

Chapter III

METHODOLOGY

In this chapter the selection of subjects, selection of variables, selection of tests, instruments reliability, reliability of the data, orientation to the subjects, competency of the tester, pilot study, training programme, collection of the data, tests administration, experimental design and statistical procedures used have been explained.

3.1. SELECTION OF SUBJECTS

The purpose of the study was to find out the effects of SAQ training, circuit resistance training and plyometric training on selected motor fitness variables namely muscular strength, muscular endurance, speed, speed endurance, leg explosive power, agility and cardio respiratory endurance among inter collegiate men football players. To achieve this purpose of the study, sixty college men students from KLN College of Information Technology, Madurai, Tamil Nadu, India were randomly selected as subjects. The age, height and weight of the selected subjects were ranged from 18 to 24 years, 162 to 175 cm and 51 to 67 kilogram respectively. The selected subjects were divided into four equal groups of fifteen subjects each at random, Group I underwent SAQ training, Group II underwent circuit resistance training, Group III underwent plyometric training and Group IV acted as control.

The experimental group namely SAQ training group (Group I), circuit resistance training group (Group II) and plyometric training group (Group III) underwent their respective training programmes for three sessions (days) per week for twelve weeks. And Group IV acted as control group in which they did not undergo any special training programme apart from their regular programme of curriculum.

All the subjects gave a written informed consent and no compulsion was made to take part in the training programme. A qualified physician examined the subjects and declared that they were medically and physically fit to participate in the training programme.

3.2. SELECTION OF VARIABLES

DEPENDENT VARIABLES

- 1) Muscular Strength
- 2) Muscular Endurance
- 3) Speed
- 4) Speed Endurance
- 5) Leg Explosive Power
- 6) Agility
- 7) Cardio Respiratory Endurance

INDEPENDENT VARIABLES

- 1) SAQ Training
- 2) Circuit Resistance Training
- 3) Plyometric Training

3.3. SELECTION OF TESTS

The researcher had discussed with the experts, physical education professionals and had reviewed the various literatures and selected the following test items, which were standardized, ideal, apt test for the selected criterion variables. Muscular strength and muscular endurance were assessed by using pushups and bend knee sit ups respectively. Speed, speed endurance and leg explosive power were measured by administering 50 mts run, 150 mts run and vertical jump respectively. Agility and cardio respiratory endurance were assessed by shuttle run and cooper's 12 min run and walk test respectively and it was presented in Table I. TABLE I

TABLE I
TESTS SELECTION

S.No	Variables	Tests
1.	Muscular Strength	Pushups
2.	Muscular Endurance	Bend Knee Situps
3.	Speed	50 mts Run
4.	Speed Endurance	150 mts Run
5.	Leg Explosive Power	Sargent Jump
6.	Agility	Shuttle Run
7.	Cardio Respiratory Endurance	Cooper's 12 min Run/ Walk test

3.4. INSTRUMENTS RELIABILITY

The following instruments which were required to test the selected criterion variables such as stop watch and measuring tape were procured from the human performance laboratory of the KLN College of Information Technology,

Madurai, Tamil Nadu, India. All the instruments used in this study were in good condition and purchased from reputed and reliable companies.

3.5. RELIABILITY OF THE DATA

To establish the reliability of the data, ten subjects were selected at random. The test-retest method was adopted to ensure the reliability of the data. All the selected criterion variables in the present investigation were tested twice for the subjects by the same tester under similar conditions. The obtained data on muscular strength, muscular endurance, speed, speed endurance, leg explosive power, agility and cardio respiratory endurance were subjected to intra class correlation of find out the reliability of the data as suggested by Thomas and Nelson and they were presented in Table II.

TABLE II
INTRA CLASS CORRELATION CO-EFFICIENT ON
SELECTED CRITERION VARIABLES

S.No	Variables	“R” Value
1.	Muscular Strength	0.83*
2.	Muscular Endurance	0.91*
3.	Speed	0.88*
4.	Speed Endurance	0.86*
5.	Leg Explosive Power	0.93*
6.	Agility	0.87*
7.	Cardio Respiratory Endurance	0.91*

*Significant at .05 level of confidence.

