*
20	Suprailiac Skinfold width	0.90*
21	Thigh Skinfold width	0.92*
22	Calf Skinfold width	0.95*
23	Muscular Strength	0.91*
24	Muscular Endurance	0.93*
25	Cardio-Vascular Endurance	0.92*
26	Flexibility	0.92*
27	BMI	0.95*
28	Power	0.94*
29	Speed	0.91*
30	Agility	0.95*
31	Balance	0.92*
32	Reaction Time	0.95*
33	Self-Awareness	0.94*
34	Empathy	0.92*
35	Effective Communication	0.94*
36	Interpersonal relationships	0.90*
37	Creative Thinking	0.92*
38	Critical Thinking	0.95*

39	Decision Making	0.93*
40	Problem Solving	0.94*
41	Coping with Emotions	0.92*
42	Coping with Stress	0.94*
43	Endomorph	0.94*
44	Mesomorph	0.91*
45	Ectomorph	0.92*
46	Service	0.93*
47	Pass	0.91*
48	Set	0.94*

3.8 TESTERS RELIABILITY

The investigator is a certified level one Anthropometrist from International Society for the Advancement of Kinanthropometry (ISAK). All selected kinanthropometric and motor fitness, psychology and game skill measurements were taken by the investigator with the assistance of a person with test and their procedures. Tester competency and reliability of test were established by test and retest method.

3.9 RELIABILITY OF THE SUBJECT

The subject reliability was established by test and retest coefficient of correlation for the scores in each of the criterion measures. Retesting was done within a period of a week of initial tests in each of the criterion measures.

3.10 ORIENTATION OF THE SUBJECTS

The investigator explained the need and expected contributions of this study and all testing requirements to all the two hundred the subject before start data collection.

3.11 COLLECTION OF DATA

The procedures in administrative test to collect the data from the intercollegiate level Volleyball players on selected predictor variables kinanthropometric, motor fitness, psychological and game skill variables and subjective rating used for playing ability were explained in detail in the following pages.

3.12 ADMINISTRATION OF TEST

KINANTHROPOMETRIC VARIABLES:

3.12.1 Body Weight

Objective: To measure Body Weight of the selected Volleyball players.

Equipment: Digital Weighing Machine

Method: "Body mass estimated in minimal clothing was sufficient for accuracy**.** The Volleyball players was informed to stand on the scale without support on both feet" (Arthur Stewart, 2011).

Score: Scores in kilograms.

3.12.2 Height

Objective: To measure the standing height of the selected Volleyball players.

Equipment: Stadiometer

Method: "The Volleyball players was informed to stand anatomical posture with barefooted on infront of wall, with subject's heels and shoulders and head touching the wall" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.3 Sitting Height

Objective: To measure the sitting height of the selected Volleyball players.

Equipments: Anthropometer Rod.

Method: "The Volleyball players was informed to sit on a table top lower legs hanging and thighs resting on the table. The crossbar of the Anthropometer is brought down to

touch the highest point on the head. The Anthropometer rod is usually kept just touching at the chest or back of the subject" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.4 Biacromial Diameter

Objective: To measure the biacromial diameter of the selected Volleyball players.

Equipments: Large sliding calliper, Skin marking pencil.

Method: "The subjects was informed to stand erect with shoulders dropping a little forward. The investigator marks the acromiale point with a skin marking pencil. While standing at the back of the subject, the tips of the two crossbars of the anthropometric compass are made to touch the acromiale points on both the shoulders along with the tips of the forefingers of the investigators so as to ensure firm grip of compass on the outer border of the acromion process with a mild pressure" (Devinder K. Kansal, 2008).

Score: Scores in centimeters

3.12.5 Bicristal Diameter

Objective: To measure the bicristal diameter of the selected Volleyball players.

Equipments: Large sliding calliper, Skin marking pencil.

Method: "The Volleyball players was informed to stand erect with heels together and arms about six inches away from the body. The investigator stands behind or infront of the subject and applies the tips of the crossbar to the lateral most points (iliocristale) of the iliac crests pressing hard the over lying subcutaneous fat" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.6 Bitrochantric Diameter

Objective: To measure the bitrochantric diameter of the selected Volleyball players.

Equipments: Large sliding calliper, Skin marking pencil.

Method: "The Volleyball players was informed to stand erect with heels together and arms about six inches away from the body. The tester standing behind the subject and applies the inner sides of the tips of the crossbar to the left and right Trochanterion points on the two femurs and presses the two crossbars hard so to minimize the soft tissue width" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.7 Humerus Bicondylar Width

Objective: To measure the humerus bicondylar width of the selected Volleyball players.

