CHAPTER – III

METHODOLOGY

3.1 INTRODUCTION

Research methodology is a way to systematically solve the research problem. It may be understood as a science of solving how research is done systematically. In this chapter the experimental design, selection of the subjects, selection of variables, criterion measures, reliability of data, instrument reliability, tester competency, reliability of test, establishing reliability of expert rating the skill performance of volleyball, orientation of subjects, pilot study, administration of tests, collection of data and application of statistics technique have been presented here.

3.2 SELECTION OF SUBJECTS

To achieve the purpose of the study thirty (30) volleyball players were selected as subjects from Kendriya Vidyalaya, Air Force Station, Sulur, Coimbatore. The age of the subjects were ranging from 16 to 18 years. They were randomly divided into three each groups of ten each. The segmented groups were named as step aerobics training group (N=10), plyometric training group (N=10), and control group (N=10). The control group was allowed to play their game, but they were not given any treatments. The subjects were free to withdraw their consent in case of discomfort during the period of training, but there was not a single dropout during the study.

3.3 SELECTION OF VARIABLES

The universally accepted fact is that training improves performance. Based on this fact step aerobics and plyometric training was designed and to find out the effects on the selected variables and skill performance of volleyball players. The research scholar
reviewed the various scientific literatures pertaining to step aerobics training and Plyometric training from books, journals, and research papers, taking into consideration the feasibility of criteria, availability of instruments and the relevance of the variables of the present study, the following variables were selected.

3.3.1 DEPENDENT VARIABLES

The following physical fitness, physiological, and skill performance variables were selected as dependent variables.

**Physical Fitness Variables**

1. Muscular strength
2. Explosive power
3. Flexibility

**Physiological Variables**

1. Anaerobic power
2. Vital capacity

**Skill Performance Variables**

1. Service
2. Attack

3.3.2 INDEPENDENT VARIABLES

1. Step aerobics training
2. Plyometric training
3.4 CRITERION MEASURES

The following criterion measures were taken up for this study.

1. Muscular (Leg) strength was measured by one repetition maximum (1RM) squat. (Yobu)

2. Explosive power was measured by the vertical jump height with the help of the stand and reach test (Chu 1996). This test was selected because it has high validity (0.80) and reliability (0.93) coefficients (Safrit 1990)

3. Flexibility was measured by sit and reach test and has high correlation coefficient (0.91) - Johnson and Nelson 1982

4. Anaerobic power was measured by the 50 yard dash which is one of the short-term tests of muscular power that directly reflects the measure of the subject’s ability to regenerate ATP during that interval. It has high correlation coefficient (0.974) with Margaria kalamen power test (Fox & Mathews, 1971)

5. Vital Capacity was measured through Spirometer (Johnson and Nelson, 1982)

6. Service and attack skills were assessed by a panel of three experts with great experience in the game of volleyball as judges for the rating of the skills.

3.5 RELIABILITY OF DATA

The reliability of data was ensured by establishing the instrument reliability, tester reliability, tester competency, and reliability of tests.

3.6 INSTRUMENT RELIABILITY

The stop watch, Wet Spirometer and measuring stick and tape were used to test the selected variables. They were considered reliable as they made ISI units.
3.7 TESTERS RELIABILITY

The investigator himself took all the measurements in accordance with the respective tests other than the skill performance variables. As for as establishing the reliability of skill performance variables are concerned the panel of experts were asked to rate ten volleyball players under two different situations to ensure the reliability of rating. Thus the testers competency; and reliability of the test was established.

3.8 SUBJECT RELIABILITY

Using the test and retest method the subject reliability was established and the same are presented in the table-2

<table>
<thead>
<tr>
<th>Table I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability Co-efficient For Criterion Variables</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criterion Variables</th>
<th>Co-efficient of correlation ‘r’</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical fitness variables</strong></td>
<td></td>
</tr>
<tr>
<td>Muscular Strength</td>
<td>0.87</td>
</tr>
<tr>
<td>Explosive Power</td>
<td>0.80</td>
</tr>
<tr>
<td>Flexibility</td>
<td>0.82</td>
</tr>
<tr>
<td><strong>Physiological Variables</strong></td>
<td></td>
</tr>
<tr>
<td>Anaerobic Power</td>
<td>0.84</td>
</tr>
<tr>
<td>Vital Capacity</td>
<td>0.91</td>
</tr>
<tr>
<td><strong>Skill performance variables</strong></td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td>0.79</td>
</tr>
<tr>
<td>Attack</td>
<td>0.83</td>
</tr>
</tbody>
</table>

