This chapter discusses the process, methodology, and instruments used in research to produce findings. The procedure adopted by the investigator in making selection of subjects, selection of variables, administration of the test, reliability of data, collection of the data and statistical techniques for analysis the data have been described in this chapter.

3.1 Selection of Subjects

For the present study the selection of the sampling was based on Veer Narmad South Gujarat University, Surat Volleyball intercollege tournament. Here for this said tournament participating colleges were divided into four zones, Surat city, Surat Rural, Bharuch and Valsad district respectively. Out of these zones the four semi-finalists team of each zone means sixteen best teams, four from each zone having 192 male best players based on their performance, select total 180 subjects out of 192 for the present study. The subjects selected was in the age range of 17 -25 years.

After being informed of the study's requirements, each participant willingly consented to participate in the testing program. The research scholar met and had a special conversation to orient the subjects on the research study. A detailed explanation of the testing, experimental process, and exercise schedules was provided so that the subjects would know exactly what to expect and how much effort would be required of them.

3.2 Selection of Variables

In order to determine the optimal factors, the researcher conferred with volleyball coaches and studied a number of scientific journals. Furthermore, drawing from their expertise and background in the field, the researchers selected the following variables for the current study: Motor fitness components (independent variables) and skill test (dependent variables) of volleyball players.

Motor Fitness Components:

1. Speed
2. Agility
3. Flexibility
4. Explosive power
5. Cardio – vascular endurance

AAHPER Volleyball Skill Test:

1. Volleying Ability
2. Service ability
3. Passing ability
4. Set-up ability

3.3 Tools and Techniques of research

Technique and measuring tool for this study as are followed:

Table 3.1 :Motor Fitness Components

Sr. No.	Motor Fitness Components	Methods	Unit/Measures
1.	Speed	50 Yards Dash	Second 1/100
2.	Agility	4 X 10 m shuttle run	Second 1/100
3.	Flexibility	Seat and Reach	Centimetres
4.	Explosive power	Sargent jump	Centimetres
5.	Cardio – vascular endurance	Cooper's 12 minutes ran/walk	Distance Covered

Table 3.2 : Skill Test Administration (AAHER Volleyball Test)

Sr. No.	Skill	Unit / Measures
1	Volleying Ability	AAHER Volleyball Test
2	Service ability	AAHER Volleyball Test
3	Passing Ability	AAHER Volleyball Test
4	Set-up Ability	AAHER Volleyball Test

3.4 Reliability of the Data

By determining the instrument reliability, tester competency, test reliability, and subject reliability, the data reliability was guaranteed.

Instrument Reliability:

Stopwatch, measuring tape, starting clapper, seat and reach box, marking cones, chock powder, volleyball net and volleyball etc., were reliable and available at R.K. Desai College, Valsad.

The manufacturers made sure that instruments were calibrated and reliable. The study employed highly dependable and exact tools to measure the subjects' performance on several criteria. The fact that the same tester used them again on the same subject in comparable circumstances served as additional confirmation of their reliability.

Tester competency and Reliability of the tests:

The investigator underwent several practice sessions in testing procedure under the knowledgeable supervision of professionals to make sure they were well- versed in the methods of carrying out the tests. Together with the test dependability, the testers' competency was assessed. Test-retest scores were obtained by randomly selecting 20 male volleyball players and measuring their performance twice in order to assess the reliability of the tests. Each measurement and test had a Pearson's Product Moment Correlation calculated, which is shown in Table 3.3.