Equipment: Small sliding calliper, Skin marking pencil.

Method: "Either in the sitting position or in the standing position, the Volleyball players was informed to bend their left arm at an angle of 90 degree that is the forearm or upper arm make a right angle while upper arm is in horizontal direction and forearm in the vertical direction. The tester, standing opposite the subject (that is face to face) applies the two arms of the calliper to the outer most points on the lower end of the Humerus exerting sufficient pressure to minimize the soft tissue effect. The calliper makes an angle of 45^0 to the axis of upper arm and forearm" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.8 Wrist Diameter

Objective: To measure the Wrist diameter of the selected Volleyball players.

Equipments: Small sliding calliper, Skin marking pencil.

Method: "The Volleyball players was informed to lift his forearm so as to make it parallel to the ground with its dorsal surface facing upwards. The two arms of the sliding calliper are applied with strong pressure on the outermost bony projections of the styloid processes of radius and ulna" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.9 Femur Bicondylar Diameter

Objective: To measure the femur bicondylar diameter of the selected Volleyball players.

Equipment: Small sliding calliper, Skin marking pencil.

Method: "The Volleyball players was informed to sit down on a table with his lower leg hanging and having no clothing on the knees. The arms of the crossbar of the anthropometric compass are applied on the outermost points of the condyles of femur with full pressure so as to compress the soft tissue" (Devinder K. Kansal, 2008).

Score: Scores in centimeters

3.12.10 Ankle Diameter

Objective: To measure the ankle diameter of the selected Volleyball players.

Equipments: Small sliding calliper, Skin marking pencil.

Method: "The two arms of the sliding calliper are applied with full pressure on the outer boniest projections of the ankle" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.11 Chest Circumference

Objective: To measure the chest circumference of the selected Volleyball players.

Equipment: Anthropometry flexible measuring steel tape (non - extensible).

Method: "The Volleyball players was informed to take off all the cloths from his upper body. A steel- tape is wrapped around his chest in such a way that it touches the body all around lightly. The tape should lie over the nipples infront and should pass just below the inferior borders of the scapulae at the back. To note the normal chest circumference, the Volleyball players was informed to breathe normally and the measurement was taken at the end of normal expiration" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.12 Upper - Arm Circumference

Objective: To measure the upper - arm circumference of the selected Volleyball players.

Equipment: Anthropometry flexible measuring steel tape. (Non - extensible).

Method: "The Volleyball players was informed to stand as in the case of upper arm circumference with naked forearm. The flexible measuring steel tape was wrapped around the fore arm just below the elbow point and the maximal measurement was recorded by moving the flexible measuring steel tape slightly up and down keeping the circle of tape in horizontal direction and touching all around" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.13 Fore -Arm Circumference

Objective: To measure the fore - arm circumference of the selected Volleyball players.

Equipment: Anthropometry flexible measuring steel tape (non - extensible).

Method: "The Volleyball players was informed to stand as in the case of upper arm circumference with naked forearm. The steel-tape was wrapped around the forearm just below the elbow point and the maximal measurement was recorded by moving the steel-tape slightly up and down keeping the circle of tape in horizontal direction and touching all around" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.14 Thigh Circumference

Objective: To measure the thigh circumference of the selected Volleyball players.

Equipment: Anthropometry flexible measuring steel tape (non - extensible).

Method: "The subject wearing only underwear was informed to stand at ease with equal weight on both feet. The middle of the thigh was 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 was wrapped around the thigh at the level of the horizontal line and the circumference was measured by keeping the steel- tape in a horizontal direction and touching gently thigh surface all around" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.15 Calf Circumference

Objective: To measure the calf circumference of the selected Volleyball players.

Equipment: Anthropometry flexible measuring steel tape (non - extensible).

Method: "The steel tape was 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" (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.16 Biceps skinfold width

Objective: To measure Biceps skinfold width of the selected Volleyball players.

Equipments: Harpenden Skinfold Calliper.

