CHAPTER III

METHODOLOGY

In this chapter the methodology engineered in the selection of subjects, selection of variables, experimental design, pilot study, criterion measures, reliability of the data, reliability of instruments, tester's reliability, subject reliability, training programme, test administration and statistical treatment have been presented.

3.1 SELECTION OF SUBJECTS

The purpose of the study was to find out the effect of progressive muscular relaxation, autogenic, meditation and mental imagery trainings on selected cognitive abilities, anxiety, mood states, game skill variables and playing ability among intercollegiate hockey players.

Seventy five intercollegiate men hockey players from Chennai were randomly selected and their age ranged between 18 and 25 years. They were assigned into five equal groups. Each group consisted of fifteen subjects. Group one acted as Experimental Group I – (Progressive Muscular Relaxation), Group II acted as Experimental Group II – (Autogenic Training), Group III acted as Experimental Group III – (Transcendental Meditation), Group IV acted as Experimental Group IV – (Mental Imagery) and Group V acted as Control Group.

The requirement of the experiment procedures, testing as well as exercise schedule was explained to the subjects so as to get full co-operation of the effort required on their part and prior to the administration of the study. The subjects were given written information about the study and they gave their informed consent in writing.

3.2 SELECTION OF VARIABLES

The researcher reviewed various scientific literatures, books, journals, internet sources and research papers which revealed the importance of progressive muscular relaxation, autogenic, meditation, mental imagery, cognitive abilities, competitive anxiety, mood states, game skills and playing ability for the all round development of hockey players. Taking into the consideration of feasibility, criteria, availability of instruments and the relevance of the variable of the present study, the following dependent and independent variables were selected for this study

3.2.1 DEPENDENT VARIABLES

a) Cognitive abilities
    (i) Concentration
        a. Concentration without distraction
        b. Concentration with distraction
    (ii) Attention
        a. Attention (TMT A)
        b. Attention (TMT B)
b) Competitive anxiety
    (i) Cognitive Anxiety
    (ii) Somatic Anxiety
    (iii) Self-Confidence
c) Mood States
    (i) Tension

(ii) Depression

(iii) Anger

(iv) Fatigue

(v) Vigor

(vi) Confusion

d) Game Skill Variables

(i) Hit

(ii) Flick

(iii) Scoop

e) Hockey Playing Ability

3.2.2 INDEPENDENT VARIABLES

(i) Group I – Progressive Muscular Relaxation

(ii) Group II – Autogenic Training

(iii) Group III – Transcendental Meditation

(iv) Group IV – Mental Imagery

(v) Group V – Control Group

3.3 EXPERIMENTAL DESIGN

Pre test and post test randomized group design was applied to this research. Seventy five intercollegiate men hockey players from Chennai were randomly selected and their age ranged between 18 and 25 years. They were divided into five equal groups. Each group consisted of fifteen subjects. Pre test was conducted for all the seventy five subjects on selected cognitive abilities namely concentration and attention, competitive

anxiety variables namely cognitive anxiety, somatic anxiety and self-confidence and mood states variables namely tension, depression, anger, fatigue, vigor and confusion and game skill variables namely hit, flick and scoop. Playing ability was measured by subjective rating. This initial test scores formed as pre test scores of the subjects. Experimental Group I was exposed to progressive muscular relaxation training, experimental group II was exposed to autogenic training, experimental group III was exposed to Transcendental meditation, experimental group IV was exposed to mental imagery training and the control group was not exposed to any experimental training other than their regular hockey practice and daily activities. The duration of experimental period was 12 weeks. After the experimental treatment, all the seventy five subjects were measured on the selected cognitive abilities, competitive anxiety, mood states, game skill variables and playing ability. This final test scores formed as post test scores of the subjects. The pre test and post test scores were subjected to statistical analysis using Analysis of Covariance (ANCOVA) to find out the significance among the mean differences, whenever the 'F' ratio for adjusted test was found to be significant, scheffe's post hoc test was used. In all cases 0.05 level of significance was fixed to test hypotheses.

3.4 PILOT STUDY

The pilot study was conducted before analyzing of training programme with ten subjects with the help of experts in sports psychology and in the game of hockey to ensure the suitability, frequencies, and duration of training. The aim of the pilot study was to know the subjects capacity and to know the difficulty of conducting training programme and to set a clear understanding about the duration of time, which is required for conducting the test.

3.5 CRITERION MEASURES AND SELECTION OF TESTS

The present study was undertaken primarily to assess the "effect of progressive muscular relaxation, autogenic, meditation and mental imagery trainings on selected cognitive abilities, anxiety, mood states, game skill variables and playing ability among intercollegiate hockey players**".**

The following tests were administered to measure the selected cognitive abilities, anxiety, mood states, game skill variables and playing ability. The tests were administered to the subjects before and after the training programme.

