Chapter-III

METHODOLOGY AND PROCEDURE

The purpose of the present study was to investigate the influence of Skill, Physical, Physiological, Psychological and Anthropometric variables in relation to the performance of Volleyball Players. In order to achieve the purpose, selection of subject, selection of variables, criterion measures, administration of tests, collection of data, and statistical techniques used have been described in this chapter.

SELECTION OF SUBJECTS

To achieve the purpose of present study one hundred and fifty male Volleyball players were selected randomly from different sports hostels and colleges of Uttar Pradesh i.e. Lucknow and Gorakhpur Sports Colleges, Allahabad, and Deoria Sports Hostels. The age of subjects was ranged between 16 to 19 years.

SELECTION OF VARIABLES

Based on the consultation with the experts of the field, gleaning through the literature available and considering the feasibility criteria in mind especially the availability of equipment’s and time factors, independent variables which seems to be contribute the Volleyball playing performance were selected as predictor variables for this study which are follow:-

Skills Variable:

➢ Volleying
➢ Passing
➢ Serving
➢ Setting

Physical Variable:

➢ Leg Explosive Strength
➢ Shoulder Explosive Strength
➢ Abdominal Strength Endurance
➢ Flexibility
➢ Agility

Physiological Variable
➢ Vital Capacity
➢ Respiratory Rate

Psychological variable:
➢ Sports Achievement Motivation
➢ Sports Aggression

Anthropometric Variable:
➢ Height
➢ Weight
➢ Arm Length
➢ Fore Arm Length
➢ Flexed Arm Girth
➢ Fore Arm Girth
➢ Leg Length
➢ Thigh Girth
➢ Calf Girth.

The Volleyball performance was selected as criterion (dependent) variable, for the purpose of present study.

CRITERION MEASURES

The criterion measures adopted for the study were as follows:

Performance: Performance was measured through the Match Practice Performance by panel of three experts on the basis of 10 point rating scale.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Test/Questionnaire</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAHPER Volleyball Skill Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volleying</td>
<td>Volley Test</td>
<td>No. of correct volley in one minute</td>
</tr>
<tr>
<td>Passing</td>
<td>Passing Test</td>
<td>No of correct passes</td>
</tr>
<tr>
<td>Serving</td>
<td>Serving Test</td>
<td>Sum of scores according to Zone</td>
</tr>
<tr>
<td>Setting</td>
<td>Set-up Test</td>
<td>No of correct set-ups</td>
</tr>
</tbody>
</table>
### Physical Variables

<table>
<thead>
<tr>
<th>Physical Variables</th>
<th>Instrument/Method</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg Explosive Strength</td>
<td>Standing Broad Jump</td>
<td>Meter</td>
</tr>
<tr>
<td>Shoulders Explosive Strength</td>
<td>Medicine Ball Throw</td>
<td>Meter</td>
</tr>
<tr>
<td>Abdominal Strength Endurance</td>
<td>Sit – Ups</td>
<td>Number/30 sec.</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Sit and Reach test</td>
<td>Centimeter</td>
</tr>
<tr>
<td>Agility</td>
<td>Zigzag Run</td>
<td>Seconds</td>
</tr>
</tbody>
</table>

### Physiological Variables

<table>
<thead>
<tr>
<th>Physiological Variables</th>
<th>Instrument/Method</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital Capacity</td>
<td>Dry Spirometer</td>
<td>Liter</td>
</tr>
<tr>
<td>Respiration Rate</td>
<td>By Count Method</td>
<td>Numbers/min.</td>
</tr>
</tbody>
</table>

### Psychological Variables

<table>
<thead>
<tr>
<th>Psychological Variables</th>
<th>Instrument/Method</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports Achievement Motivation</td>
<td>Sports Achievement Motivation Test</td>
<td>Sum of responses</td>
</tr>
<tr>
<td>Sports Aggression,</td>
<td>Sports Aggression Inventory</td>
<td>Sum of responses</td>
</tr>
</tbody>
</table>

### Anthropometric Variables

<table>
<thead>
<tr>
<th>Anthropometric Variables</th>
<th>Instrument/Method</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>Stadiometer</td>
<td>Meter</td>
</tr>
<tr>
<td>Weight</td>
<td>Weighing Machine</td>
<td>Kilogram</td>
</tr>
<tr>
<td>Arm Length</td>
<td>Steel Tape</td>
<td>Centimeter</td>
</tr>
<tr>
<td>Fore Arm Length</td>
<td>Steel Tape</td>
<td>Centimeter</td>
</tr>
<tr>
<td>Flexed Arm Girth</td>
<td>Steel Tape</td>
<td>Centimeter</td>
</tr>
<tr>
<td>Fore Arm Girth</td>
<td>Steel Tape</td>
<td>Centimeter</td>
</tr>
<tr>
<td>Leg Length</td>
<td>Steel Tape</td>
<td>Centimeter</td>
</tr>
<tr>
<td>Thigh Girth</td>
<td>Steel Tape</td>
<td>Centimeter</td>
</tr>
<tr>
<td>Calf Girth</td>
<td>Steel Tape</td>
<td>Centimeter</td>
</tr>
</tbody>
</table>