3.9 ORIENTATION OF SUBJECTS

The investigator explained the purpose and importance of the study to the subjects for their cooperation to achieve the purpose. He also explained the testing procedure on selected variables and gave instruction to the subjects about the procedure of measurement.
3.10 EXPERIMENTAL DESIGN

The methodology and design of experiments adopted in this study are discussed here. The study mainly aimed at finding out the effects of step aerobics, and plyometric on selected physical fitness Physiological and skill performance variables of volleyball players. The experimental design used in this study was random group design consisting of pre test and post test. Thirty students were selected at random from Kenderiya Vidyalaya School Coimbatore. They were divided into three groups as step aerobics training group, plyometric training group, and control group of 10 subjects each. The step aerobics training group was given step aerobics exercises designed by the researcher five days a week for twelve weeks, and duration of the training was from 6.30 am to 7.30 am. The plyometric training group was carried out a set of plyometric exercises also designed by the researcher thrice a week for twelve weeks, and the timing also 6.30 am to 7.30am. And the control group as usual was not given any treatment, but they were allowed to play their game. Pre test and Post test were conducted for all the students on selected Physical fitness physiological and skill performance variables, after experimental period of twelve weeks.

3.11 PILOT STUDY

A pilot study was conducted to assess the initial capacity of the subjects in order to fix the load. For this ten volleyball players were selected at random as subject and they were divided into two groups. The intensity of the step aerobic exercises was decided by the maximum heart rate reserved method. The method consisted of calculating the working heart rate and target heart rate. The working heart rate (WHR) was the difference between the maximal heart rate (MHR) and resting heart rate (RHR). The target heart rate (THR) was determined as the percentage of working heart rate (WHR) resting heart rate
(RHR). Experimental groups I and II were given step aerobics exercises and plyometric exercises. Based on the response of the subjects the number of repetitions assigned to each subject was tested and it was found that they were within the reach of the individual’s capacity.

3.12 ADMINISTRATION OF TESTS AND DATA ACQUISITION

The subjects were given clear instructions pertaining to the training programme and mode of measurements of all criterion measures used in the study. To get optimum results the demonstration of all the exercises was also made, and asked their co-operation for the accurate and better results.

3.12.1 DATA ACQUISITION – PRE TEST

Each subject underwent measurements of his 1 RM squat, vertical jump performance, sit and reach, 50 yard run, Vo2 max, serving and attacking ability in volleyball. Pre-test was conducted in 6 sessions. The first session included an introduction of the testing protocols to the subjects. In the second session the measurement of the vertical jump performance was taken. Muscle (leg) strength was determined by 1 RM Squat, flexibility was assessed by sit and reach test. In the third session the 50 yard run and vital capacity was measured. In the fourth and last session, service and attack was measured. There was a 24 hour rest between the testing sessions. Identical measurements were performed in the same order of 5 days following the completion of the training period. The description of test items used to assess the variables used in the present study was given here.

3.12.2 MUSCULAR STRENGTH (1RM SQUAT)

Purpose: To measure maximum strength

Equipment required: Free weights (barbells, dumbbells)
**Procedure:** One repetition maximum tests (1-RM) is a popular method of measuring muscle strength. It is a measure of the maximal weight a subject can lift with one repetition. After a warm up, the subjects were asked to lift weight that is achievable by them. Then after a rest of at least several minutes, increase the weight and to do so, to reach their capacity. The numbers of repetition, total kilogram of weight lifted by the subjects were recorded.

**Scoring:** The maximum weight lifted and the repetitions of lifts were recorded. The IRM was assessed using the formula the weight lifted divided by total number of repetitions.

### 3.12.3 EXPLOSIVE POWER (VERTICAL JUMP)

This procedure describes the method used for directly measuring the vertical jump height jumped.

**Equipment required:** measuring tape or marked wall, chalk for marking wall jump mat.

**Procedure:** The subject stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips is marked or recorded. This is called the standing reach height. The subject then stands away from the wall, and leaps vertically as high as possible using both arms and legs to assist in projecting the body upwards. Attempt to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is the score. The best of three attempts is recorded.