(The table value required for significance at .05 level of confidence with df 9 was 0.767)

3.6. ORIENTATION TO THE SUBJECTS

The investigator explained the purpose of the training programs to the subjects participating in the study. For the collection of data, the investigator explained the procedure of the pushups, bend knee sit ups, 50 mts run, 150 mts run, sergeant jump, shuttle run and cooper's 12 min run/ walk test for measuring muscular strength, muscular endurance, speed, speed endurance, leg explosive power, agility and cardio respiratory endurance respectively.

3.7. COMPETENCY OF THE TESTER

The investigator was assisted by his colleagues. To ensure that the investigator and his colleagues were well versed with the techniques of conducting the test, the investigator and his colleagues had a number of practice session to learn the correct testing procedures under the guidance of an expert after considerable practice.

3.8. ESTIMATING 1 RM

Before training, the maximum load that can be lifted once, the one repetition maximum (1 RM) was established by increasing the load gradually over a series of lifts with sufficient periods of rest in between lifts. Once established, the 1 RM was used as a measure of the maximal concentric force of the muscle or a group of muscles.

3.9. PILOT STUDY

A pilot study was conducted to assess the initial capacity of the subjects in order to fix the load. For this, fifteen subjects were selected at random and divided into three groups of five each, in which group I underwent SAQ training, group II

underwent circuit resistance training and group III underwent plyometric training under the watchful eyes of experts and the researcher. Based on the results of the pilot study, the initial load of the subjects for SAQ training group, circuit resistance training group and plyometric training group were fixed. The initial loads for all experimental groups were more or less similar.

3.10. TRAINING PROGRAMME

During the training period, the experimental groups namely Group I underwent SAQ training, group II underwent circuit resistance training and group III underwent plyometric training for three days per week (alternative days) for twelve weeks. Every day, the workout lasted for 60 to 90 minutes approximately including warming up and warming down periods. Subjects in Group IV acted as control and they were instructed that not to participate in any strenuous physical exercise and specific training throughout the training program. The subjects underwent the respective programs as per the schedules under the supervision of the investigator. All training session was conducted only in the morning time. Attendance was recorded and calculated for all the training groups separately for dividing the total numbers of training session by the number of sessions present. The detailed training programme of the three training group were given in the appendix I, II and III respectively.

3.11. COLLECTION OF THE DATA

The data on muscular strength, muscular endurance, speed, speed endurance, leg explosive power, agility and cardio respiratory endurance were collected by administering pushups, bend knee sit ups, 50 mts run, 150 mts run, vertical jump, shuttle run and cooper's 12 min run/ walk test respectively. Pre test and post test data were collected at prior and immediately after the training period. All the variables were tested in the same day.

3.12. TESTS ADMINISTRATION

The administration of the tests and method of collecting data for all the criterion variables were explained here.

3.12.1. Muscular Strength

Push Ups

Purpose

To measure the muscular strength

Equipment

Mat

Description

The exercise started by the subject in a prone position on the mat. The body was raised straighten the arms in a straight line, with no sagging or pumping action permitted. In the return, the subject's chest touched and the exercise was performed until the exhaustion.

Rules

No scores are permitted if: The subjects arms were bent at the top of the movement, the hip sagged, a pumping motion in which the shoulders, there the hips were raised, or vice versa was noted.

Scoring

The number of correctly executed pushups was recorded as the score of the subject.

3.12.2. Muscular Endurance

Bent knee sit-ups

Purpose

To assess abdominal strength and muscular endurance.

Equipments

A mat and a stopwatch.

Procedure

To subjects were asked to take a supine lying position on the mat, knees bent to an angle less than 90 degrees, and hands clasped behind neck. The ankles were held firmly on the ground by a partner. To perform the sit-ups, the subjects lifted his trunk, head and elbows forward in curt-up motion elbows touching the knees and then lowered his trunk touching the done continuously without pause for one minute. Number of correctly executed sit-ups were recorded as his performance.

To facilitate counting and recording the subjects were paired one subjects performed the exercise. While his partner counted. After the score was recorded, the subject inter changed their positions, i.e., the partner become the performer and vice versa.

Scoring

Recorded the number of correctly executed sit-ups performed with in one minute.

3.12.3. Speed

50 Metres Run

Purpose

To assess speed.

Equipments used

Measuring tape, starting clapper and stopwatch.

Procedure

The standing start method was adopted for this purpose. The time elapsed from the 'clap' to the runner crossing the finish line was taken as the test score. The fractions were rounded to the next largest one tenth of a second. For this purpose digital electronic watch was used. Two trials were conducted with sufficient rest in between.