Method: "The subject with a naked arm was informed to stand at ease with hanging arms. Usually, the midpoint of the upper-arm marked previously for measuring upper-arm circumference helps to provide a landmark for measuring biceps and triceps skinfolds. These skinfolds were also to be taken at exactly the same level where the upper-arm circumference was measured. The skin and subcutaneous fat fold was picked at about 1 cm above the marked level on the anterior side of the biceps muscle. The jaws of the calliper were applied on the fold so that the marked horizontal line was approximately at a level of the midpoint of the jaws and that the jaws hold a double layer of skin plus subcutaneous fat. The lighter arm of the calliper was slowly released so as to put full pressure of the jaws on the vertical skinfold. The reading was noted from the dial of the calliper about two seconds after leaving the smaller arm of the calliper when the reading was quite stable**"** (Kansal K. Devinder, 2008).

Score: Scores in centimeters.

3.12.17 Triceps Skinfold Width

Objective: To measure the triceps skinfold width of the selected Volleyball players.

Equipments: Harpenden Skinfold Calliper.

Method: "The method was the same as explained in case of biceps skinfold except that the fold in this case was picked up on the posterior side of upper-arm over triceps muscle**"** (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.18 Fore-Arm Skinfold Width

Objective: To measure the fore-arm skinfold width of the selected Volleyball players.

Equipments: Harpenden Skinfold Calliper.

Method: "The method was the same as explained in the case of biceps skinfold except that the skinfold was picked up on the lateral side of forearm about a half centimeter above the maximal forearm circumferential level**"** (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.19 Subscapular Skinfold Width

Objective: To measure the subscapular skinfold width of the selected Volleyball players.

Equipments: Harpenden Skinfold Calliper.

Method: "The skinfold was picked diagonally below the inferior angle of the scapula almost parallel to the medial border of scapula, in such a way that the skinfold forms an angle of roughly 45 degrees to the horizontal with its lower end pointing outwards. The jaws of calliper are applied about half a centimeters below the fold picking tip of the thumb**"** (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.20 Suprailiac Skinfold Width

Objective: To measure the suprailiac skinfold width of the selected Volleyball players.

Equipments: Harpenden Skinfold Calliper.

Method: "A skinfold was lifted about 1 centimeters above and 2 cm medial to the anterior superior iliac spine on the left side. The jaws of the skinfold calliper are applied parallel to the natural direction of the picked up skinfold which was usually horizontal or slightly oblique pointing upwards latterly and downwards medially**"** (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.21 Thigh Skinfold Width

Objective: to measure the thigh skinfold width of the selected Volleyball players.

Equipments: Harpenden Skinfold Calliper.

Method: "The Volleyball players was informed to sit on the table with naked middle thigh with legs hanging freely. The skinfold was picked at a level about 1 cm superior to previously marked middle of the thigh on the anterior side of left thigh. The jaws of the calliper are applied exactly in line with the marked horizontal line and the standard pressure of 10 gm/mm^2 by slowly leaving the lighter arm of the calliper**"** (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.22 Calf Skinfold Width

Objective: To measure the calf skinfold width of the selected Volleyball players.

Equipments: Harpenden Skinfold Calliper.

Method: "The Volleyball players was informed to sit on the corner of a table top in such a way that his one leg is in front of the longer side of table and the other leg is infront of the breadth side of the table. The tester sits on his feet between the two legs of the subject and picks up the skinfold on the medial side of the left leg of the subject and applies the jaws of the calliper exactly in line with the marked level where the calf circumference was measured**"** (Devinder K. Kansal, 2008).

Score: Scores in centimeters.

3.12.23 Endomorph

Method: "Heath Carter" (1967) Method.

3.12.24 Mesomorph

Method: "Heath Carter" (1967) Method.

3.12.25 Ectomorph

Method: "Heath Carter" (1967) Method.

3.12.26 Push-Ups Test

Objective: To measure muscular strength of the selected Volleyball players.

Equipments: A parallel bar

Method: "The bars were adjusted at approximately shoulder height and shoulder width. Subject stands at the end of parallel bars, grasping one bar on each hand. He jumps to

front support with arms straight. He lowers the body until the angle of the upper arm and forearm is less than a right angle, then push up to straight arm position. The subject should not jerk, kick or stop and rest when executing pushups. Up to four half credits can be given if the subject does not go down to the proper bent arm angle or all the way up to a straight arm position" (Yobu, 2010).

Score: Scores in numbers (Counts of correct push-ups).

3.12.27 Bent Knee Sit-Ups Test

Objective: To measure the muscular endurance of the selected Volleyball players.

Equipments: A mat, stop watch, score sheet.