**Scoring:** The jump height is usually recorded as a distance score.
3.12.4 FLEXIBILITY (SIT AND REACH TEST)

**Purpose:** To measure the muscular flexibility.

**Equipment Used:** Measuring stick and mat.

**Procedure:** The subject sat on the mat, both legs were extended forward, the measuring stick was placed on the floor in-between both legs. The zero end of the measuring stick was placed as proximal end. The subject bent forward and extends both arms forward. The zero point of the measuring stick was placed to the tip of the middle finger. The subject slowly stretch forwards the hip, back and the arm. The maximum distance reached was recorded with the help of measuring stick in cm. Three trials were given with adequate rest in between. *(Johnson and Nelson, 1982).*

**Scoring:** The best of three trails was treated as final score in centimeters.

3.12.5 ANAEROBIC POWER (50 METERS RUN)

**Purpose:** To measure the anaerobic power

**Equipment:** Two stop watches, measuring tape, clapper and track marking 50 meters.

**Procedure:** Two lines were marked 50 meters apart from the starting line and finish line. The subject was asked to stand on the starting line. On the command, ‘clap’, the subject ran as fast as possible across the finish line to cover 50 meters.

**Scoring:** The elapsed time was measured to the nearest one tenth of a second.

3.12.6 VITAL CAPACITY

**Purpose:** Determination of vital capacity.

**Equipment:** Wet spirometer, chair, and nose clips.
**Procedure:** The vital capacity of the subject was determined by the wet Spirometer in sitting position. The subject was allowed to inspire the maximum amount of air voluntarily and then he was asked to blow into the dry wet Spirometer to the maximum extent while taking the test the nose of the subject was clipped using a nose clip.

**Scoring:** The vital capacity of the subject was obtained from the movement of Circular volume indicator which was set at ‘0’ before the vital capacity measure was taken. The result was recorded in milliliter. *(Mathew, 1988).*

This test was selected with an aim of measuring the ability of the subject to inhale the maximum wind in to the lungs. A wet Spirometer was used to measure the vital capacity.

### 3.12.7 SERVICE IN VOLLEYBALL

**Purpose:** To assess the serving ability in volleyball.

**Equipment:** Marked volleyball court, volleyballs, writing pad, paper and pen.

**Procedure:** The tester after sufficient warming up exercises and practice stand at the service area of the volleyball court. Subjects were given three trials. After three trails the subjects were asked to execute service to the opposite side of the court as per the rules and regulations of the game. Sufficient time was given for each attempt. Ten attempts were given to each individual.

**Scoring:** Each successful attempt carries 1 mark.

### 3.12.8 ATTACK IN VOLLEYBALL

**Purpose:** To assess the attacking ability in volleyball.

**Equipment:** Volleyball court with marking, volleyballs, writing pad, paper and pen.
Procedure: The Tester after sufficient warming up exercises and practice stand at the attacking area of the volleyball court. Subjects were given three attack hit trails over the net. After three trails the subjects were asked to stand at the zone four of the volleyball court. Subjects will be fed balls as set from zone 2. The tester should make attack hit over the net to the opposite side of the court as per the regulations. Each successful attempt will be given one mark. Ten attempts were given to each individual.

Scoring: The experts evaluated their performance by subjective rating. Each successful attempt carries 1 mark.

The skill performance variables were assessed by a panel of three experts with rich experience in the game of volleyball as judges for the rating of the skills. The average of the three scores was taken and recorded. The mean scores of the experts for each subject were recommended to determine the skill performance. The following were served as judges, to rate the skills of the subjects.

1. Dr. K.VADIVELEU, M.P.Ed., M.Phil., Ph.D, Professor, Department of Physical Education, SNR Sons College, Coimbatore.
2. Mr.THOMSON, NIS Volleyball Coach, Indian Air Force Player and Coach.

3.13 TRAINING PROTOCOL

3.13.1 STEP AEROBICS

All the subjects performed the step aerobics exercises after proper warm up.
Warm-up Segment

A ten minutes warm up session consisted of jogging 200 meters, a balanced combination of static stretches, smoothly controlled rhythmic calisthenic and limbering exercises were performed by the subjects prior to the training sessions.