Table 3.3 : Motor Fitness Components Test Reliability Coefficients on Retest Scores

S. No.	Test	R Value
1	Speed - 50 Yards Dash	0.86*
2	Agility - 4 X 10 m shuttle run	0.88*
3	Flexibility - Sit and Reach	0.84*
4	Explosive power – Standing Broad jump	0.83*
5	Cardio – vascular endurance - Cooper's 12 minutes run/walk	0.82*

***Significant (p < 0.01), N-20, r – 0.01 (18) = 0.562**

Table 3.4 : Test Reliability Coefficients and the Skill Test's ((AAHER Volleyball Test) Retest Score

S. No.	Test	R Value
1.	AAHER Volleying Ability	0.94*
2.	AAHER Service ability	0.92*
3.	AAHER Passing Ability	0.86*
4.	AAHER Set-up Ability	0.88*

*Significant (p < 0.01), N-20, r – 0.01 (18) = 0.562

In terms of the instrument, tester, and subjects, the data were deemed credible since the acquired 'r' values were more than the necessary values.

Subject Reliability:

The test-retest correlation method's above coefficient of correlation also demonstrated that subjects' reliability was significant at the 0.01 level of confidence because the same subjects were used by the same tester in similar circumstances without the use of a motivational device or training.

3.5 Administration of the Test

- **Speed**

  Test: 50 Yards Dash

  Objective: To measure the speed of the subject.

  Equipments: Track, measuring tape, clapper, and stop watches

  Procedure: The participant was instructed to start in a standing position and asked to stay behind the starting line. The athlete had to run the requisite separation as hard as possible when the clapper sound was heard. The individual's score was determined by recording their best time from two trials.

  Scoring: The time was recorded in seconds.

- **Agility:**

  Test: Shuttle Run (4x10 m)

  Purpose: The test had the purpose to measure the participants' level of agility.

  Equipments: White powder, stop watches, whistles, and measuring tapes.

  Procedure: Ten meters separated the markings of two parallel lines. The subject was positioned behind the line of commencement. He ran to the other line, touched with his hand, and then came back to the starting line as the signal came on. He then moved to another line and touched with his hand once more, repeating the process six times in all. There were two trails provided, and the best one was chosen.

  Scoring: For the better of two tries, the elapsed time expressed in seconds and one tenth of a second was used to calculate the score.

- **Flexibility**

  Test: Sit and Reach

  Purpose: The test was designed to measure each subject's level of flexibility.

  Equipments: Sit and Reach Box**,** Score Sheet

  Procedure: For this test, you must sit on the floor with your legs extended straight ahead. You should take off your shoes. The feet are positioned with their soles flat against the box. The tester may help by holding down both knees as they should be locked and pressed flat to the floor. The individual reaches forward as far as they can along the measuring line, palms down, hands on top of each other or side by side. Make sure both hands stay level, with neither reaching farther forward than the other. The patient reaches out and maintains that posture for one to two seconds while the distance is recorded, following some practice reaching. Verify that there aren't any abrupt motions.

  Scoring: A score of centimetres was assigned to the measurement.

- **Explosive power**

  Test: Standing Broad jump

  Purpose: The purpose of the test was to measure explosive power.

  Equipments: The test was administered using an outdoor broad jump, measuring tape, lime powder, thread, score sheet, and pen.

  Procedure: Before leaping, the participant was instructed to perform a warm-up motion by flexing his knee and swinging his arms as much as possible. The participant was asked to stand with his feet apart, parallel to each other, and his toes just beyond the takeoff line. The participant made an effort to leap as far as they could and land on both feet without falling backward. The Standing Broad Jump exam allowed three attempts for each topic.

  Scoring: The Dimensions of the jump was made from the outermost point of the take- off line to the closest point where his body made touch with the landing surface. The score was determined by recording the longest distance

jumped out of the best three attempts. The meter was used to take the measurement.

- **Cardio – vascular endurance**

  Test: Cooper's 12 minutes run/walk test

  Purpose: To measure Cardio Respiratory Endurance

  Equipment: Ground, stop watch, marking cones and score sheet.

  Procedure: Markings for the 200-meter track were spaced 10 meters apart. The individuals were told to position themselves behind the starting line, and when they heard the words "set, go," they started to run. The participants were told to run as far as they could in 12 minutes in order to cover the greatest feasible distance. The subjects were told there was one minute remaining after the eleventh minute during the test. The participants stopped long enough for the researcher or her assistant to measure the distance traveled when the whistle blew to indicate that the twelve minutes had come to an end.