### Instrument’s Reliability

The instruments used in this study were calibrated and supplied by the leading firms and their reliability was ensured by manufactures. Thus, the instruments were considered reliable for the purpose of this study. While test and questionnaire used in this study were reliable and valid and this is mentioned in below table.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Questioners/Test</th>
<th>Reliability</th>
<th>Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports Achievement Motivation</td>
<td>Sports Achievement Motivation Test</td>
<td>.70</td>
<td>-</td>
</tr>
<tr>
<td>Sports Aggression,</td>
<td>Sports Aggression Inventory</td>
<td>.87 to .90</td>
<td>.84</td>
</tr>
<tr>
<td>Skill</td>
<td>AAHPER Volleyball Test</td>
<td>.71</td>
<td>.80</td>
</tr>
</tbody>
</table>

**TESTER’S COMPETENCY**

For the collection of data research scholar had taken help from Physical Education Teacher who were experts in the field. To ensure the competency in the technique of measuring selected independent and dependent variables for the purpose of the study, the scholar with the team had number of practice sessions in testing procedure under the guidance of experts. All the measurements were taken by the researcher.

**ADMINISTRATION OF TEST**

**Standing Broad Jump**

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

**Equipment’s:** Mat, measuring tape, chalk/lime powder etc.

**Procedure:** The subjects were asked to stand behind the starting line with the feet parallel to each other and instructed to jump as far as possible by bending knees and swinging arms in the forward direction one by one. The subjects were get three successive trials.
**Scoring:** The distance between the starting line and the nearest point of landing provides the score. The best jump was recorded and used as the final score of the test.

**Medicine Ball Put**

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

**Equipment’s:** Six pound medicine ball, measuring tape, lime powder etc.

**Procedure:** The subjects were asked to sit behind a restraining line with spread legs. Subjects were asked to stretch back and throw the ball, Overhead forward with the both hand three trials were given to putting the medicine ball.

**Scoring:** The best one out of three put was recorded. As score of the subjects it was measure in nearest of the foot

**Sit – Ups**

**Purpose:** To measure abdominal strength endurance.

**Equipment’s:** Mat, Yard Stick

**Procedure:** Subject were laid in supine position with flexed knees while sliding their heels as close to the seat as possible. The yard stick was held tightly under the knees until the subject as instructed to slowly slide his feet forward. At the point where the yard stick drops on the floor, the tester was marks the heel and seat line in order to indicate how far the seat should remain from the heel during the bent knee sit-up exercise. The fingers of the subject were inter-locked behind the neck and perform the sit-ups, elbows touching to the knees at the completion of the sit-up.
Scoring: The total numbers of correct sit-ups were recorded as score for the abdominal strength of the subject.

Sit and Reach Test

Purpose: To measure the hamstring and spine flexibility of the subject.


Procedure: One yard stick was fixed by the tape on the floor in such a way that 15 inches mark of the yard stick coincided with a line draw on the floor. The subject was asked to sit on the floor and to line up his heels with the near edge of the 15 inches mark and slides the seat back beyond the zero end of the yard stick. One assistant was asked to stand and to trace his toes against the heels of the subjects and another assistant to hold subject knees in a locked position while stretching forward. With the heels not more than 5 inches apart, the subject was asked to stretch forward slowly by sliding his finger tips of both hands along with the yard stick. The reading was taken at the near edge of the finger up-to the 15 inches mark of the yard stick.
Scoring: The best of three trials measured to nearest quarter inch was recorded as subjects test scores.

Zigzag Run

Purpose: To measure the agility.

Equipment’s: Stop watch, Indian clubs/Cones, lime powder, measuring tape etc.

Procedure: The subjects were asked to run from a standing start on the command “GO” in a prescribed pattern shown in the Fig.1 as quickly as they can without grasping or moving the Indian clubs/cones. Three complete circuits were run by each subject. The stop watch was start when the command “GO” was given and stopped when the subject completed the 3rd circuit.
Scoring: The elapsed time to the nearest tenth of a second was recorded.

