CHAPTER - III

METHODOLOGY
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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 scientifically. The purpose of the study was to analyze the effects of a preseason psychomotor training package on selected physical and performance parameters related to the use of the non-dominant arm among cricketers. 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, and training programme, collection of the data, administration of the tests, experimental design and statistical techniques used.

3.1 Selection of Participants

The study was intended to find out the effects of the preseason psychomotor training package on the selected physical and performance parameters of Polytechnic college cricketers. To achieve these purpose thirty two polytechnic college self-classified right handed cricketers in the age group of 16 to 19 years were randomly selected. The subjects were randomly divided into two equal groups of sixteen each one as psychomotor training and the other as control group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Age (years)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>16</td>
<td>16.93 ± .92</td>
<td>171.8 ± 4.11</td>
<td>59 ± 1.86</td>
</tr>
<tr>
<td>Experimental</td>
<td>16</td>
<td>17.25 ± 1.06</td>
<td>172.18 ± 5.41</td>
<td>55.87 ± 4.64</td>
</tr>
</tbody>
</table>

Values given are mean ± SD
Research Flow chart

SUBJECTS
Thirty two Polytechnic College Cricket Players

Design
Pre test and Post test Random Group Design

Group I
Control Group
(n=16) ➔ PRE-TEST ➔ Physical

Speed, Muscular endurance; Grip strength, Reaction time, dominant & non-dominant arm

Group II
Experimental Group
(n=16) ➔ POST-TEST ➔ Performance

MNK Skill Test for Throwing accuracy, Throwing velocity dominant & non-dominant arm

No Specific Training
(12 weeks) ➔ Psychomotor Training
(12 weeks) ➔ Statistical Analysis (ANCOVA)
3.2 Selection of Variables

Physical and performance parameters play a decisive role in non-dominant arm throwing performance. In consultation with experts in the game of cricket and the findings of various literatures focus on throwing performance the following variables namely Speed, muscular endurance, strength, reaction time, were selected. In the performance parameter throwing velocity and MNK Skill test for accuracy were selected. It may have direct relation to the throwing performance of cricketers in competitive situations.

Speed is one component which is essential for all the sports that require dynamic movements like, basketball, skiing, and sprinting. Forearm grip strength, abdominal strength, all has direct relationship with throwing performance.

Parameters which may influence the cricket throwing skill test such as Speed, strength, endurance, throwing velocity, Cricket skill test for throwing accuracy were selected as the dependent variables for the study.

Independent Variables

Training principles are generally called a guideline and are only meant as an orientation basis for training (Zawieja, 2005). Of all human skills, speed is the hardest and most difficult to improve when compared to other factors such as strength and endurance. For this reason many attempts have been made by coaches during the last 50 yeas to invent new training methods in order to improve the speed of athletes. These attempts have led coaches to include
running in either more difficult or much easier conditions than those faced by the sprinter in track competitions.

The specific speed depends on a variety of factors, but the best way to improve speed is to increase the percentage use of the aerobic energy supply. This can be achieved, not only through an increase of the maximum oxygen uptake (the traditional method), but also through the use of specific training methods to develop the oxidative capacity of the muscles (Verkhoshansky, 1996). Psychomotor training was selected as independent variable.

**Selection of the Tests**

As per the available literature the following standardized tests were used to collect the relevant data on the selected dependent variables and they are presented in Table 3.2.

**Table 3.2**

<table>
<thead>
<tr>
<th>Criterion Variables</th>
<th>Test Items</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>30 meters run</td>
<td>1/10 seconds</td>
</tr>
<tr>
<td>Muscular Endurance</td>
<td>Sit-ups</td>
<td>Numbers</td>
</tr>
<tr>
<td>Grip Strength D &amp; ND</td>
<td>Hand Grip Strength</td>
<td>Kilograms</td>
</tr>
<tr>
<td>Velocity D &amp; ND</td>
<td>Cricket ball throw</td>
<td>KMIPH</td>
</tr>
<tr>
<td>Reaction time D &amp; ND</td>
<td>Electronic chronometer RT</td>
<td>1/100 seconds</td>
</tr>
<tr>
<td>MNK skill test for accuracy D &amp; ND</td>
<td>MNK Cricket skill test for accuracy</td>
<td>Points</td>
</tr>
</tbody>
</table>
3.3 **Orientation to the Participants**

The investigator explained the purpose of the study to the participants and their role in this 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. Five sessions were spent to familiarize the participants with the technique involved to execute the grip strength, velocity throws and cricket skill test. Further, the control group was specially oriented not to follow any specific training programme till the end of experimental period.