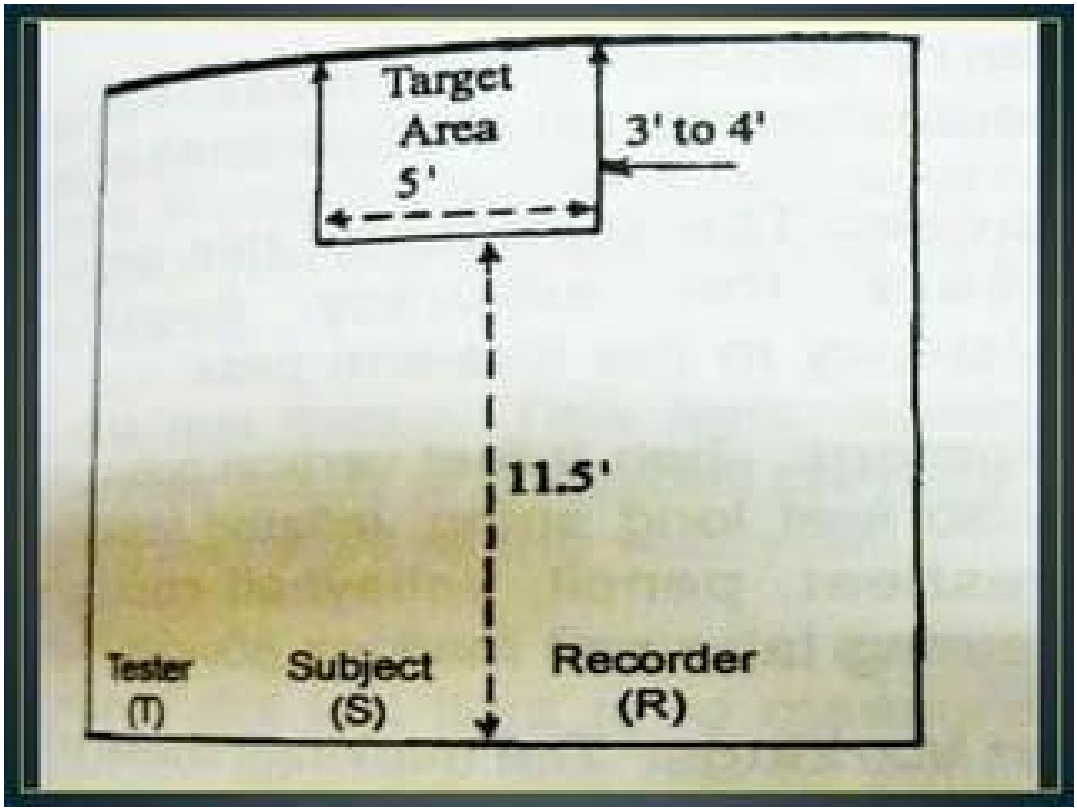
  Scoring: The overall distance covered was expressed in meters.

- **AAHER Volleying Ability Test**

  Volleying: Volleying is a sort of contact that facilitates the attack and ball-slamming over the net by your teammates. Similar to bumping, establishing is a hand skill that unexpectedly depends on force from the lower body.

  Equipment: Volleyball, wall, measuring tape, whistle, stop-watch, marking chalk, and lime powder.

  Dimensions: A high-quality marking chalk was used to mark a target on the wall. A five-foot-long horizontal line that was 11.5 feet above the ground surrounded the target. The horizontal line's two ends are stretched upward to a height of three to four feet above the ceiling.