Physiological Variables

Vital Capacity

Objective: To measure Lung Capacity
Equipment: Dry Spirometer
Procedure: Vital Capacity was measured in liters by using a dry spirometer. The Spirometer was brought the zero position. The subject was inhale to his maximum capacity and after that the air inside the lungs was blown out as intensely as possible into the mouthpiece of the dry spirometer.
Score: The amount of expired air was read directly from the calibrated scale and recorded as score for vital capacity of the subject.

Respiratory Rate

Purpose: To measure the Respiratory rate
Equipment’s: Stop watches, record sheets, pen, and pencil.
Procedure: The number of breaths taken in each minutes was referred as breathing frequency or respiratory rate and this was assessed by keeping the hand on each subject’s stomach and reading was taken for complete one minute.
Scoring: Number of the Respiration taken by the subject in one minute was recorded as score.

Psychological Variables

Sports Achievement Motivation Test

Purpose: To measure achievement motivation level of players.
Questionnaire: Sports Achievement Motivation Test (SAMT) developed by Dr. M. L. Kamlesh.
Procedure: The 'Sports Achievement Motivation Test' was given to subjects before the start of competition to yield a general assessment of achievement motivation needs. This questionnaire consists of 20 items and each item has got two answers.

Scoring: For the correct answer 2 marks were given, whereas for the incorrect responses '0' (zero). Total scores obtained for all the correct response was final score of subject on achievement motivation. Response value of this test extends from 0 to 40.

**Sports Aggression Inventory**

**Purpose:** To measure aggression level of players.

**Questionnaire:** Sports Aggression Inventory constructed and standardized by Prof. A. K. Shrivastava & P. S. Shukla.

**Procedure:** Questionnaire was distributed to the subjects after the competition. The directions were explained by the researcher. This inventory consists of 25 items, in which 13 items are keyed "YES" and rest of 12 is keyed "NO". The statements which are keyed "YES" are 1, 4, 5, 6, 9, 12, 14, 16, 18, 21, 22, 24, and 25. And the statements which are keyed "NO" are 2, 3, 7, 8, 10, 11, 13, 15, 17, 19, 20, and 23.

**Scoring:** For each correct item the score was 1, whereas for the incorrect response zero. Scores obtained by each subject on each statement was added up which represent one's total score on aggression.
Anthropometric Variables

Standing Height

Purpose: To measure standing height.

Equipment: Stadiometer

Administration: Subjects were asked to stand erect without shoes against a marked scale on the wall. The hills, buttocks and back were touching the wall. The subjects were instructed to keep the hills together, head straight and hold a full breath during measurement. A stiff hard board was held horizontally on the head and touching the scale marked on the wall.

Scoring: The subjects were asked to step out and the reading indicated by the hard board was recorded. This was repeated twice to ensure accurate measurement and height was recorded to the nearest to 1 centimeter.

Body Weight

Purpose: To measure weight of subjects

Equipment: Weighing machine.

Administration: The subjects were asked to wear possible minimal cloths and asked to stand at the center of the weighing machine.
Scoring: The Weight was recorded from the indicator of dial to a nearest to .1 kilogram.

Arm Length

Purpose: To measure arm length.
Equipment: Arm Length was measured with the flexible steel tape.
Procedure: The subjects were asked to stand erect, arm completely hung loosely by the side of the body and arm length was taken from the acromion process, the point just above the shoulder joint to the tip of the middle finger.
Scoring: The arm length was recorded to the nearest of half centimeter.

Fore Arm Length

Purpose: To measure fore arm length.
Equipment: Flexible steel tape.
Procedure: The subjects were instructed to stand erect and relaxed. Fore arm length was measured with the flexible steel tape. The tip of the tape was placed at the upper edge of the head of radius to the tip of the middle finger.
Scoring: The fore arm length was recorded correct to the nearest of half centimeter.
Upper Arm Girth

**Purpose:** To measure flexed arm circumference.

**Equipment:** Flexed arm girth was measured with the flexible steel tape.

**Procedure:** Subjects were instructed to stand erect with flexed arm by the side of the body. Arm girth was taken with the help of flexible steel tape at maximal bulge of the biceps muscles with slight up and down movement of the steel tape keeping it in a horizontal direction.

**Scoring:** The measurement was recorded to the nearest of half centimeter.
Fore Arm Girth

**Purpose:** To measure the fore arm girth of the subjects

**Equipment:** Steel tape

**Procedure:** Subjects were asked to stand at ease. Steel tape was wrapped around the fore arm just below the elbow point at the maximal measurement was recorded in by moving steel tape slightly up and down keep the circle of tape in horizontal direction and touching all around the measurement was recorded in centimeters.