3.4 **Competency of the Tester**

All the measurement in this study was taken by the investigator with the assistance of two qualified cricket coaches. To ensure well versed with the techniques of conducting tests, the investigator and the coaches underwent number of practice sessions. The tester’s reliability was established by test and re-test method.

3.5 **Reliability of the Instruments**

Instruments used for this study were stopwatches, measuring tapes, hand grip dynamometer and radar gun were availed from PSG Polytechnic College, Coimbatore, India. The instruments were considered accurate enough to serve for the purpose of the study.
3.6 Reliability of the Data

Test and retest method was followed in order to establish the reliability of the data by using ten participants at random. All the dependent variables selected in the present study were tested twice by the same person under similar conditions. The intra class co-efficient of correlation was used to find out the reliability of the data the results are presented in Table 3.3

Table 3.3

Intra Class co-efficient of correlation on Selected Dependent Variables

<table>
<thead>
<tr>
<th>Test Variables</th>
<th>‘R’ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 meters run (Speed)</td>
<td>0.89*</td>
</tr>
<tr>
<td>Sit-ups (Muscular strength &amp; endurance)</td>
<td>0.86*</td>
</tr>
<tr>
<td>Grip Strength (muscular strength) Dominant</td>
<td>0.86*</td>
</tr>
<tr>
<td>Grip Strength Non dominant arm</td>
<td>0.91*</td>
</tr>
<tr>
<td>Velocity of dominant arm throw</td>
<td>0.89*</td>
</tr>
<tr>
<td>Velocity of non dominant arm throw</td>
<td>0.88*</td>
</tr>
<tr>
<td>MNK skill test for accuracy dominant arm</td>
<td>0.94*</td>
</tr>
<tr>
<td>MNK skill test for accuracy non dominant arm</td>
<td>0.89*</td>
</tr>
</tbody>
</table>

* Significant at 0.01 level of confidence

Since the obtained ‘R’ Values on selected criterion variables were much higher than the required value, the data were accepted as reliable in terms of instruments, testers and the participants.

3.7 Pilot study

Prior to the formal training sessions, a pilot study was conducted to validate research procedure and the initial capacity of the participants to fix the
load and also to design the training programme. For the purpose, five subjects were selected at random from the experimental group. The initial loads of the participants were fixed for dexterity, coordination and the training programme for resistance training, plyometrics, speed training were designed separately based on the performance in the pilot study. While constructing the training programmes the basic principles of sports training (progression of overload and specificity) were followed. During scheduling the training programme, the individual differences were also considered. The different kind of throwing movements performed by varied sports persons in games like baseball, handball, basketball, cricket, and football were recorded and the various actions performed during game situations were analyzed. The basic actions performed were noted and exercises were designed to mimic these basic actions.

3.8 Training Programme

During the training period, the experimental group underwent their training programme as given in the appendix for five days per week for 12 weeks.

The duration of training session in all days was of 2 hours which included warming up and warming down. In the initial stages of training participants underwent handwriting, finger dexterity and coordinative ability exercises. All the participants involved in this study were carefully monitored throughout the training programme to be away from injuries. None of them reported with any injury during the training period. However, muscle soreness was reported in the earlier period of training programme and was reduced in
due course. This could be because of the non dominant arm not being familiar with certain movement pattern and strength exertion over manipulative exercises.

The training programme was scheduled in the evening sessions between 4.30 to 6.30 pm five days a week for 12 weeks. The detailed training programme for the twelve weeks is presented in Appendix

3.9 Collection of the Data

The data on speed was collected by administering 30 meters run. Muscular strength of the arm was collected by administering hand grip dynamometer test. Muscular endurance test was collected by performing sit-ups test. Velocity of throw for dominant and non dominant arm was collected by Cricket ball throw. Accuracy throw test for dominant and non dominant arm were collected by administering MNK cricket skill test.

3.10 Administration of the Tests

3:10.1 Speed

Purpose

The purpose of the test was to measure running speed of the control and psychomotor training group.

Facilities and Equipments

Test course, electronic stop watch, scorecards and a starting clapper.

Procedure

The participants were allowed to run fast the distance of 30 meters by fly start. The time taken to cover the distance was measured from the starting line up to the finish line.
Scoring

The calculated time was rounded-off to one-tenth of a second (Seagrave, 1996).

3:10.2 Strength

Purpose

To measure the grip strength of the dominant and non-dominant arms of the participants.

Facilities and Equipment

Grip dynamometer, scorecard.