TABLE – I

TEST SELECTION

SI.No.	Criterion Variables	Test Item	Unit of Measurements
1.	Concentration	Letter cancellation Test (as cited in Shahin Ahmed, 1993)	Score
2.	Attention	Trail Making Test (Reitan, 1986)	Seconds
3.	Cognitive Anxiety	Competitive State Anxiety Inventory-2 (CSAI-2) (Martens, Vealey, & Burton, 1990). (Illinois Self-evaluation Questionnaire)	Score
4.	Somatic Anxiety		Score
5.	Self-Confidence		Score
6.	Tension	Brunel Mood Scale (BRUMS: Terry et al., 2003).	Score
7.	Depression		Score
8.	Anger		Score
9.	Fatigue		Score
10.	Vigor		Score
11.	Confusion		Score
12.	Hit	Munjal's Hockey Skill Test Battery (Dilip Dureha and Akhil Mehrotra, 2003)	Points
13.	Scoop		

14.	Flick		
15.	Playing Ability	Subjective Rating	Score

3.6 RELIABILITY OF DATA

The reliability of data was established by using test-retest method. To achieve this purpose, ten subjects were randomly selected and the test was administered twice after a day's gap. Care was taken to keep all testing conditions uniformly during testing and retesting. The scores recorded for the ten subjects during the test and retests were correlated using Intra Class Correlation for the different variables. The co-efficient of correlation is presented in Table – II.

TABLE – II

INTRA CLASS CORRELATION CO-EFFICIENT OF TEST - RETEST SCORES

S.No.	Criterion Variables	Correlation Co-efficient 'r'
1.	Concentration without Distraction	0.91*
2.	Concentration with Distraction	0.87*
3.	Attention (TMT A)	0.94*
4.	Attention (TMT B)	0.90*
5.	Cognitive Anxiety	0.85*
6.	Somatic Anxiety	0.87*
7.	Self-Confidence	0.81*
8.	Tension	0.87*
9.	Depression	0.84*
10.	Anger	0.86*
11.	Fatigue	0.87*
12.	Vigor	0.90*
13.	Confusion	0.83*
14.	Hit	0.92*
15.	Flick	0.89*
16.	Scoop	0.94*
17.	Hockey Playing Ability	0.88*

*Significance at .05 level of confidence

3.7 RELIABILITY OF INSTRUMENT

The reliability of the instruments such as Stop watches and Measuring tapes used in recording the data on selected variables were reliable as they were supplied by the standard manufacturers who have certified these instruments with regard to their calibration.

3.8 RELIABILITY OF THE QUESTIONNAIRE AS A TOOL

The questionnaires used in this study such as Competitive State Anxiety Inventory-2 (CSAI-2) and Brunel mood scale (BRUMS) were standardized by the authors concerned by statistically proving the validity, reliability and objectivity of the questionnaires.

3.9 TESTER'S RELIABILITY

Tester's reliability was established by test-retest procedures. For this purpose two subjects were selected at random on the chosen variables, which were recorded twice under identical conditions on different occasions by the investigator.

3.10 SUBJECT RELIABILITY

Prior to the test administration, the exercise and the test procedure were explained in detail to subjects to ensure proper understanding and secure effective cooperation so as to derive reliable data from the tests. Demonstration was done before the subjects prior to the actual collection of data. The training programme was conducted under the personal supervision of the research scholar with the assistance of sports psychology personnel.

3.11 ORIENTATION OF SUBJECTS

In order to get the full co-operation from the subjects, the investigator clearly explained the purpose of the study to them.

Prior to the experiment, the training and the test procedures were explained to the subjects in detail to ensure proper understanding and helpful co-operation and to obtain and measure reliable data from the tests.

3.12 TRAINING PROGRAMME

During the training period the experimental groups underwent their respective training programme in addition to their daily routine activities and regular hockey practices as per the schedule. Experimental groups namely progressive muscular relaxation training, autogenic training, transcendental meditation and mental imagery training underwent their respective experimental training on three alternate days per week for twelve weeks.

The experimental training programmes were designed based on the resources collected from books, periodicals, e-materials and discussions with the experts. The duration of experimental training were planned for 45 to 60 minutes. The subjects reported for experimental training between 7.30 am and 8.30 am after their regular hockey practices. All the subjects involved in this study were carefully monitored throughout the training programme.

3.12.1 PROGRESSIVE MUSCULAR RELAXATION TRAINING

Progressive muscular relaxation starts with one muscle group, adds another when first is relaxed, and progresses through the body until total body relaxation occurs. It starts with the distal muscle groups (the feet and legs) and moves to the proximal muscle groups (the head and trunk) afterward (Greenberg, 2008).

3.12.1.1 DESCRIPTION OF PROGRESSIVE MUSCULAR RELAXATION TRAINING

The following steps were used during the relaxation period.

1. Close both eyes, take two deep breaths, and feel “let go”.
2. Extend both arms straight out and clench the fists... gradually increase the tension level until all the muscles in the fingers and hands are fully tight... then relax... let te arms drop naturally. Be aware of the difference between feeling “tense” and “relaxed”.
3. Extend both arms again, straight out, and tense the muscles of the lower arm and elbow... hold it, become aware of the feeling... now relax… let the arms drop naturally to the side.
4. Tense the muscles in forehead by frowning... hold it, become aware of the feeling... now relax... let all the muscles in the forehead become smoother and smoother.
5. Tense the muscles in the face... grimace... hold it, become aware of the feeling... now relax.
6. Tense the muscles in the neck... hold it, become aware of the feeling... now relax.
7. Tense the muscles of the shoulders... hold it, become aware of the feeling... now relax.

