Chapter III

METHODOLOGY

This chapter describes the selection of subjects, selection of variables, selection of tests, competence of the tester, instruments reliability, reliability of the data, orientation to the subjects, validity of the questionnaires, procedure of scoring, collection of the data, administration of the tests and experimental design and statistical procedures for analyzing the data.

Selection of Subjects

The purpose of the present study was to analyze the selected bio-motor, physiological and psychological parameters between state government (SDAT) and central government (SAI) sponsored sports hostel players of different disciplines. To achieve the purpose of the study, thirty basketball (N=30), football (N=30) and volleyball (N=30) players were selected randomly from each state government sponsored sports hostels (SDAT) and central government sponsored sports hostels (SAI) with a total of 180 players.

<table>
<thead>
<tr>
<th>Game/Hostels</th>
<th>SDAT Sports Hostel</th>
<th>SAI Sports Hostel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball</td>
<td>30 Players</td>
<td>30 Players</td>
</tr>
<tr>
<td>Football</td>
<td>30 Players</td>
<td>30 Players</td>
</tr>
<tr>
<td>Volleyball</td>
<td>30 Players</td>
<td>30 Players</td>
</tr>
</tbody>
</table>
Selection of Variables

The research scholar reviewed the available scientific literature pertaining to the games of basketball, football and volleyball from books, journals, periodicals, magazines and research papers. From the literatures of the previous studies, the discussion with his guide and experts in the field and consideration of the feasibility of the study the following bio-motor, physiological and psychological variables were selected for the study.

Bio-motor Variables

- Cardio Respiratory Endurance
- Muscular Endurance
- Flexibility
- Speed
- Explosive Power

Physiological Variables

- Resting Pulse Rate
- Breath Holding Time
- Respiratory Rate

Psychological Variables

- Achievement Motivation
- Sports Competition Anxiety
- Aggression
Selection of Tests

The present study was undertaken primarily to determine the selected bio-motor, physiological and psychological parameters between state government sponsored sports hostel players and central government sponsored sports hostel players of different disciplines. As per the available literature, the following standardized tests were used to collect relevant data on the selected dependent variables and they were presented in the Table I.

**TABLE I**
**TESTS SELECTION**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Criterion Variables</th>
<th>Test items/Instruments</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cardio Respiratory Endurance</td>
<td>12 minutes Run/Walk</td>
<td>In metres</td>
</tr>
<tr>
<td>2</td>
<td>Muscular Endurance</td>
<td>Bent Knee Sit-ups</td>
<td>In numbers</td>
</tr>
<tr>
<td>3</td>
<td>Flexibility</td>
<td>Sit and Reach</td>
<td>In centimeters</td>
</tr>
<tr>
<td>4</td>
<td>Speed</td>
<td>50 Mts. Run</td>
<td>In seconds</td>
</tr>
<tr>
<td>5.</td>
<td>Explosive Power</td>
<td>Vertical Jump</td>
<td>In centimeters</td>
</tr>
<tr>
<td>6.</td>
<td>Resting Pulse Rate</td>
<td>Radial Pulse Method</td>
<td>In numbers</td>
</tr>
<tr>
<td>7.</td>
<td>Breath Holding Time</td>
<td>Stop Watch</td>
<td>In seconds</td>
</tr>
<tr>
<td>8.</td>
<td>Respiratory Rate</td>
<td>Expirograph</td>
<td>In numbers</td>
</tr>
<tr>
<td>9.</td>
<td>Achievement Motivation</td>
<td>SAMT Questionnaire</td>
<td>In numbers</td>
</tr>
<tr>
<td>10</td>
<td>Sports Competition Anxiety</td>
<td>SCAT Questionnaire</td>
<td>In numbers</td>
</tr>
<tr>
<td>11</td>
<td>Aggression</td>
<td>Smith’s Aggressive Questionnaire</td>
<td>In numbers</td>
</tr>
</tbody>
</table>
Competence of the Tester

The investigator took all the measurements in this study with the assistance of coaches/managers of concerned teams. To ensure that the investigator was well versed with the technique of conducting tests, they had a number of practice sessions in the correct testing procedure. The tester's reliability was established by test and re-test method.