Step aerobics exercise segment

The step aerobics exercises were given for 20 minutes, along with the music which was at 118 beats per minute with an 18 cm high plat form as stepper. To start with the exercises, the subject stood with both feet at shoulder width distance and the arms were kept on either side of the body in a relaxed position, then the following exercises comprising of node consumption (cycle) of 4 counts and 8 counts were continued.

Table-II

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the exercise</th>
<th>No of Counts</th>
<th>No of sets</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V’ Step</td>
<td>28/32</td>
<td>3/4</td>
<td>30 sec</td>
</tr>
<tr>
<td>2</td>
<td>Leg Curl</td>
<td>28/32</td>
<td>3/4</td>
<td>30 sec</td>
</tr>
<tr>
<td>3</td>
<td>Toe Tap</td>
<td>28/32</td>
<td>3/4</td>
<td>30 sec</td>
</tr>
<tr>
<td>4</td>
<td>Truck Twist with Extended Arms</td>
<td>28/32</td>
<td>2/3</td>
<td>30 sec</td>
</tr>
<tr>
<td>5</td>
<td>Front Kick</td>
<td>28/32</td>
<td>3/4</td>
<td>30 sec</td>
</tr>
<tr>
<td>6</td>
<td>Slice</td>
<td>28/32</td>
<td>3/4</td>
<td>30 sec</td>
</tr>
<tr>
<td>7</td>
<td>90 Degree Turn with Single Arm Extension</td>
<td>28/32</td>
<td>2/3</td>
<td>30 sec</td>
</tr>
<tr>
<td>8</td>
<td>Side Kick</td>
<td>28/32</td>
<td>3/4</td>
<td>30 sec</td>
</tr>
<tr>
<td>9</td>
<td>‘V’ Step with Flexed Knees</td>
<td>28/32</td>
<td>3/4</td>
<td>30 sec</td>
</tr>
<tr>
<td>10</td>
<td>Straddle Down</td>
<td>28/32</td>
<td>2/3</td>
<td>30 sec</td>
</tr>
</tbody>
</table>
The training schedule was planned as two segments. For the first six weeks the selected step aerobics exercises were done with 28 counts and two sets. And in the second six weeks the same exercises but the numbers of exercise counts were increased in to 32 counts and three sets, the height of the stepper also increased by 10 centimeters.

I. ‘V’ Step

1. The subject placed the left foot forward and diagonally out to the left side at 45 degree angle to mount on the stepper and simultaneously placed the hands on hip.

2. The same step was performed with the right leg to the right side so that both the legs were on top of the stepper.

3. The left foot was brought back to the starting position.

4. The right foot and hands were brought back to the starting position.

Counts 5 to 8 were repetitions of counts 1 to 4 with right foot as the lead foot.

**Number of Sets:** Three sets were performed six weeks continuously on both left and right side for a total of 28 counts.

II. Leg Curl

1. The left foot was placed diagonally forward at 45 degree angle to mount on the stepper and simultaneously both the hands were placed on the hip.

2. The right leg was swung diagonally forward to the left side with the knee flexed.

3. The right leg was brought back to the starting position.
4. The left leg and arms were brought back to the starting position. Counts 5 to 8 were repetitions of counts 1 to 4 with right leg as the lead leg.

**Number of Sets:** Three sets were repeated continuously on both left and right side alternatively for a total of 28 counts.

### III. Toe Tap

1. The left foot was brought forward and the toes were tapped on the stepper.

2. The toes were tapped again and the foot was placed in an outward angle at about 45 degree while mounting on the stepper.

3. The right foot was placed across the stepper.

4. With a pivot turn of the right foot the left foot was brought near the right foot.

Counts 5 to 8 repetitions of counts 1 to 4 continued in the reverse direction starting with right foot as lead foot to reach the starting position.

**Number of Sets:** Three sets were repeated continuously left and right side alternatively for a total of 28 counts.

### IV. Trunk Twist with Extended Arms

1. The left foot was placed forward to mount on the stepper.

2. Right foot was placed forward to mount on the stepper.

3. Both the arms were extended side wards at shoulder height.

4. The trunk was twisted to the left side about 90 degree.

5. Returned to count 3 positions.
6. Returned to count 2 positions.

7. The right foot was brought to the starting position.

8. The left foot was brought to the starting position.

Counts 9 to 16 were repetition of counts 1 to 8 with the right foot as lead foot.

