Chapter-III

METHODOLOGY

Research methodology involves the systematic procedure by which the researcher starts from the initial identification of the problem to its final conclusion. The role of the methodology is to carry out the research work in a scientific and valid manner.

This chapter discusses the methodology that was used in the study. It describes in detail about the selection of participants, selection of variables, selection of tests, orientation to the participants, competence of the tester, reliability of the instruments, reliability of the data, pilot study, training programme, collection of the data, administration of the tests, experimental design and statistical techniques employed in analyzing the data are presented.

SELECTION OF SUBJECTS

The purpose of this study was to investigate the effects of continuous running with and without mental training on selected bio-motor, psychological parameters and athletic performance of college men athletes. To achieve the purpose of this study, the subjects were selected from Alagappa University College of Physical Education, Karaikudi, Tamilnadu, India. Those who were participated in middle distance events in inter collegiate level athletic competitions for the past three years. 50 middle distance athletes reported voluntarily to participate this study. The athletes were oriented and explained their significance contribution of this research work. In order to qualify the subjects were assessed by Coopers twelve minutes run / walk test to find out their present aerobic capacity (minimum 2800 metres from the subjects. All the subjects were completed successfully from the screen test and they were selected as subjects randomly.
The age, height and weight of the subjects were ranged from 18 to 24 years, 155 to 175 centimetres and 50 to 60 kilograms respectively. And the mean age, height and weight are 21 years, 165 centimetres and 56 kilograms respectively. The selected subjects were medically examined by the qualified physician and certified that they were medically and physically fit to undergo the selected training programme.

The selected subjects were randomly assigned into three groups of fifteen each such as two experimental groups and a control group. The group I underwent continuous running with mental training and group II underwent continuous running without mental training for duration of 12 weeks with three days per week in addition to the regular schedule of the college curriculum, and group III acted as control group and they were asked to refrain from any special training except their leisure time pursuit as college students. A written consent was obtained from the subjects. However, they were free to withdraw their consent in case of feeling any discomfort during the period of their participation but there were no dropouts in this study.
FIGURE 1: FLOW CHART OF RESEARCH PLAN

Start

Selection of subjects

50 middle distance Runners (Voluntary Participations)

Aerobic Capacity Screening Test (12 minutes run / walk test) minimum distance 2800 metres

45 middle distance Runners randomly selected

Randomly Assigned

Group-I Continuous running with mental Training Group (n=15)

Group-I Continuous running without mental Training group Training (n=15)

Group –III Control Group (n=15)

PRE-TEST

Speed endurance-150metres run Test, Cardio respiratory endurance-Cooper’s 12 minutes Run/Walk Test, Sports competition Anxiety-SCAT, Imagery ability, Mental preparation, Self-confidence, Anxiety and worry management, Concentration ability and Relaxation ability measured by Hardy Nelsons Mental skill Test, 800metres run-800metres run Test and 1500 metres run-1500 metres run

Training for 12 weeks

POST-TEST

Speed endurance-150metres run Test, Cardio respiratory endurance-Cooper’s 12 minutes Run/Walk Test, Sports competition Anxiety-SCAT, Imagery ability, Mental preparation, Self-confidence, Anxiety and worry management, Concentration ability and Relaxation ability measured by Hardy Nelsons Mental skill Test, 800metres run-800metres run Test and 1500 metres run-1500 metres run

Statistical Analysis of Results

'\( t'\) Test for Training Improvement

ANCOVA for Effect Differences

END
SELECTION OF VARIABLES

Sport training is a conscious human activity. It is also a goal oriented activity. Therefore, it is obligatory for sports training to include the study of sports performance and performance capacity in its subject matter. Without understanding of sports performance and performance capacity no effective and meaningful theories and methods of training are possible. As a consequence, sports training give high weightage to study the nature and genesis of sports performance in training and competition. Similarly, a large portion of sports training is devoted to the study of performance capacity, which further comprises of physical condition (physical fitness), technique and coordinative abilities, tactics, physique and psychic factors.

Speed, explosive strength (power) and muscular endurance are critical to many sports. Running speed is an athletic event itself and it is also important for numerous other sports. Speed is mostly considered in the form of acceleration. Speed is an important factor in almost all games, and it can make the difference in whether an athlete is able to gain an advantage over his opponent.

Muscular endurance is very important for people playing sport. Muscular endurance is determined by how well your slow twitch muscle fibers are developed. It is important to pay attention to muscular endurance if you play any sort of sports, or involved in any sort of physical activity like Hockey, Tennis, Football and another activity that is very dependent on muscular endurance is cross country running. In fact it is probably the best example of muscular endurance.