Instruments Reliability

The clinical stopwatches, measuring tape, Sargent jump board, sit and reach box, sphygmomanometer, expirograph and stethoscope used in this study were availed from Faculty of Physical Education and Sports Sciences, Vinayaka Missions University, Salem, Tamilnadu. The instruments were purchased from reliable and standardized companies and were considered accurate enough to serve the purpose of the study.

Reliability of the Data

Test and retest method was followed in order to establish the reliability of data by using ten subjects at random. The same personnel under similar conditions tested all the dependent variables selected in the present study twice for the subjects. The intra class co-efficient of correlation was used to find out the reliability of the data and the results are presented in Table II.
### TABLE II
INTRA CLASS CO-EFFICIENT OF CORRELATION ON SELECTED DEPENDENT VARIABLES

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Variables</th>
<th>'R' Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cardio Respiratory Endurance</td>
<td>0.89*</td>
</tr>
<tr>
<td>2</td>
<td>Muscular Endurance</td>
<td>0.91*</td>
</tr>
<tr>
<td>3</td>
<td>Flexibility</td>
<td>0.90*</td>
</tr>
<tr>
<td>4</td>
<td>Speed</td>
<td>0.95*</td>
</tr>
<tr>
<td>5</td>
<td>Explosive Power</td>
<td>0.91*</td>
</tr>
<tr>
<td>6</td>
<td>Resting Pulse Rate</td>
<td>0.92*</td>
</tr>
<tr>
<td>7</td>
<td>Breath Holding Time</td>
<td>0.97*</td>
</tr>
<tr>
<td>8</td>
<td>Respiratory Rate</td>
<td>0.93*</td>
</tr>
<tr>
<td>9</td>
<td>Achievement Motivation</td>
<td>0.95*</td>
</tr>
<tr>
<td>10</td>
<td>Sports Competition Anxiety</td>
<td>0.92*</td>
</tr>
<tr>
<td>11</td>
<td>Aggression</td>
<td>0.94*</td>
</tr>
</tbody>
</table>

*Significant at .01 level of confidence.

Since the obtained 'R' values were much higher than the required value, the data were accepted as reliable in terms of instrument, tester and the subjects.

**Orientations to the Subjects**

The investigator explained the purpose of the study to the subjects and their part in the study. For the collection of data, the investigator explained the procedure of testing on selected dependent variables and gave instructions about the procedure to be adopted by
them for measuring. The subjects of all the groups were sufficiently motivated to perform their maximal level during testing periods.

**Validity of the Questionnaires**

Many researchers have used these questionnaires for research. The questionnaire used by them was Sports Achievement Motivation Test (SMAT), Sports Competition Anxiety Test (SCAT) and Smith’s Aggressive Questionnaire. There can be no better evidence to prove the validity of the questionnaire than this.

**Procedure of Scoring**

**Sports Achievement Motivation Test (SAMT)**

In the SAMT questionnaire there are twenty test items. Among them, for questions 1, 3, 4, 9, 10, 11, 12, 13, 15, 16, 17 and 20, the expected answer is 'a'. For the questions 2, 5, 6, 7, 8, 14, 18 and 19 the expected answer is 'b'. For correct statement 2 marks and for incorrect zero mark are awarded.

**Scoring:** The total number of score was recorded as the individual score. Sports Achievement Motivation questionnaire (SAMT) is given in Appendix-I.

**Sports Competition Anxiety Test (SCAT)**

The standardized sports competition anxiety test (SCAT) was used to measure the anxiety. The test considered of fifteen statements. It is based on Likerts method and each statement consisted of three responses.
Hardly ever, sometimes and often, the respondents made a cross mark (x) on any one of the response that fitted to them. The inventory in its original form was used in this investigation.