8. Tense the muscles of the back, first the upper back and then the lower... hold it, become aware of the feeling... now relax.
9. Tense the muscles of the chest... hold it, become aware of the feeling... now relax.
10. Tense the muscles of the stomach... hold it, become aware of the feeling... now relax.
11. Tense the muscles of the abdomen... hold it, become aware of the feeling... now relax.
12. Tense the muscles of the upper leg - all the muscles of the thigh... hold it, become aware of the feeling... now relax.
13. Tense the muscles of the lower leg - all the muscles of the knee and calf... hold it, become aware of the feeling... now relax.
14. Tense the muscles of the feet and toes... hold it, become aware of the feeling... now relax.
15. Now concentrate on relaxing all the muscles of your body. Become aware of any areas that might still be tense in any way, and relax them. Maintain this state of total muscle relaxation for at least two to three minutes.
16. Open the eyes, stretch, and feel refresh.

3.12.2 AUTOGENIC TRAINING

Schultz's autogenic training consisted of a series of exercise designed to bring about these two physical sensations and, thereby, an autohypnotic state. The generalized warmth was a function of the dilation of blood vessels, resulting in increased blood flow. The sensation of heaviness was caused by muscles relaxing. Because both vasodilation and muscle relaxation are components of the relaxation response, autogenic training

exercises have been employed as a relaxation technique designed to help people better manage the stress in their lives (Greenberg, 2008).

3.12.2.1 DESCRIPTION OF AUTOGENIC TRAINING

The Breathing Warm-up

Warm-up is given before every autogenics practice session, even after the techniques have become proficient at the more advanced exercises.

Begin a process of deep breathing, exhaling to a mental count that is twice as long as you inhale. With each breath cycle, increase the duration. For instance, inhale counting, "One," exhale counting, "One, Two." Inhale counting, "One, Two;" exhale counting, "One, Two, Three, Four." Go up the scale to six counts in, twelve counts out. Then reverse: six counts in, twelve counts out; five counts in, ten counts out; and so on, down to one count in, two counts out.

Stage 1: Heaviness

After the Breathing Warm-up, Phase 1 practice begins with the right arm. (But in chase, if the subjects are left-handed, begin, in this as in all other exercises, on the left side.) Breathe deeply, one count in, one count out, and silently repeat the following formula—the first half of each phrase (the part before the "/") as the subject inhale, the second half (the part after the "/") as the subject exhale:

My right arm is getting / limp and heavy	-	6-8 times
My right arm is getting / heavier and heavier	-	6-8 times
My right arm / is completely heavy	-	6-8 times

My left arm is getting / limp and heavy	-	6-8 times
Both my arms are getting / limp and heavy	-	3-5 times
My right leg is getting / limp and heavy	-	6-8 times
My left leg is getting / limp and heavy	-	6-8 times
Both my legs are getting / limp and heavy	-	3-5 times
My arms and legs are getting / limp and heavy	-	6-8 times
I feel / supremely calm	-	1 time

This routine was practiced for a period of two weeks (1st & 2nd week)

The Phase 1 routine takes atleast two weeks of practice.

At the end of the one week, the last cycle of this routine will from now on be known as your final Heaviness Formula:

My arms and legs are getting / limp and heavier	-	6-8 times
My arms and legs are getting / heavier and heavier	-	6-8 times
My arms and legs are / completely heavy	-	6-8 times
I feel / supremely calm	-	1 time

Stage 2: Warmth

Phase two begins with the Warm-up breathing exercise and followed by the final Heaviness Formula with all the repetitions. (Heaviness—and the muscular relaxation it represents—is critical to the rest of the training. So the subjects need to master it well right from the start.) At the end of the Heaviness Formula the below mentioned exercises for warmth are added:

My right arm is getting / limp and warm	-	6-8 times

My right arm is getting / warmer and warmer	-	6-8 times
My right arm / is completely warm	-	6-8 times
My left arm is getting / limp and warm,	-	6-8 times
Both my arms are getting / limp and warm,	-	3-5 times
My right leg is getting / limp and warm,	-	6-8 times
My left leg is getting / limp and warm,	-	6-8 times
Both my legs are getting / limp and warm,	-	3-5 times
My arms and legs are getting / limp and warm	-	3-5 times
I feel / supremely calm	-	1 time

This routine (the Heaviness Formula combined with the warmth exercises) was practiced for a period of two weeks (3rd & 4th week).

The Phase 2 routine takes at least two weeks of practice.

At the end of the four weeks, the subjects were asked to use a final Heavy/Warm Formula to sum up the first two exercises:

My arms and legs are getting / limp and heavy and warm	-	6-8 times
My arms and legs are getting / heavier and warmer	-	6-8 times
My arms and legs are / completely heavy and warm	-	6-8 times
I feel / supremely calm	-	1 time

The subjects had practiced this Heavy/Warm Formula (beginning with the Warm-up breathing exercise) for two sessions at the end of second week.

Stage 3: A Calm Heart

Phase three begins with Warm-up and then followed by routine which incorporates the subjects previous work (the Heavy/Warm Formula) and adds the calm heart exercise:

My arms and legs are getting / limp and heavy and warm	-	1-2 times
My arms and legs are getting / heavier and warmer	-	1-2 times
My arms and legs are / completely heavy and warm	-	1-2 times
I feel / supremely calm	-	1 time
My chest feels / warm and pleasant*	-	6-8 times
My heartbeat is / calm and steady	-	6-8 times
I feel / supremely calm	-	3-5 times

* This phrase helps to achieve a calm heart response, but it will be dropped after this exercise.