Endurance training is essential for a variety of endurance sports. A notable example is distance running events (800 metres to marathon) with the required degree of endurance training increasing with race distance other endurance sports for which
extensive amount of endurance training is required include rowing. Endurance tends to be popular with non-athletes for the purpose of increasing general fitness.

Sports Psychology involves the study of how psychological factors affect the performance and how participation in sport and exercise which affect the psychological skills for performance improvement. Applied sports psychology may include work in athletes, coaches, and parents regarding injury, rehabilitation, communication, team building and career transitions.

Sports psychology focuses on teaching practical skill to athlete to enable them to develop their mental abilities to the same level as their physical abilities. Mental skill training focuses upon core skill such as concentrating, anxiety control, goal setting, motivation and relaxation techniques, imagery and self-confidence to develop mental toughness and mental strength of an athlete. In addition, the ability to perform consistency is often determined by the consistency of our emotion.

Competition can cause athletes to react both physically (somatic) and mentally (cognitive) in a manner which can negatively affect their performance abilities. Stress, arousal and anxiety are terms used to describe this condition.

The major problem in competition is letting the mind to work against runner rather than for runner. Athletes must accept parcel of the competition experience only then anxiety begin to facilitate our performance. Concentration one way to maintain focus is to set process goals for each session or competition (Example) Sprinting techniques requires the athlete to focus on being tall, relaxed, smooth and to drive with the elbow trigger would be technique athlete will develop routine for competition that may include the night before, the morning pre competition, competition and post competition routines.
Confidence is a positive state of mind and belief that one can meet the challenge ahead a feeling of being in control. It is not the situation that directly affects confidence, thoughts, assumptions and expectation can build or destroy confidence.

Physical and psychological parameters play an important role in almost all games and sports. Hence, the following dependent variables were selected for this study.

**Bio-motor Variables**

1. Speed endurance
2. Cardio respiratory endurance

**Psychological Parameters**

3. Sports competition anxiety
4. Imagery ability
5. Mental preparation
6. Self-confidence
7. Anxiety and worry management
8. Concentration ability
9. Relaxation ability

**Performance Variables**

10. Performance of 800 metres run
11. Performance of 1500 metres run

Physical activity leads to physiological, biological and psychological changes in a player. The efficiency of a physical activity result from its duration, distance and repetition (volume); load and velocity (intensity); and the frequency of performance (density). When planning the dynamics of training, one should consider these aspects, referred to as the variables of training. Throughout training phases preceding a
competition, the component should be emphasized, to achieve the planned performance objective. As a rule, the intensity should also be emphasized for sports of speed, power and volume for endurance sports.

The following training programmes were selected as independent variables for this study by considering the significance of the present study.

1. Continuous Running with Mental Training
2. Continuous Running without Mental Training

SELECTION OF TESTS

The present study was undertaken primarily to assess the effects of continuous running with mental training and continuous running without mental training on selected criterion variables such as speed endurance, cardio respiratory endurance, sports competition anxiety, imagery ability, mental preparation, self-confidence, anxiety and worry management, concentration ability, relaxation ability, performance of 800 metres run and 1500 metres run. As per the available literature the following standardized tests were used to collect relevant data on the selected dependent variables and they have been presented in Table I.
# TABLE-I
## SELECTION OF TESTS

<table>
<thead>
<tr>
<th>No</th>
<th>Criterion Variables</th>
<th>Test items</th>
<th>Unit of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Speed Endurance</td>
<td>150 Metres run</td>
<td>In seconds</td>
</tr>
<tr>
<td>2</td>
<td>Cardiac Respiratory Endurance</td>
<td>Coopers twelve minutes Run / Walk Test</td>
<td>In metres</td>
</tr>
<tr>
<td>3</td>
<td>Sports Competition Anxiety</td>
<td>Sports competition anxiety test (SCAT) Questionnaire</td>
<td>In numbers</td>
</tr>
<tr>
<td>4</td>
<td>Imagery Ability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Mental Preparation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Self – confidence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Anxiety and Worry Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Concentration Ability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Relaxation Ability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Performance of 800 Metres Run</td>
<td>800 Metres run test (2x400m track)</td>
<td>In seconds</td>
</tr>
<tr>
<td>11</td>
<td>Performance of 1500 Metres Run</td>
<td>1500 Metres run test (3 and 3/4x400m track)</td>
<td>In seconds</td>
</tr>
</tbody>
</table>

## ORIENTATION TO THE PARTICIPANTS

The investigator explained the purpose of training programme 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 procedures to be adopted by them. Five sessions were spent to familiarize the subjects with the techniques involved to execute the continuous running with mental training and continuous running without mental training. It helped them perform the continuous running with mental training and continuous running without mental training perfectly and avoid injuries. Further, the control group was specially oriented, advised and controlled to avoid the special practice of any of the specific training programme till the end of the experimental period. The subjects of all the groups were sufficiently motivated to perform their maximal level during testing periods.
COMPETENCY OF THE TESTER

All the measurement in this study was taken by the investigator with the assistance of students from Alagappa University College of Physical Education, Karaikudi. To ensure that the investigator and his assistants were well versed with the techniques 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.