This inventory was scored with the help of a scoring key, which is given below. A separate scoring method was followed for positive and negative statements. The scores obtained for both positive and negative statements were added. The higher score indicates the higher anxiety. Positive Statement-Questions are numbered such as 1, 2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 14 and 15 and Negative Statement-Questions are 6 and 11.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Response</th>
<th>Scores for Positive Statements</th>
<th>Scores for Negative Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hardly ever</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Sometimes</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Often</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**Scoring**: Sports competition anxiety test (SCAT) questionnaire consists of fifteen questions. There was no right or wrong answer. In this three point scale was used for scoring. Subjects were asked to mark one of the above cited words Hardly ever _ some times _ often before the players was measured. Performance improves with increasing level of anxiety to an optimum point, whereupon further increase in anxiety causes performance impairment. Sports
competition anxiety test (SCAT) questionnaire is given in Appendix -II.

**Aggression Test**

Standardized Smith’s questionnaire for sporting aggression was used to scale the aggressiveness. The test consists of four questions with five levels of responses. The level changes from strongly disagree to strongly agree. The respondents were made to encircle the approximate number, which suited their attitude.

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

<table>
<thead>
<tr>
<th>Response</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>1</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
</tr>
<tr>
<td>Undecided</td>
<td>3</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>5</td>
</tr>
</tbody>
</table>

**Scoring** : The total number of score was recorded as the individual score. Aggression questionnaire is given in Appendix-III.
Collection of the Data

The investigator administered the questionnaire and other tests to measure the criterion variables to 180 male subjects. The investigator collected the data from the subjects before their matches during their rest time. The purpose of the study was clearly explained. The investigator explained the subjects about the uses of the question and meaning of each questions and how to fill the questionnaire. Care was taken to see that the subjects answered the entire questions. The filled up questionnaires from respondents were collected after checking whether all the items were responded and using the scoring key the total scores obtained by each subjects were tabulated.

Administration of Tests

Copper’s 12 Minutes Run/Walk Test

Purpose

To measure the cardio vascular endurance

Facilities and Equipment

A 400 mts. track with marking. A specific course was measured in distance and the number of laps completed was counted. The entire course was divided into eights by placing makers. This enable the tester to quickly determine the exact distance covered in 12 minutes. Stopwatches, whistle, and distance markers are needed for group testing.
Procedure

Each runner was assigned a spotter. The runners start behind a line and upon the starting signal; run as many laps as possible around the course within the 12 minutes. The spotters maintain a count of each lap, and when the signal to stop was given, they immediately run to the spots at which their runners were at the instance the whistles to stop was given.

Scoring

The score in meters was determined by multiplying the number of completed laps. The distance (400 mts.) of each laps (Ex 400 mts. plus the number of segments in eights of an incomplete lap, plus the number of meters stepped off between particular segments).

Bend Knee Sit-ups

Purpose
To measure the strength endurance of the abdominal muscles.

Equipment
Mats and stopwatch.

Procedures
The subjects lied flat on the back with knees bent and the feet on the floor with the heels not more than 30 cms. from the buttocks. The knee angle should not be less than 90 degrees. The fingers were interlocked and placed behind the neck with elbows touching the mat. The feet were held securely by a partner. The subject then curled up
to a sitting position and touched his knees with the elbows. The exercise was repeated as many times as possible in one minute.

**Scoring**

One point was scored for each correct sit-up. The score was the maximum number of sit-ups completed in one minute.

**Sit and Reach**

**Purpose**

The sit and reach test is designed to ensure the Flexibility of the low back and posterior thigh.

**Equipment**

Sit and reach box, scorecard and pencil.

**Procedures**

The subjects were asked to remove their shoes to test. To begin the test, the subject sits in front of the test apparatus with feet flat against the end board. The knees should be fully extended and the feet shoulder width apart. To perform the test, the subject extends the arms forward with one hand placed on top of the other. The reach was repeated 3 consecutive times, and on the fourth trial the maximum reach was held. The distance of the maximum reach was recorded as the test score.
Scoring

Three trials were given and the distance of the maximum reach was recorded as the test score.

50 meters Run

Purpose

The purpose of the test was to measure the speed of the subject.

Equipments

Stopwatch, chunnam, score card.

Procedure

The subject took a position behind the starting line. The starter used the command, “ready” and “go”. The starter was accompanied by a downward sweep of the arm as a signal to the timer. The subjects ran across the finish line. The standing start method was adopted for this purpose. The stopwatch was started on the command “Go” and stopped when the runner crosses the finish line.