This routine was practiced for two weeks.

Stage 4: Breathing

Phase four begins with Warm-up and then followed by routine which incorporates all the subjects previous work and adds command of their breathing as well:

My arms and legs are getting / limp and heavy and warm	-	1-2 times
My arms and legs are getting / heavier and warmer	-	1-2 times
My arms and legs are / completely heavy and warm	-	1-2 times
My heartbeat is / calm and steady	-	1-2 times
I feel / supremely calm	-	1-2 times
My breathing is / supremely calm	-	6-8 times

I feel / supremely calm - 1 time

This routine was practiced for two weeks.

After these practices the subjects would probably have begun to notice some pleasant and surprising effects from this practice. But they were continued on to further refine their sense of bodily command.

Stage 5: Stomach

Phase five begins with Warm-up and then followed by routine which helps them add a radiant feeling of central warmth and peace to their body:

My arms and legs are getting / limp and heavy and warm - 1-2 times

My arms and legs are getting / heavier and warmer - 1-2 times

My arms and legs are / completely heavy and warm - 1-2 times

My heartbeat is / calm and steady - 1-2 times

I feel / supremely calm - 1-2 times

My breathing is / supremely calm - 1-2 times

I feel / supremely calm - 1-2 times

My stomach is getting / soft and warm - 6-8 times

I feel / supremely calm - 1 time

This routine was practiced for two weeks.

Stage 6: Cool Forehead

Phase six begins with Warm-up and then followed by routine which helps the subjects to add a calm, stabilizing sensation of coolness to their forehead:

My arms and legs are getting / limp and heavy and warm - 1-2 times

My arms and legs are getting / heavier and warmer	-	1-2 times
My arms and legs are / completely heavy and warm	-	1-2 times
My heartbeat is / calm and steady	-	1-2 times
I feel / supremely calm	-	1-2 times
My breathing is / supremely calm	-	1-2 times
I feel / supremely calm	-	1-2 times
My stomach is getting / soft and warm	-	1-2 times
I feel / supremely calm	-	1-2 times
My forehead is / cool	-	6-8 times
I feel / supremely calm	-	1 time

This routine was practiced for two weeks.

Completion

By this time the subjects would have mastered all the six phases of the basic training. And now their final condensed Autogenics Formula is as follows:

Warm-up

My arms and legs are / heavy and warm	-	1-2 times
My heartbeat and breathing are / calm and steady	-	1-2 times
My stomach is / soft and warm	-	1-2 times
My fore head is / cool	-	1-2 times
I feel / supremely calm	-	1-2 times.

To maintain the proficiency of the subjects, it was recommended to practice the technique at least once a day.

3.12.3 TRANSCENDENTAL MEDITATION

It is a simple, natural, effortless procedure practiced sitting comfortably with the eyes closed. It's not a religion, philosophy, or lifestyle. It's the most widely practiced, most researched, and most effective method of self-development.

The Transcendental Meditation technique allows the mind to settle inward beyond thought to experience the source of thought — pure awareness, also known as transcendental consciousness. This is the most silent and peaceful level of consciousness — of one's innermost Self. In this state of restful alertness, brain functions with significantly greater coherence and the body gains deep rest.

3.12.3.1 DESCRIPTION OF TRANSCENDENTAL MEDITATION TRAINING

The actual practice of Transcendental Meditation involves a simple technique of sitting in a comfortable position with eyes closed and silently, effortlessly repeating a mantra. This is easily learned and only requires 40 minutes each day. The mantras used such as "om" (first - third week), "ahhom" (fourth - sixth week), "I feel calm and at peace in the universe…" (Seventh - ninth week) and the mantras of their feelings (tenth - twelfth week). This TM technique was practiced in the morning between 7:30 and 8:30am.

Instructions

The following were given to subjects

- Close your eyes. Let mind and body relax.
- Make sure you are breathing deeply, slowly and properly.

- Say the mantra to yourself slowly and softly and repeat this mantra for approximately 2-3 minutes.
- Having said your mantra, it's now time to move the mantra to your head. So, stop saying the mantra out loud. Allow it to continue in your head. It's important to be aware of the mantra without forcefully focussing on it.
- Become aware of the universe around you. Feel closeness and oneness with the universe. Continue to repeat the mantra in your mind for up to thirty to forty minutes.
- If you should happen at some time to forget the mantra, remain calm and simply allow the mantra to return to you naturally.
- If different words or a different mantra happen to enter your mind, do not permit yourself to focus on it. Remain with the original mantra.

3.12.4 MENTAL IMAGERY TRAINING

It is a particular mental training that includes the use of all senses to produce a comprehensive experience in the mind of the athlete (Ungerleider, 1996). Mental imagery and self-talk strategies are implemented by athletes in order to regulate arousal, reduce maladaptive behaviors, reconstruct negative thoughts, and to increase one's concentration and focus. There are many names for mental imagery including visualization, mental rehearsal, mental practice, and cognitive enactment (Short, Ross-Stewart and Monsma, 2006).