Test Administration: The subject was asked to perform a maximum standing volley at any point in front of the target in one minute. The subject was asked to perform an actual volley i.e. the ball thrown for the volley should hit the wall above a fixed boundary. A restart was given if the ball was caught or out of control. Two trials may be given and considered the best. On-going to the signal the ball was thrown over the wall at the target area and a stop watch was started and the ball was volleyed in to mark the target continuously for one minute until the stop signal was given. The number of actual volleys per minute gives the test score.

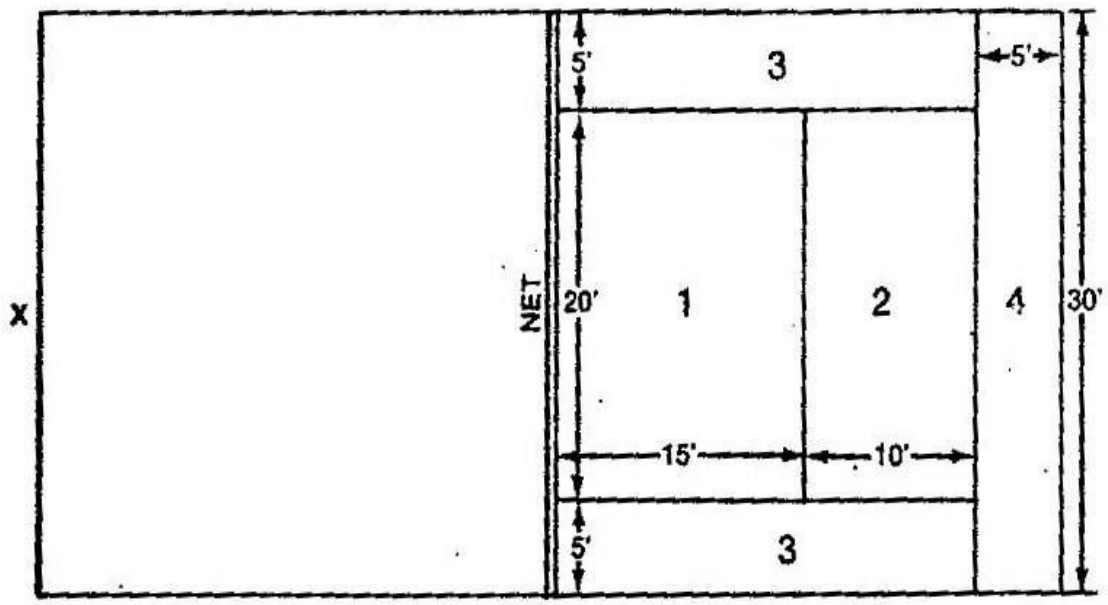
Scoring: The number of volleying in which an action would have occurred based on a correct one-minute volley was taken into account for the multiplier.

- **AAHER Service Ability Test**

  Service: The act of placing the ball into play by the server, who may use any part of their hand, involved hitting the ball from the court's end line into the opponent court and sending it over the net and between the antennae.

  Equipment: Volleyball, net, polls, measuring tape, whistle, and lime powder.

Field Marking: Marking one side of the volleyball court as shown in the figure below.



Test Administration: The test was conducted on a standard volleyball court. The test taker was asked to serve as per the rules by standing in a place suitable for service outside the court in front of the marked court. The served ball will be scored according to the number of the zone in which it falls. Each examiner was given ten tucks.

Scoring: The 10 service balls correctly placed in the zone in which they fall will be considered for multiplying the total number of points scored for that zone.

Passing: Handling the ball deceptively. Sending the ball to the intended location after it has been received is known as a pass. With the forearms separated from the body, a surface will be created on which the pass can be made. When the oncoming ball has enough force, it should be employed.

Equipment: volleyball, lime powder, measuring tape, polls, net, rope, whistle etc.