Method: "The Volleyball players was informed to lie on back with knees bent feet on the floor with heels not more than 12 inches from the buttocks. The angle of the knees should be less than 90^{o}. The Volleyball players was informed to put his hand on the back of the neck with fingers clasped and to place the elbows squarely on the mat. The subject's feet are held by a companion to ascertain that the feet do not leave the surface and remain touching it. Then the Volleyball players was informed to tighten the abdominal muscles and bring the head and elbows forward so as to curl up to touch the elbows to the knees. The entire above process constitutes one sit-up" (Devinder K. Kansal, 2008).

Score: Scores in numbers (Counts of correct sit-ups).

3.12.28 Harvard Step Test

Objective: To measure cardiovascular endurance of the selected Volleyball players.

Equipments: A Stop watch, 20 inch high bench

Method: "The tester gives a demonstration of the stepping up style to be followed by the subjects during the test. Depending upon the availability of 20" high bench area and pulse count tester, a subject informed to start stepping up and down exercise by starting the stopwatch at the signal go. The Volleyball players was given instruction that on the command up. He should place one foot on the bench; on the second command up, he should place both feet fully on the bench with the body erect straightening the legs and back. The subject is instructed to repeat the stepping up and down exercise in the above manner for five minutes at the pace of 30 steps per minute. Exactly one minute after the exercise, the tester starts counting the pulse rate and records the same for duration from 1 to 1.5, 2 to 2.5 and 3 to 3.5 minutes" (Devinder K. Kansal, 2008).

Scoring: F.I=Duration of exercise periods in seconds*100/2* sum of three pulse counts.

3.12.29 Modified Sit and Reach Test

Objective: To measure flexibility of the selected Volleyball players.

Equipments: Flexomeasure case with yardstick and tape.

Method: Line up 30 cm mark the yardstick with a line on the floor and tape the ends of the stick to the floor so that the flexomeasure case window side is face down. Sit down and line up your heels with the near edge of the 30 cm mark and slide your seat back beyond the zero end of the yardstick. Have a partner stand and brace his toes against your heels. Also have an assistant on each side to hold your knees in a locked position as you prepare to stretch with heels not more than 5 inches apart slowly stretch forward while pushing the flexomeasure case as far down the stick as possible with the fingertips of both hands

Score: Take reading at the edge of flexomeasure casein best of three trails.

3.12.30 Body Mass Index Test

Objective: To measure body mass index of the selected Volleyball players.

Method: body weight in kg / height in m^2 (James Morrow, 2016).

3.12.31 Standing Broad Jump Test

Objective: To measure power of the selected Volleyball players.

Equipments: long jump pit, Measuring tape, score sheet.

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

Score: scores in meters

3.12.32 50m Run Test

Objective: To measure speed of the selected Volleyball players.

Equipment: Clapper, track, stop watch.

Method: Two lines are marked apart 50 meters as starting and finish line. After clap the subjects were informed 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: scores in seconds.

3.12.33 Shuttle Run Test

Objective: To measure agility of the selected Volleyball players.

Equipment: Measuring tape, stop watch, Chunnam powder.

Method: Two parallel lines are drawn on the floor 10 meters apart. The subject starts from behind the starting line. On the signal Ready Go!, the subject runs and touches with her hand on the other line and comes back to the starting and touches it and then again turns and runs to the other end and touches the line with her hand. Like this all the six repetitions are completed till he finishes across the starting line (Yobu, 1988**)**.

Score: scores in seconds.

3.12.34 Stork Stand Test

Objective: To measure the balance of the selected Volleyball players.

Equipment: Stop watch.

Method: From a stand on the foot of the dominant leg, place the other foot on the inside of the supporting knee and place the hands on the hips. Upon a given signal raise the heel from the floor and maintain the balance as long as possible without moving the ball of the foot from its initial position or letting the heel touch the floor (Yobu, 1988).

Score: scores in seconds.

3.12.35 Nelson Hand Reaction Test

Objective: To measure reaction time of the selected Volleyball players.

Equipment: Nelson reaction timer, Table

Method: The subject sits with his forearm and hand resting comfortably on the table. The tips of the thumb and index finger are held in a ready to pinch position about 3 or 4 inches beyond the edge of the table. The upper edges of the thumb and index finger should be in a horizontal position. The tester holds the stick timer near the top, letting it hang between the subjects thumb and index finger. The base line should be even with the upper surface of the subjects thumb (Yobu, 1988).

Score: scores in centimeters.

3.12.36 Life Skills Questionnaire

Objective: to measure self-awareness, empathy, effective communication, interpersonal relationships, creative thinking, critical thinking, decision making, problem solving, coping with emotions, coping with stress.