Procedure

The subject held the dynamometer in the hand to be tested, with the arm and the elbow by the side of the body. The handle of the dynamometer was adjusted if required - the base rested on first metacarpal (heel of palm), while the handle rested on middle of four fingers. When ready, the subject squeezes the dynamometer with maximum isometric effort, which was maintained for about 5 seconds. No other body movement is allowed. The subject was strongly encouraged to give a maximum effort. The test was performed in standing position. Subjects were allowed to press the lever once and in one effort.

Scoring

Scoring was measured to nearest kilograms.

3:10.3 Muscular Endurance

Purpose

Purpose of the test was to find out muscular strength as well as muscular endurance of the participants involved.
Facilities and Equipments

Tumbling mat, Stop watch.

Procedure

The participants were asked to do sit-ups by lying on the mat in supine position with the given time of 1 minute.

Scoring

The number completed sit-ups in one minute by the participants were counted as scores.

3.10.4 Reaction time test

Purpose

To measure the reaction time of the participants.

Facilities and equipment

Electronic Chronometer, table and chair, scorecards.

Procedure

The participant was comfortably seated in a chair, freedom of the forearm movement was ensured. Participants were asked to press the key when the visual stimulus was perceived. The time taken from sensing the stimulus to the response of pressing the key was measured. Best time out of the three efforts was calculated.

Scoring

The time taken from the visual stimulus to the response of pressing the key was measured in seconds.

3.10.5 MNK Skill Test for Accuracy

Purpose

To measure throwing accuracy of dominant and non-dominant arms.
**Facilities and equipment**

Cricket balls, score card, Thirty yards circle marked in Cricket field with stumps, target zones.

**Procedure**

The participants threw the ball from the thirty yard circle and from different fielding positions namely midon, square leg, leg slip, short thirdman, point and midoff where cricket balls were placed. All throws examined were within 1.2 m of the middle stump as measured by an accuracy target. This consisted of a frame measuring 1.3 m wide by 1.80m high was located directly outside the circles from the stumps. The target included circle zones drawn at 0.3 m, 0.6 m, 0.9 m, and 1.2 m intervals from the middle stump. The participant’s throwing movement was directly towards the target. The participant had to complete the six target throws within 30 seconds during the pre test and post test. Participant completed throwing with dominant arm first and when the whole group has completed, in the same order they completed throwing with nondominant arm.

**Scoring**

A direct hit was awarded 5 points, throws touching the outer most target circle at 1.20 m, 0.90 m, 0.60 m and 0.30m were awarded four, three, two and one point respectively.
FIGURE 1 MNK SKILL TEST FOR ACCURACY
3.10.6 Peak Velocity

Purpose
To measure the peak velocity of throws.

Facilities and Equipment
Cricket balls, Radar gun, Score card.

Procedure
Subjects were asked to throw cricket at their maximal effort towards a target of 15m from a restraining line from standing position. Subjects were allowed to take one step to prepare and release. The investigator was positioned in front of the thrower slightly in line with the direction of throw with a hand held radar gun. Peak velocity of the ball was measured immediately after the release of ball by the subjects.

Scoring
Peak velocity was measured to the nearest KMPH.

3.11 Experimental Design
This study was conducted to determine the effects of 12 weeks psychomotor training package on speed, strength, muscular endurance, reaction time, throwing velocity and throwing for accuracy in dominant and non dominant arms. A pre and post test random group design was employed for this investigation. This study consisted of two groups, namely control group and Experimental group, Group A (n=16) and Group B (n=16). All the participants were tested prior and after the experimentation on speed, strength, reaction time, throwing velocity and accuracy.
3.12 Statistics

In order to find out the significant improvement on selected dependent variables, paired ‘t’ test and independent t-test were employed. No attempt was made to equate the groups in any manner. Hence, to make adjustments for difference in the initial means and test the adjusted post test means for significant differences, the one way analysis of covariance (ANCOVA) was used (Broota, 1989). One-way univariate analysis of covariance was used to determine how each dependent variable was influenced by independent variables while controlling for a covariate (pre-test) (Hari et al., 1998). Analysis of covariance adjusts the mean of each dependent variable to what they would be if all groups started out equally on the covariate. In this study, pretest scores of selected variables have been shown to correlate with post test scores, they were considered as appropriate covariates. A preliminary analysis was conducted to determine whether the requisite assumptions of ANCOVA were met before preceding the univariate analysis. Thus, the assumption of equality of variance (homogeneity), the linear relationship between the covariates and the dependent variables and the homogeneity of regression slopes were examined. All of the statistical analysis tests were computed at 0.05 level of significance (P<0.05).