3.12.4.1 DESCRIPTION OF THE MENTAL IMAGERY TRAINING

Phase I

Vividness

Good imagers use all of their senses to make their images as vivid and detailed as possible. It is important to create or recreate as closely as possible the actual experience in the mind. The subjects were familiar with the playing surface, grandstands, background, colors, and other environmental details. The subjects practiced getting vivid images with the three vividness exercises that follow.

Vividness Exercises

1. Imagining Play field: The subjects were asked to imagine that they are in the play field and instructed to look around and take in all the details includes the shape and texture of the play field, sounds in and around, the climatic conditions etcetera.
2. Imagining a Positive Performance of a skill: the subjects were asked to select a particular skill in hockey and they visualize performing it perfectly. The subjects perform the skill over and over in their mind, and imagine every feeling and movement in their muscles.
3. Imagining a Positive Performance: The Subjects were asked to recall as vividly as possible a time when they performed very well. The subjects visualization must cover three specific areas of recall: visual, auditory and kinesthetic. First, the subjects visually recall how they looked when performing well and playing poorly. The subjects were asked to get as clear a picture as possible of what they look like when they are playing well and suggested to review films of successful performances to help crystallize the image. Next, the subjects were asked to reproduce the sounds in the mind as they hear when playing well, particularly the

internal dialogue that they have with themselves. Finally, recreate in mind all the kinesthetic sensations that they have when playing well, like, how the feet and hands feel, how the muscles feel tight or relaxed. The subjects were asked to stay focused on the sensations associated with playing well.

Phase II

Controllability

Another key to successful imagery is learning to manipulate the images so they do what they want to do them. Many athletes have difficulty in controlling their images and often find themselves repeating their mistakes as they visualize.

Controllability Exercises

1. Controlling performance: the subjects were asked to imagine working on a specific skill that has given them trouble in the past and suggested to take careful notice of what they were doing wrong. Next, they were asked to imagine themselves performing that skill perfectly while seeing and feeling the movements.
2. Controlling performance against a tough opponent: the subjects picture themselves playing a tough opponent who has given him trouble in the past. The subjects try to execute a planned strategy against this person just as they would for a competition. The subjects should imagine situations in which they are getting best of their opponent.
3. Controlling emotions: the subjects picture themselves in a situation in which they tense up, become angry, lose concentration, or lose confidence (for example: missing a field goal). Then they recreate the situation, especially the feelings that

accompany it. Next, the subjects feel the anxiety and then use anxiety management strategies to feel the tension drain from the body and try to control what they see, hear, and feel in their imagery.

Phase III

Positive Self-Talk

Self talk can be in the form of words actually spoken, or in the form of thoughts that come into subject's mind. Self talk words and phrases such as "I can", "Focus", "Stay with him", "Now", "I See the Goal Post" or "I see the target".

3.13 DESCRIPTION OF THE TRAINING SCHEDULE

Experimental Group I was exposed to Progressive muscular relaxation, experimental group II was exposed to Autogenic Training, experimental group III was exposed to Transcendental Meditation, experimental group IV was exposed to Mental Imagery Training and the control group was not exposed to any experimental training other than their regular daily activities and hockey Practices.

Every session starts after the regular hockey Practices. Before the experimental training begins the subjects were taken to a calm environment and made to sit comfortably. Each training session was divided into three parts in all the four groups respectively. The first part contains Breathing exercises followed by major experimental training and the third session ends with deep breathing exercises. The trainings were lasted up to forty five to sixty minutes.

The experimental training programmes are show in Figures 1 – 10

3.14 TEST ADMINISTRATION

The following tests were administered to measure the selected cognitive abilities, competitive anxiety, mood states, game skill variables and playing ability. The tests were administered to the subjects prior to the training programme and after 12 weeks of training.

TABLE – III

TABLE SHOWING THE SELECTED VARIABLES AND TESTS ADMINISTERED

SI.No.	Criterion Variables	Test Administration
I	**Cognitive Abilities** 1. Concentration 2. Attention	1. Letter cancellation Test (as cited in Shahin Ahmed, 1993) 2. Trail Making Test (Reitan, 1986)
II	**Competitive Anxiety** 3. Cognitive Anxiety 4. Somatic Anxiety 5. Self-Confidence	Competitive State Anxiety Inventory-2 (CSAI-2) (Martens, Vealey, & Burton, 1990). (Illinois Self-evaluation Questionnaire)
III	**Mood States** 6. Tension 7. Depression 8. Anger 9. Fatigue 10. Vigor 11. Confusion	Brunel Mood Scale (BRUMS: Terry et al., 2003).
IV	**Game Skill Variables** 12. Hit 13. Scoop 14. Flick	Munjal's Hockey Skill Test Battery (Dilip Dureha and Akhil Mehrotra, 2003)
V	15. Hockey Playing Ability	Subjective Rating

3.14.1 TESTER'S ASSISTANTS

The investigator was assisted by sport psychology personnel working in Chennai. They were assisting the investigator voluntarily for the conduct of test and collection of relevant data under the direct supervision of the investigator. Those who were assisting the tester were given proper instructions and practice for conducting the actual tests.