Equipment: Question Paper, Pad,

Method: The test administrator would be provide clear instruction about the assessment before start. After instruction distribute questionnaire to all the subject and make them to answer all the statements. The test administrator requires certain precautions to be taken and making sure that the individual has understood the directions, respondent not to omit any statements and answer all the statements (Radhakrishnan Nair. A).

Score: The score for the life skills assessment scale is based on the five point scale ranging from always true of me to not at all true for me.

S.No	Dimensions of Life Skills	Items	Maximum Possible Score
1	self-awareness	1*,11,20,29,36,46, 55, 65, 74, 80 & 89	55
2	empathy	2,12,21,30*,37,47*,56*,66,81,90 & 96	55
3	effective communication	3, 13, 22, 31*,38*,48*,57,67* & 75*	45
4	interpersonal relationships	4,14*,23,32,39,49,58*,76*,82,91,98	55
5	creative thinking	5*,40,50,59,68,77,83,92	40
6	critical thinking	6,15,24,41,51*,60*,69,78,84,93,99	55
7	decision making	7,16,25,33,42,52*,61*,70*,79*,85,94*	55
8	problem solving	8,17,26,34,43,53,62,71,86	45
9	coping with emotions	9*,18*,27,44,54*,63*,72*,87,95*,97*,100*	55
10	coping with stress	10*,19*,28*,35*,45*,64*,73*,88*	40
	Global Score	**Sum of all the dimensions**	**500**

*indicates negative items which required reverse scoring.

3.12.37 Russell Lange Volleyball Serving Test

Objective: To measure Volleyball serving ability.

Equipments: Volleyball court, marking powder, 10 Volleyball.

Method: After giving a demonstration of the service and informing the areas responsible for score points as shown. The subject is informed to serve 10 times in proper legal manner into the target areas on the court across the net. All let services are repeated (Devinder K. Kansal, 2008).

Score: each service is scored according to the weightage of the target area where the ball lands.

3.12.38 Russell Lange Volleying Test

Objective: To measure volleying ability.

Equipments: A high plane wall, stop watch, Tape.

Method: A demonstration trail may be shown to the subjects with the help of a trained helper. A subject is informed to stand behind the 3 feet distant restraining line and to start tossing the ball to the wall with underhand movements and then to the wall with underhand movements and then to volley the ball, after each toss against the wall above the net line for thirty seconds. The tester has to start the stopwatch as soon as the subject tosses the ball to the wall with underhand movement for the first time. The ball may be set-up as many times as many times as desired or necessary. The subject may catch the ball and restart with a toss as in the beginning. In case the ball gets out of control, it must be retrieved by the subject himself and put into play at 3 feet line as at the beginning (Devinder K. Kansal, 2008).

Score: The number of times the ball was clearly batted from the behind the 3 feet line to the wall above or on the net line was recorded as the score.

3.12.39 AAPHERD Volleyball Set Test

Objective: To measure Volleyball set-up ability

Equipment: Volleyball court, marking powder, 10 Volleyball.

Method: The Volleyball players was informed to stand in midcourt position within the 6 feet by 5 feet area marked near a 10 feet high rope tied in the Volleyball court. The set up persons receives a high throw from the thrower and execute a set up. So that the ball goes over a 30 feet long rope tied at a height of 10 feet and lands onto the marked area between the ropes the usual Volleyball net. The subject have 10 throws to left side and 10 throws to right side (Devinder K. Kansal, 2008).

Score: one point is awarded for each set up that goes over the rope.

3.12.40 Overall Playing Ability

The criterion measure of overall playing ability was measured by a panel of experts consisting three persons. They were serving as renowned and qualified coaches for about two decade. The experts were informed to make a subjective assessment of the overall playing ability of the players using the 100 points scale which consist of 6 factors. The average rating of the three experts on the overall playing ability was considered as score of subjects.

S. No	Components	Scores
1	Servicing	20
2	Passing	15
3	Setting	15
4	Spiking	20
5	Blocking	20
6	Digging	10
	Total	100

3.13 STATISTICAL TECHNIQUE

According to Thomas and Nelson (2005) The prediction equation from multiple regression is basically that of the two-variable regression model, Y= a+bx. In this research study there are 48 predictor variables and hence the following statistical regression equation was used. The equation is $Y = a+b_1x_1+b_2x_2+\ldots\ldots+b_nx_n$.

Where Y= Y predictor.

A = Constant.

b_1,b_2 = Beta weights for predictor variables.

x_1, x_2 = predictor variables.