**Number of Sets:** Two sets were performed continuously on left and right side alternatively for a total of 28 counts.

**V. Front Kick**

1. The left foot was placed forward to mount on the stepper.

2. The right knee was flexed and raised to the hip level and kicked forward.

3. The right leg was brought back to the starting position.

4. The left leg was brought down to the starting position.

Counts 5 to 8 were repetitions of counts 1 to 4 with right foot as the lead foot.

**Number of sets:** Four sets were performed continuously on both left and right side alternatively for a total of 28 counts.

**VI. Slice**

1. The left foot was placed forward to mount on the stepper and simultaneously arms were raised upward above the head, palms facing forward.

2. Right foot was placed forward to mount on the stepper and simultaneously the arms pulled downwards with clenching the hands, and fists to the shoulder level.

3. Left arm was extended downwards along the side of the leg and simultaneously the right arm was raised upward straight above the head.
4. Pulled both fists back to the shoulder.

5. Right arm was extended downwards along the side of the leg and simultaneously the left arm was extended straight above the head. 138


7. Returned to count 1 position.

8. Returned to the starting position.

**Number of Sets:** Three sets were performed on left and right side alternatively for a total of 28 counts.

**VII. 90 Degree Turn with Single Arm Extension (or) Stretch**

1. The left foot was brought diagonally forward to the left at 45 degree angle to mount on the stepper, and simultaneously right elbow was fixed at the side of the trunk with clenched hand, and flexed the elbow.

2. The right foot was swung diagonally forward to the left and straddles down across the stepper, and simultaneously extended the right arm side wards at shoulder height.

3. A left turn was made by the right foot and simultaneously flexed the elbow and the left leg was brought close to the right leg.

4. The right arm was brought back to the position Counts 5 to 8 were marching on the spot, with alternate leg and arm movements. Counts 9 to 16 were repetitions of 1 to 8 continued in the reverse direction with the right foot as lead foot to return to starting position.
**Number of Sets:** Two sets were performed continuously on left and right side for a total of 28 counts.

**VIII. Side Kick**

1. The left foot was placed forward to mount on the stepper.

2. The right leg was raised to hip level and kicked side wards.

3. The right leg was brought back to the starting position.

4. The left leg was brought back to the starting position.

Counts 5 to 8 were repetitions of counts 1 to 4 with right foot as the lead foot.

**Number of Sets:** Three sets were repeated continuously on both left and right side for a total of 28 counts.

**IX. ‘V’ Step with Flexed Knees**

1. The left foot was brought forward and placed diagonally on the stepper at 45 degrees angle.

2. The right foot was taken diagonally out forward at 45 degree angle to mount to form a ‘v’ step and hands were placed on the thigh.

3. With trunk kept erect it was lowered below the hip level.

4. Simultaneously the left shoulder was bent inward and forward towards the medial axis of the body.

For counts 5 and 6 the trunk was raised and simultaneously counts 3 and 4 were repeated on the right side.
7. The trunk was raised to the standing position and the right foot was brought back to the starting position.

8. The left foot and arms were brought back to the starting position.

**Number of Sets:** Three sets were performed continuously on left and right side alternatively for a total of 28 counts.

**X. Straddle Down**

1. The left leg was brought diagonally forward to the left at 45 degrees to mount on the stepper; simultaneously hands were placed on the hip.

2. The right leg swung forward to the left at 45 degree angle and the knee was flexed.

3. The right leg was straddle down across the stepper.

4. The left leg was straddle down on the starting side of the stepper.

5. A right turn was made by the right foot towards left, with a backward movement the left foot was placed on the stepper.

6. Repeated the movements of count 2.

7. Returned back to the count 5 position.

8. The left foot was brought closer to the right leg

Counts 9 to 16 were repetitions of counts 1 to 8 continued in reverse direction to return back to the starting position.