3.14.2 CONCENTRATION

Purpose

To measure the concentration of hockey players

Facilities and Equipments

A class room, letter cancellation sheet, pencil and stop watch.

Procedure

A sheet consisting of all 26 alphabets (in block letters) of the English language presented in a jumbled manner with equal spaces between any two letters was used as the tool, for assessment of concentration. A stop watch was used for keeping the time factor constant. The test was administered individually. The subject was seated comfortably and was given a letter cancellation sheet with a pencil. The following instructions were given, when the investigator say 'start' the subject should cancel out the letters 'A' and 'E' from the top left going through the sheet line by line. Cancel out as many as possible of these letters, till the investigator say 'stop'. Two trials for 1 minute with and without distraction, between the trials a rest period of 1 minute were given. First trail was conducted for concentration without distraction of any physical stimuli for 1 minute and

second trail was conducted for concentration with distraction by using certain physical stimuli such as pinching, shaking the pen etcetera.

Scoring

The correctly cancelled out letters in each trial were counted; wrongly cancelled and omitted letters were accounted as errors. One fourth of the errors were subtracted from the number of right responses. Thus, the formula R-1/4 W (R = Right Answers and W = Wrong Answers) was used for every trial. The average of 2 trials was taken as the index of concentration. Therefore, the higher score, the better the concentration (as cited in Shahin Ahmed, 1993).

3.14.3 ATTENTION

Purpose

Trail Making Test measures attention, speed, and mental flexibility. It also tests spatial organization, visual pursuits, recall, and recognition.

Facilities and Equipments

A classroom, Trail making Test (TMT A & B) worksheet, pencil, paper, writing pad.

Description of the Questionnaire

The Trail making Test (TMT A & B) was developed by Reitan (1986). It is a measure of attention, speed, and mental flexibility. It also tests spatial organization, visual pursuits, recall, and recognition. Part A requires the individual to draw lines to connect 25 encircled numbers distributed on a page. Part A tests visual scanning, numeric sequencing, and visuomotor speed. Part B is similar except the person must alternate between numbers and letters and is believed to be more difficult and takes longer to

complete. Part B tests cognitive demands including visual motor and visual spatial abilities and mental flexibility. Both sections are timed and the score represents the amount of time required to complete the task.

Administration of the test:-

The subject was seated in a well lighted classroom and the worksheet was distributed along with a pencil. After distributing the worksheet a brief introduction was given about filling up the worksheet. Instructions: Both parts of the Trail Making Test consist of 25 circles distributed over a sheet of paper. In Part A, the circles are numbered 1 – 25, and the subject should draw lines to connect the numbers in ascending order. In Part B, the circles include both numbers (1 – 13) and letters (A – L); as in Part A, the subject draws lines to connect the circles in an ascending pattern, but with the added task of alternating between the numbers and letters (like, 1-A-2-B-3-C, etcetera.). The subject should be instructed to connect the circles as quickly as possible, without lifting the pen or pencil from the paper. Time the subject as he connects the "trail." If the subject makes an error, point it out immediately and allow the subject to correct it. Errors affect the subject's score only in that the correction of errors is included in the completion time for the task. It is unnecessary to continue the test if the subject has not completed both parts after five minutes have elapsed.

Scoring

Results for both TMT A and B are reported as the number of seconds required to complete the task; therefore, higher scores reveal greater impairment (Reitan, 1986).

	Average	**Deficient**	**Rule of Thumb**
Trail A	29 seconds	> 78 seconds	Most in 90 seconds

Trail B	75 seconds	> 273 seconds	Most in 3 minutes

3.14.4 COMPETITIVE ANXIETY

Purpose

To assess the cognitive anxiety, somatic anxiety and self-confidence of the subjects.

Facilities and Equipments

A class room, Competitive State Anxiety Inventory - 2 (CSAI-2, Martens et al. 1990) questionnaire, pencil, paper, writing pad.

Description of the test:

The Competitive State Anxiety Inventory-2 (CSAI-2), a sport-specific state anxiety scale developed by Martens, Vealey, and Burton (1990). The scale divides anxiety into three components: cognitive anxiety, somatic anxiety, and a related component-self-confidence. Self-confidence tends to be the opposite of cognitive anxiety and is another important factor in managing stress. This questionnaire consists of 27 items, whereas 9 items in each subscales.

Administration of the test

The subjects were seated in a well lighted classroom and the questionnaire was distributed along with a pencil. After distributing the questionnaire a brief introduction was given about filling up the questionnaire. The subjects were asked to describe their feelings for each statement and circle the appropriate number to indicate how they feel right now, at this moment. There are no right or wrong answers. The CSAI-2 normally takes less than 5 minutes to complete.

Scoring

The CSAI-2 is scored by computing a separate total for each of the three sub-scales, with scores ranging from a low of 9 to a high of 36. The higher the score, the greater the cognitive or somatic A-state or the greater the self-confidence. No total score for the inventory is computed.

The cognitive A-state subscale is scored by totalling the responses for the following 9 items: 1, 4, 7, 10, 13, 16, 19, 22, and 25. The somatic A-state subscale is scored by adding the responses to the following 9 items: 2, 5, 8, 11, 14R, 17, 20, 23, and 26. Scoring for item 14 must be reversed in calculating the score for somatic A-state subscale as indicated below: (Martens et al. 1990)

1=4
2=3
3=2
4=1

3.14.5 MOOD STATES

Purpose

The Brunel Mood Scale was developed to provide a quick assessment of mood states.