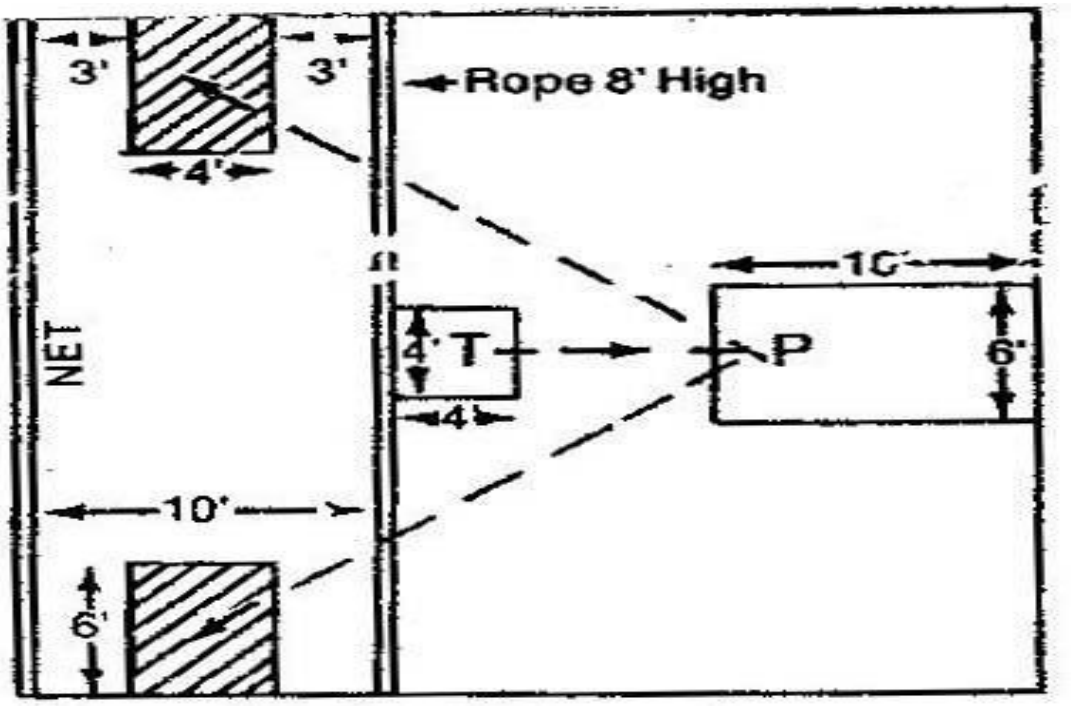
- **AAHER Passing Ability**

  Passing: An opponent's attack ends with a volleyball pass. Additionally, passing signals the start of the volleyball attack for your team. Volleyball

players should try to successfully pass the ball to a teammate on the court after fending off an opponent's attack. A pass crosses the net first.

Equipment: Volleyball, net, polls, measuring tape, whistle, and lime powder.

Field Marking: For this test, a rope will be tied 10’ away from the net on one side of the volleyball court and 8’ above the ground.



Test Administration: The test is also conducted on a volleyball court. The participant is instructed to take up center back on the court, receive a high throw from the thrower, and pass the ball over an eight-foot-tall rope and onto the regions of the court that have been marked out. The participant is required to execute passes to the left and right in turn during 20 trails.