**Number of Sets:** Two sets were performed continuously on left and right side for a total of 28 counts.
Cool Down Segment

The step aerobics sessions concluded with a continued light aerobics cool-down (10 minutes) exercises such as walking slow on the spot marching standing leg kicks and controlled static stretches to lower the heart rate gradually toward normal, to promote faster removal of metabolic waste products from the muscles and to prevent excessive pooling of blood in the lower extremities (Reebok, 1993). Thus, the step aerobics training sessions were conducted in the following timings:

1. Assembly and instructions 5 Minutes
2. Warm-up 10 Minutes
3. Aerobic Exercises 30 Minutes
4. Cool down 10 Minutes
5. Assembly, Instructions and Dismissal 5 Minutes

Table II shows the names of the step aerobic exercises, number of counts and number of sets executed by the step aerobics group subjects.

After the initial measurements the specially designed training programme was given to the subjects’ of the two groups namely step aerobics group, and plyometric group. The step aerobics group carried out ten exercises namely  V’ Step, Leg Curl, toe tap, Truck Twist with Extended Arms, Front Kick, Slice, 90 Degree Turn with Single Arm Extension, Side Kick, V’ Step with Flexed Knees, Straddle Down.
The plyometric group performed five plyometric exercises – Depth jump, split squat jump, Rim jump, Box to Box depth jump, medicine ball on the wall.
I. Depth jump

1. Stand on box with toes close to edge, feet shoulder width apart.

2. Step off (do not jump off) box and land on both feet. Immediately jump up as high as possible and reach up with both hands towards.

3. The jump should be vertical with no horizontal movement.

4. Ground contact time should be short and landing should be soft.

The depth jump height started two sets of six repetitions at 30 centimeters bench height with a rest of 30 seconds in between sets. In the second three weeks it was three sets of six repetitions at 40 centimeters bench height with 30 seconds rest. During the third three weeks the exercise performed were three sets of six repetitions at 50 centimeters height with 30 seconds rest and four sets of eight repetitions at 60 centimeters height with 30 seconds rest in the forth three weeks.

II. Split squat jump

1. Stand with feet hip width apart. Take left leg and step back approximately 2 feet standing on the ball of back foot.

2. Feet should be positioned at a staggered stance with head and back erect and straight in a neutral position.

3. Lower body by bending at right hip and knee until thigh is parallel to floor then immediately explode vertically.

Split squat jump was performed by two sets of six repetitions with 30 seconds rest, again in the second three weeks three sets of six repetitions with 30 seconds rest and
in the third three weeks three sets of six repetitions with 30 seconds rest; and in last session it was four sets of eight repetitions with 30 seconds rest.

III. Rim jump

The subject accomplished by standing below the rim of the hoop and jumping up to reach the rim alternating the hands trying to reach the rim. After signal the subject starts jump. Each time after land, try to jump as high as possible. Three times they have to do the rim jump and two repetitions. The Rim jump was also performed as the split squat jump.

IV. Box to Box depth jump

Three boxes feet were placed apart. Subject stand on one box and try to jump into the middle with no box, then jump onto the other box. On signal the subject repeats this step but this time jumping at the other box for three times.

Box to Box jump was started with two sets of three repetitions at 30 centimeters height; proceed to three sets of four repetitions at 40 centimeters in the second week’s three sets of five repetitions at 50 cm height in third and four sets of six repetitions at 75 centimeters height.

V. Medicine ball throw

The subject sat near the wall with one meter distance and holds the 5kg medicine ball. On signal the subject throw the medicine ball on the wall with force. The ball will be collected by the assistance and in turn hand over to the subject for next throw. Three repetitions they have to do for three sets
3.14. DATA ACQUISITION – POST TEST

On completion of treatment of step aerobics training, and plyometric for the respective groups in addition to control group as they practiced with their own training schedule, all the subjects were measured on physical and skill performance variables as such procedure followed in the pre test. It was considered as a post test. The collected data on pre test and post test were treated with the following statistical techniques to test the objectives of the present study.

3.15. STATISTICAL ANALYSIS

The following statistical techniques were adopted to treat the data in connection with the established hypothesis and objectives of the study.

1. An analysis of covariance was used to determine significant differences among the step aerobics training group, plyometric training group, and control group on strength, explosive power, flexibility (Physical variables) anaerobic power, vital capacity (physiological variables) service and attack (Skill performance variables of volleyball players).

2. When a significant difference among the training programme was detected, a pair-wise comparison of the programs was done by Scheef’s post hoc test to identify significant differences between the training groups.