Scoring

The best of two trials was recorded as test score.

3.12.4. Speed Endurance

150 meters run

Purpose

The purpose of the test was to measure the speed endurance of an individual for a given distance

Equipments

Stop water, whistle, finishing stand paper, pencils.

Procedure

The subject was asked to take a positions behind the starting line after a short warm up. The starter give the single “G” the administrator switch on the stop watches. The subject run as test as possible and crossing the finishing line which will be draw so meters from the starting line. The watch for a designated runner is stopped when the subjects cross, the finish line one trial was taken.

Scoring

The score is the elapsed time to the nearest tenth of a second between the starting and the instant the student crossed the finish line.¹

3.12.5. Leg Explosive Power**Sargent Jump****Purpose**

To measure explosive power in vertical direction.

Equipments used

A plywood board as suggested by sargent was used to obtain the data.

¹ www.brainmac.co.uk/end150.htm

Procedure

To obtain data for vertical jump, sargent jump was administered to the subjects. before the execution of the test, all the subjects were directed by the tester regarding the test performance. the subjects were taught how to perform the test perfectly by the investigator. Before the execution of the vertical jump test, subjects were directed to practice for a few minutes.

A plywood board (blackened 1 cm, Thick 1.50 mts. long and 50 cm. Wide) with lines marked horizontally 1 cm. apart was used. This board was placed vertically, the zero point of the scale being at the reaching height of the shortest subject tested. The subject stood with his side toward the wall and reached as high as possible with heels on the floor and made a mark on the wall with chalked fingers. The subject then swung his arms downward and backward assuming a crouched position with the swung his arms downward and backward assuming a crouched position with the knees bent at about right angle. The subject then jumped as high as possible, swinging the arms upward, as the highest point of the jump was reached, another mark was made above the initial one. Three trials were allowed one-minute rest in between.

Scoring

The score was recorded to the nearest centimeter, between the reach and jump mark. The best of the three trials was recorded as the test score.

3.12.6. Agility

Shuttle runs (4 x 10 yards)

Purpose

The purpose of the test was to measure the agility.

Procedure

Two lines parallel to each other was marked on the floor 30 feet apart the subject shall stand behind one of the lines with the blocks at the other line on the signal 'start' the subject runs to the blocks takes on block, and returns to starting line and takes on block, which was carried across the starting line on the way back. Two trails were given and to best trail were taken into account.

Scoring

The score was the elapsed time recorded in seconds and one tenth of seconds for the better of 2 trails.

3.12.7. Cardio Respiratory Endurance

Cooper's 12 Minutes Run/Walk Test.

Purpose

To assess the cardiovascular endurance of the subjects.

Equipments

400 meters track, stopwatch, whistle, score sheets and pencils.

Procedure

For this test, a 400 meters track was prepared with marking at every tenth meter. The investigator and the tests served as the lap scores. The subjects were asked to stand on the starting are drawn at the finish line of the 400 meters track and they were given instructions to cover as much distance as possible by running/walking. They were instructed to continue the run/walk till the final whistle. The race was started with a whistle and at the end of the nine minute again. The whistle was blown. The number of minutes left was announced to the subjects every minute. At the twelfth minute a whistle was blown and the subjects stopped instantly and stood on the spot. The distance covered by each in twelve minutes was recorded to the nearest tenth meter.

Scoring

The distance covered by each subjects were recorded with the help of the lap scores.

3.13. EXPERIMENTAL DESIGN AND STATISTICAL PROCEDURES

Random group design was used as an experimental design involving sixty subjects who were divided at random into four groups of fifteen each SAQ training group, circuit resistance training group, plyometric training group and control group. Group I underwent SAQ training, Group II underwent circuit resistance training, Group III underwent plyometric training for three days per week for twelve weeks and Group IV acted as control who did not participate in any of the special training programme. The data collected from the four groups at prior and after

experimentation on muscular strength, muscular endurance, speed, speed endurance, leg explosive power, agility and cardio respiratory endurance were statistically examined for significant difference, if any, applying the analysis of covariance (ANCOVA).

Since four groups were involved whenever the obtained “F” ratio was found to be significant for adjusted post mean, the Scheffe’s test followed as a post hoc test to determine which of the paired means difference was significant. In all the cases, .05 level of confidence was fixed to test the level of significance which was considered as an appropriate.