RELIABILITY OF THE INSTRUMENTS

The stopwatches and measuring tape used in this study were availed from Alagappa University College of Physical Education, Karaikudi, India. The instruments were purchased from reliable and standardized companies and were considered accurate enough to serve for the purpose of the study.

REALIABILITY OF THE DATA

Test and re-test method was followed in order to establish the reliability of the data by using ten subjects at random. All the dependent variables selected in the present study were tested twice by the same personnel under similar conditions. The intra class co-efficient of correlation was used to find out the reliability of the data as suggested by Johnson and Nelson and the result have been 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>Speed Endurance</td>
<td>0.91*</td>
</tr>
<tr>
<td>2</td>
<td>Cardiac Respiratory Endurance</td>
<td>0.90*</td>
</tr>
<tr>
<td>3</td>
<td>Performance of 800 Metres Run</td>
<td>0.89*</td>
</tr>
<tr>
<td>4</td>
<td>Performance of 1500 Metres Run</td>
<td>0.91*</td>
</tr>
</tbody>
</table>

(*Significant at 0.05 level. Table value required for significant at 0.05 level with df 9 is 0.77.*)
PILOT STUDY

A pilot study was conducted to assess the initial capacity of the subjects to fix the load and also to design the training programme. For the purpose, ten subjects were selected at random and they were divided into two groups of five subjects each. Group I underwent continuous running with mental training and group II underwent continuous running without mental training for five sessions under the watchful eyes of the investigator. The initial loads of the subjects were fixed and the training programme for continuous running with mental training and continuous running without mental training were designed separately based on the performance in the pilot study. While constructing the training programme the basic principles of sports training (progression of over load and specificity) were followed. During the construction of the training programme, the individual difference was also considered.

TRAINING PROGRAMME

During the training period, the experimental groups underwent their respective training programme in addition to their regular routine. Group I underwent continuous running with mental training and group II underwent continuous running without mental training for three alternative days per week up to 12 weeks.

The training period was delimited to three alternative days per week up to 12 weeks. Group I and II underwent continuous running simultaneously for 45 to 90 minutes in three alternate days (Monday, Wednesday and Friday) during morning session for 12 weeks. Group I alone underwent mental training for 30 minutes in three alternate days (Monday, Wednesday and Friday) during evening session for 12 weeks. Group III acted as control which did not participate in any specific training on par with experimental Groups. All the subjects involved in this study were carefully monitored throughout the
training programme to be away from the injuries. They were questioned about their health status throughout the training programme. None of them reported with any injuries. However, muscles soreness appeared in the earlier period of the training programme and was reduced in due course. The detailed training schedule for continuous running and mental training are presented in Appendix VI and VII respectively.

**COLLECTION OF THE DATA**

The data on bio-motor variables of speed endurance and cardio respiratory endurance were collected by administering 150 metres run test and coopers 12 minutes run/walk test. The psychological variables namely sports competition anxiety were collected by administrating SCAT questionnaire and the imagery ability, mental preparation, self-confidence, anxiety and worry management, concentration ability and relaxation ability were collected by administrating Hardy and Nelsons mental skills questionnaire. The performance variables namely 800 metres run and 1500 metres run were collected by administering 800 metres run test and 1500metres run respectively. The pre and post test data were collected on selected criterion variables prior to and immediately after the training programme. In both the tests were administered in two consecutive days.

**ADMINISTRATION OF THE TESTS**

**BIO-MOTOR VARIABLES**

**Speed Endurance (150 metres run)**

**Purpose**

To measures the speed endurance of the Athletes.
Facilities and Equipments

Standard 400 metres track with a marking for 150 metres, electronic stopwatch, score cards and starting clapper.

Procedure

After a short warm-up period, the participants took standing start position behind the starting line. To obtain better result, two participants ran at the same time. The time elapsed from the ‘clap’ to the runner crossing the finishing line was taken as test score. The fractions were rounded to the next largest one tenth of a second. For this purpose digital electronic stopwatches were used. Two trials were conducted with sufficient rest in between and the better of the two trials were recorded.