Facilities and Equipments

A class room, Brunel Mood Scale (BRUMS) Questionnaire, pencil, paper, writing pad.

Description of the test

The BRUMS is derived from the Profile of Mood States. It is a 24-item questionnaire of simple mood descriptors such as angry, nervous, unhappy, and energetic.

The BRUMS has six subscales, with each of the subscales containing four mood descriptors. The subscales are anger, confusion, depression, fatigue, tension, and vigor.

Administration of the test

The subject was seated in a well lighted classroom and the questionnaire was distributed along with a pencil. After distributing the questionnaire a brief introduction was given about filling up the questionnaire. The subjects were asked to indicate the extent to which they have experienced the feelings described by the 24 mood descriptors. Responses are recorded using a 5-point Likert scale, where '0' = 'Not at all', '1' = 'A little', '2' = 'Moderately', 3 = 'Quite a bit', and '4' = 'Extremely'. The standard reference timeframe used is "How you feel right now", although a variety of other reference time periods can be used. The BRUMS has been shown to be a valid and reliable measure of mood in several scientific studies. The average completion time of the BRUMS is 1 to 2 minutes.

Scoring

BRUMS data were converted to standard score format using tables of normative data from Terry et al. (2003) on young athletes.

3.14.6 HIT

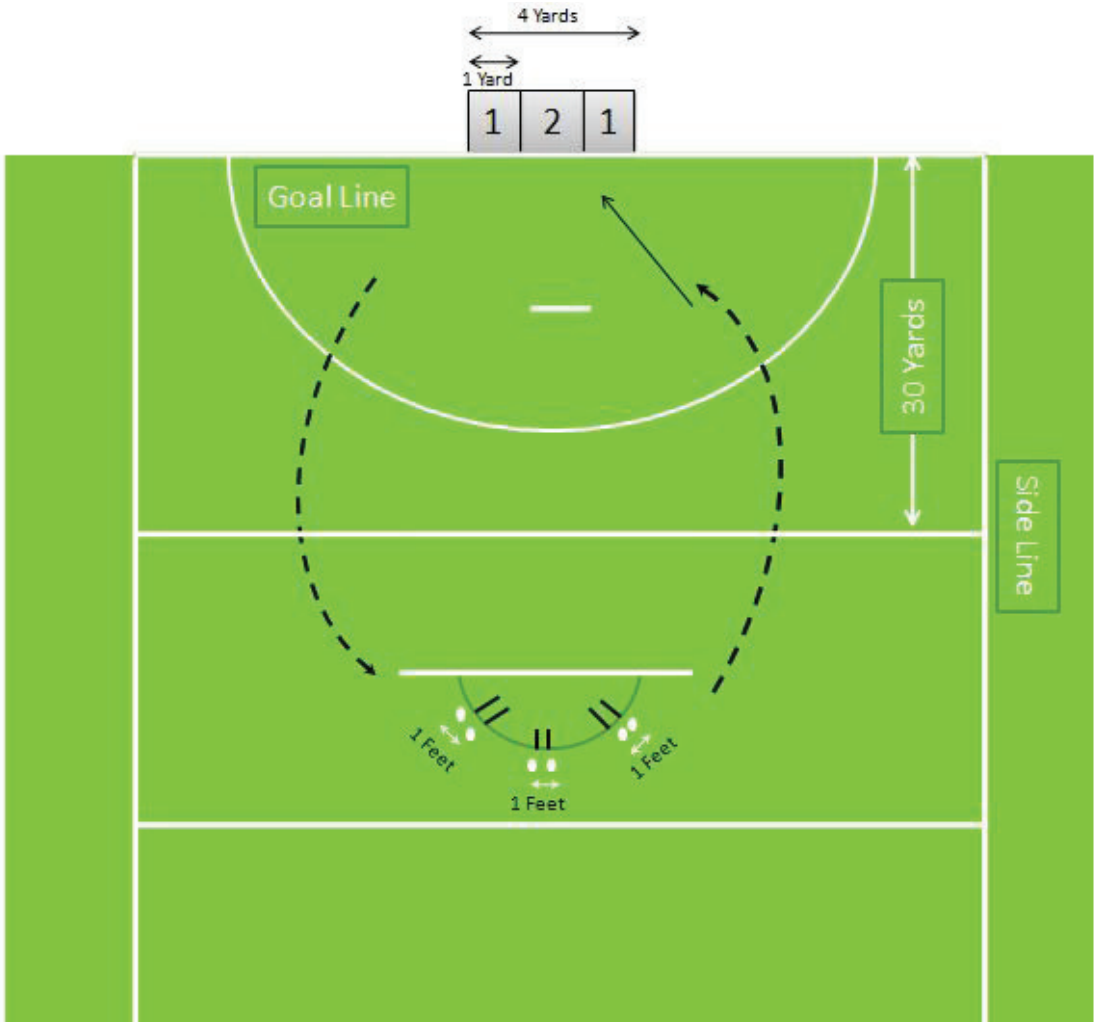

Figure – 11: Figure showing the field markings of Hit Test

Purpose

To measure the hitting ability of the hockey players.