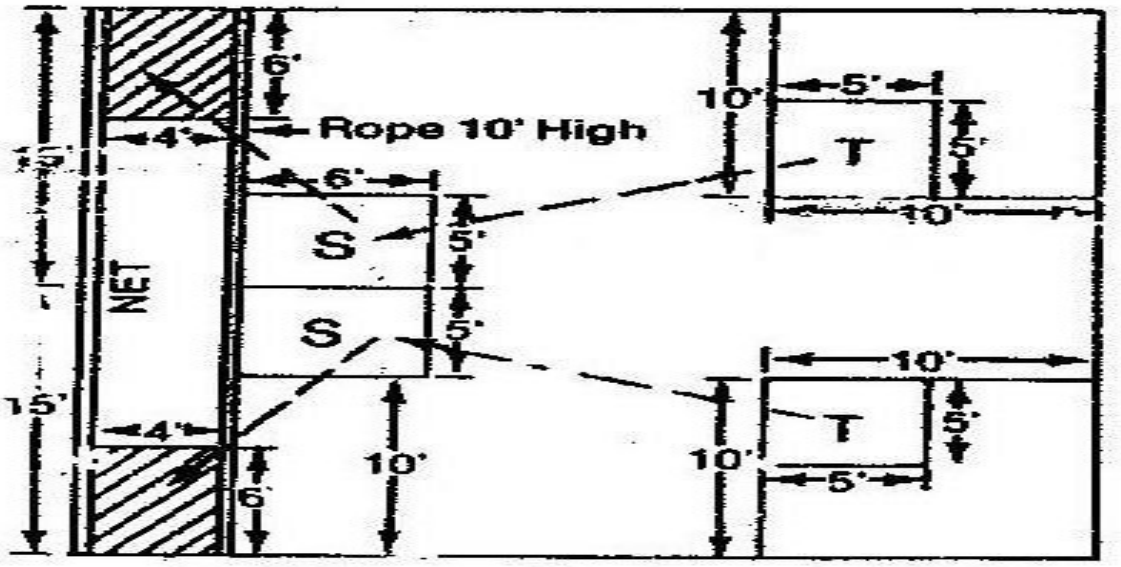
Scoring: For each correct pass, i.e. making the ball to go over the rope and land on to the marked area, the subject is awarded one point, while the wrong passes count out of his chances but without any point being awarded.

- **AAHER Set-up Ability**

Setting: The second pass is called setting, and it can be used to dump the ball over into an open area or to "set" it so that the batter can spike it over. A high ball that is only inches from the net constitutes the ideal set.

Equipment: Volleyball, line powder, tape, polls, net, rope, whistle etc.

Field Marking: For this test, a 4' x 30' rectangle 4' x 6' will be drawn at both corners 4' from the center line, in which zone the taker must drop the set-up ball.



Test Administration: For measuring the set-up ability of the volleyball, the subject is asked 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 person receives a high throw from the thrower and executes a set-up so that the ball goes over a 30 feet long rope tied at a height of 10 feet for boys and lands onto the marked area between the rope and the usual volleyball net.

Scoring: The examinee is given 10 correct throws for set-up to the left and 10 correct throws for set-up to the right side. One points is awarded for each set-up that goes over the rope (without touching rope and the net) and lands over the correct marked area.

3.6 Collection of Data

To ensure that his subjects were making serious attempts, the research scholar met with experts and other physical education technical staff prior to the delivery of tests for collecting data. He gave them an explanation of the aim and importance of the research he was conducting. To dispel any doubt or uncertainty regarding the efforts and labor they had to put in for the effective conclusion of this inquiry, the test technique was also thoroughly explained to them. The researcher completely persuaded

and reassured the subjects of their heartfelt and true support. In the interest of this scientific endeavor, the professionals and other qualified officials in the field freely offered to offer their complete support and sincere assistance.

The test was arranged over two days to allow the subjects to perform at their best and they were given enough time between tests. Not only this but uniform status was also ensured for all the subjects. No special techniques were used to encourage subjects to do their best

The experts were completely independent of each other in assessing the subject's skill performance and submitted their scores based on the test's measurement standards. This assessment of the subject's ability to play volleyball was taken as a criterion for the purpose of this study.

3.7 Statistical Procedure

1. In order to investigate the motor fitness components and skill performance of volleyball players, descriptive analysis statistics; such as mean, standard deviation, minimum value, maximum value was applied.
2. The relationship of motor fitness components and skill performance of volleyball players, was established by computing Karl Pearson's Product Moment Co-relation was used.
3. The combined contribution of separately considered motor fitness components to skill performance was obtained through multiple correlations.
4. Further in order to find out which aspect has the maximum impact on the skill performance score of volleyball players, multiple regression analysis was applied.
5. For testing the hypothesis, the levels of confidence were set at $p<0.05$.