Scoring

The time taken to run the 150 metres distance was measured in one-tenth of a second.

Cardio Respiratory Endurance (Coopers 12 Minutes Run/walk)

Purpose

To determine the Cardio respiratory endurance.

Facilities and Equipments

Measuring tape, standard 400m track, stopwatch, cone, markers and starting clapper.

Procedure

For this test, a 400 metres track was prepared with marking at every tenth metres. The investigator and the testers served as the lab scorer. The subjects were asked to stand on the starting line drawn at the finish line of the 400 metres 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.

**Scoring**

The distance covered by each in 12 minutes was recorded to the nearest tenth meter. The distance covered by the subjects was used as a measure of cardio respiratory endurance.

**PSYCHOLOGICAL VARIABLES**

**Sports Competition Anxiety Test (SCAT)**

**Purpose**

To identify the level of sports competitive anxiety among the Athletes.

**Tools Used**

SCAT (Sports Competition Anxiety Test) questionnaire was used.

**Procedure**

The SCAT questionnaire consists of 15 statements about experiences associated with anxiety feeling. Each subject was given a questionnaire and a pen. The subjects were asked to read each statement very carefully and then tick the appropriate anxiety level (sometimes, often and rarely) to indicate the extent to which one agrees with the statement. The subject was asked to answer honestly to each question in relation to his own experience.

**Scoring**

If the athlete’s score is less than 17 it will represent the lower level of anxiety, 17 to 24 means average level of anxiety and if it is more than 24 represent high level of anxiety.
Mental Skills Test

Purpose

To identify general mental strength and weakness level of the Athletes.

Tool Used

Hardy and Nelson’s mental skill questionnaire was used. This questionnaire measures six important aspects of the mental side of sport performance. They are (1) Imagery ability (2) Mental preparation (3) Self-confidence (4) Anxiety and worry management (5) Concentration ability and (6) Relaxation ability.

Procedure

The mental skills questionnaire consists of a number of statements about experiences associated with competitive sport. Each subject was given a questionnaire and a pen. The subjects were asked to read each statement very carefully and then circle the appropriate number to indicate the extent to which one agrees with the statement. The rating was based on six point scale from strongly disagree to strongly agree. The subjects were asked to answer honestly to each question in relation to their own sporting experience.

Scoring

In each item add all the four numbers which have been circled. The lower score represents weakness level and higher score represents stronger level of mental ability.

ATHLETIC PERFORMANCE VARIABLES

800 METRES RUN TEST

Purpose

The 800 meters run test can be considered an anaerobic capacity test.
Facilities and Equipments
A standard 400 Metres track with marking and stopwatches.

Procedure
The aim of this test is to find out the 800 metres performance in the quickest possible time. 800 metres run was conducted as per standard procedures suggested by IAAF followed, at time testing only four subjects were allowed to participate the events.

Scoring
The total time taken to run 800 metres is recorded 1/10 seconds performance.

1500 METRES RUN TEST

Purpose
This test measures aerobic fitness and leg muscles endurance.

Facilities and Equipments
A standard 400 Metres track with marking and stopwatches.

Procedure
The aim of this test is to find out the 1500 metres performance. 1500 metres run was conducted as per standard procedures suggested by IAAF followed, at time testing only four subjects were allowed to participate the events.

Scoring
The total time taken to run 1500 metres is recorded as 1/10 seconds of performance.

EXPERIMENTAL DESIGN
The pre test and post test random group design was used as experimental design in which forty five men subjects were randomly divided into three groups of fifteen each. Group I underwent continuous running with mental training, group II underwent
continuous running without mental training and group III acted as control. The selected subjects were tested on selected criterion variables such as speed endurance, cardio respiratory endurance, sports competition anxiety, imagery ability, mental preparation, self-confidence, anxiety and worry management, concentration ability, relaxation ability, performance of 800 metres run and 1500 metres run prior to and immediately after the training programme.

**STATISTICAL TECHNIQUES**

The paired sample ‘t’ test was used to find out the significant improvement on selected criterion variables and Analysis of Covariance (ANCOVA) was used to find out the significant difference, if any among the adjusted post test means of experimental and control groups on each variables separately. Whenever, the obtained F-ratio for adjusted post test means was found to be significant, the Scheffe’s test was applied as post hoc test to determine which of the paired mean differences was significant. In all the cases 0.05 level of confidence was fixed as a level of confidence to test the hypotheses.