**Scoring:** The arm girth was recorded in centimeters.
**Leg Length**

**Purpose:** To determine the leg length.

**Equipment:** Steel tape.

**Procedure:** The examiner was facing the subject and asked to swing the right leg back and forth slowly and lifting it to the outside. By manipulation, the examiner located the spot where the greater trochanator entered the pelvic girdle. The height of the greater trochanator from the floor was measured.

**Scoring:** This procedure was followed five times with each subject. The measurement was recorded in centimeters.

**Thigh Girth**

**Purpose:** To measure the thigh circumference of the subject.

**Equipment:** Steel measuring tape

**Procedure:** Thigh girth was measured by a steel tape placed around the thigh horizontally with its top edge under the fold of the buttock. The subjects were ask to stand with there weight equally distributed on both feet.

**Scoring:** The thigh girth was recorded to the nearest of centimeter.

**Calf Girth**

**Purpose:** To measure calf circumference

**Equipment:** Steel tape

**Procedure:** The steel tape was wrapped horizontally around the naked lower leg of the subject at maximal bulge of the calf muscles with slight up and down movement of the steel tape keeping it in a horizontal direction. The maximal circumferential measurement gave the value of calf circumference.

**Scoring:** The calf girth was recorded to the nearest of centimeter.
AAHPER Volleyball Test

Volleying Test

**Purpose**: To measure volleying ability.

**Equipment**: Well marked wall.

**Procedure**: On the signal ‘Go’ the ball was tossed against the wall at the target area and the stopwatch started. On rebound, the ball was volleyed into marked target consecutively for one minute till the stop signal was given. Volley must hit the wall within the boundaries of target. If the ball was caught or gets out of control, the subject was asked to repeat from the start.

**Scoring**: The number of real volleys in one minute were recorded as score of the subject.
Serving Test

**Purpose:** To measure the Volleyball serving ability.

**Equipment:** Standard Volleyball court with proper marking.

**AAHPER Serving Test Area**

**Procedure:** The subject was asked to stand behind service line and asked to serve over the net on the opposite side where markings were made for test scoring. Subject may use any legal service.

**Scoring:** Ten trials were given to each subject and the composite score obtained in total ten trials was recorded as score of the subjects.
Passing Test

**Purpose:** To measure the Volleyball passing ability

**Equipment:** Standard Volleyball court with proper marking.

AAHPER Passing Test Area

**Procedure:** The subject was asked to stand at the center back position on the court, received a high throw from the thrower, and execute a pass so that the ball goes over an 8-feet high rope and onto the specifically marked areas on the court.

**Scoring:** Subjects were given twenty trials and asked to perform passes alternately to the right and to the left. For each correct pass one point was awarded to subject.
Set-Up Test

**Purpose:** To measure the set-up ability of Volleyball player.

**Equipment:** Standard Volleyball court with proper marking

![AAHPER Set-up Test Area Diagram]

**Procedure:** Subject was asked to stand in midcourt position within the 6×5 feet area marked near a 10 feet high rope tied in the Volleyball court. The subject was received a high throw from the thrower and execute a set-up so that the ball goes over a 30 feet long rope tied at height of 10 feet and land onto the marked area between the rope and the usual Volleyball net.

**Scoring:** Subject was get 10 trials for set-up to left and 10 trials for set-up to right direction. One point was awarded for each set-up that goes over the rope to the marked area. The total composite score obtained by the subject was recorded.

**Volleyball Playing Performance**

Performance was measured through Match practiced by panel of three experts on the basis of 10 point rating scale.
COLLECTION OF DATA

Data was collected from Deoria & Allahabad sports hostels and Lucknow & Gorakhpur sports colleges from prior permission of incharges/coaches. Purpose of test was well explained and demonstrated to the subjects and required trials were provided before final effort/attempt. Questionnaires were also explained clearly and necessary instructions were given to respondents. To get honest response subjects, it was clearly explained to subjects that all personal information will be kept confidential and will be used only for study purpose.

STATISTICAL TECHNIQUES

Descriptive Statistics was used to determine the characteristics of Volleyball players.
To test the hypothesis of the present study following statistical methods were adopted:

➢ Pearson Product Moment Correlation was used to find out the relationship of each predictor variable with Volleyball player’s performance.
➢ Multiple Correlation was used to find out the joint contribution of predictor variables on Volleyball player’s performance.
➢ In order to formulate the equation for prediction of Volleyball player’s performance on the basis of selected independent variable, Linear Multiple Regression Equation was applied.
➢ Level of significance was set at 0.05 for the present study.