Scoring

The score was the elapsed time to the nearest one tenth of a second between the starting signal and the instant the subject crossed the finished line. The fractions were rounded to the next largest one tenth of a second. One trial was permitted.
Vertical Jump

Purpose

The purpose of the vertical jump that was to measure the ability to exert maximum energy in one explosive act projecting the body through space.

Equipment

The Sargent jump board, chalk, tape and rope.

Procedure

The subject was asked to stand next to the concrete pillar on the floor and the side his dominant hand holding a piece of chalk. The Sargent board was fixed at the concrete pillar with 2 mts height. From this position the subject reached upward as high as possible and mark on the board. To execute the jump, the subject was asked to squat next to the board and jump as high as possible and make a mark on the board. Once in the starting position, the subject was not allowed to move his feet, that is, to walk in or step in to the jump.

Scoring

The height of the jump was measured from the distance between standing and jumping heights. Measurement was taken to the nearest centimeter. Three trials were given and best trials were taken for the final score.
Resting Pulse Rate

Purpose
To record the resting pulse rate per minute

Equipment
Stop watch and chair were used.

Procedure
The pulse rate of all the subject were recorded in a sitting position in the morning session between 6.00 am before taking the pulse rate, the subjects were asked to sit in a chair and relax for 15 min. To record the pulse rate, the three finger tips were placed or the left radial artery at the wrist in such a manner that pulse was clear.

Scoring
The number of pulse were conducted for 15 seconds and then multiplies by four to record for full minute.

Breath holding time

Purpose
The purpose was to measure the ability of the subject to hold the breath for longer time.

Equipment
A stop watch with calibration of 1/10 seconds, score sheets and a pencil were used to administer this test.
**Procedure**

The subjects stand at ease and inhaled deeply after which he held his breath for a length of time possible to him. The index finger of the respondent served as an indicator to the Investigator to know the start and end of the recording time. The thumb and middle finger were used to hold the nose to avoid letting the air through the nostrils. The subjects were requested not to let the air out by opening the mouth while recording the breath holding time.

**Scoring**

The total time was calculated which the subject hold the breath depends upon his ability.

**Respiratory Rate**

**Purpose**

The objective was to measure the subject’s number of breaths per minute.

**Equipment**

The apparatus expirograph was used to measure the respiratory rate of the subjects.

**Procedure**

Respiratory rate was assessed by using the apparatus expirograph. When the subject became familiar with the room temperature and attained normal breathing Kymograph was switched
on at a speed of 60mm / minute. Then the subject was asked to have the breath normally for one minute. Now the recorder pen was moving up and down with marking on the graph. It was allowed to move up to 60 millimeters.

**Scoring**

There were a number of sharp edges on the graph sheet indicating the number of breaths in one minute. This reading was recorded as the respiratory rate of the subjects. The investigator stood nearby, observed and recorded the readings.

**Experimental Design and Statistical Procedures**

The data were collected on the selected criterion variables from the state government (SDAT) and central government (SAI) sponsored sports hostel basketball, football and volleyball players. The design used for this study is 2x3 factorial designs.

The collected data were analysed by two factor (2x3) Analysis of Variance (ANOVA) to find out the influence of each factor independently and also their combined influence on each of the selected criterion variables. The first factor consisted of state government (SDAT) and central government (SAI) sponsored sports hostel players and the second factor consisted of games such as basketball, football and volleyball.

According to Jerry R. Thomas and Jack K. Nelson, whenever the main purpose is usually lies in the interaction, it is sufficient to
discuss the interaction effect only, unless some special circumstances exist, interest in testing the main effects is usually limited. Hence, whenever the obtained F-ratio for interaction effect was found to be significant, the simple effect test was used as a follow up test. Since, two groups and three different games were compared, whenever the obtained F-ratio value in the simple effect was significant, the Scheffe’s test was applied as post hoc test to determine the paired mean differences, if any. In all the cases .05 level of significance was fixed to test the hypothesis.