Field Marking

A semi-circle was marked 30 yards (27.43m) away from the goal line and divided equally in three parts by one feet marking on curved line. A 4 yard (3.66m) goal line was marked centre of the shorter perimeter line of the hockey field with a flag placed at a

distance of 1 yard (0.91m) each from the two ends of goal line towards the centre of goal line as shown in the figure-11.

Procedure

Six balls placed at the five yard semi-circle in three parts by one feet marking on curved line. On the whistle player picks up first ball from right rolls it towards the centre sheet of the shooting circle and hits towards the goal and has pick the second ball from mid of semi-circle and so on as numbered.

Scoring

If the ball passes through the central area of the goal post between the flag posts within marked two yards then two points(2) are accounted. If the ball passes between the flag and goal post one point is accounted and no point is given if ball misses the goal and hits the goal post rebounds off in the ground or crosses over the goal line (Dilip Dureha and Akhil Mehrotra, 2003).

3.14.7 SCOOP

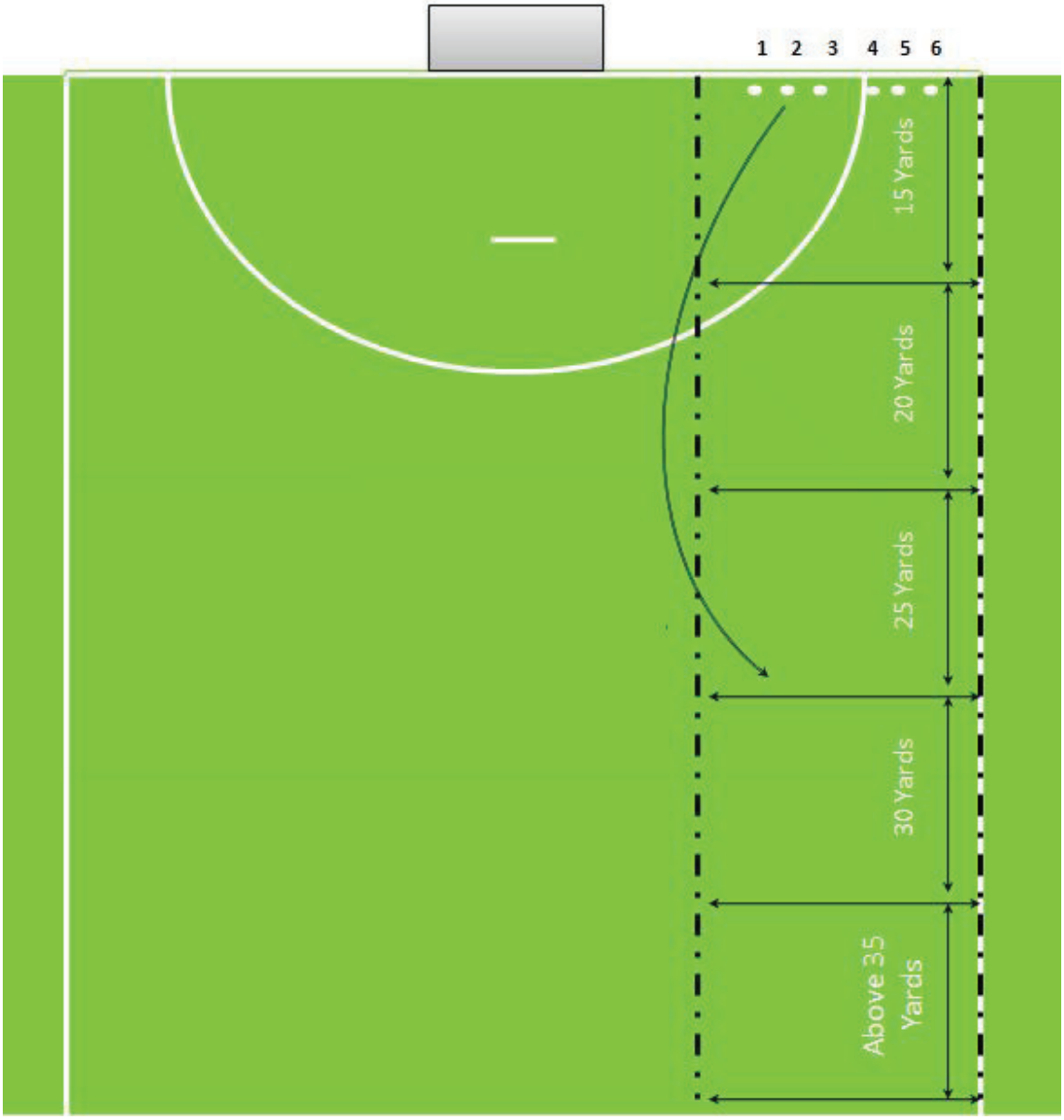

Figure – 12: Figure showing the field markings of Scoop Test

Purpose

To measure the scooping ability of the hockey players.

Field Marking

A starting line is marked on the open field at a distance of 5 yards (4.57m). From the starting line at a distance of 15 yards (13.72m) first spot is marked to place the flag and the next spot is marked after every 5 yards up to 30 yards (4.57m to 27.43m). A 4ft spot is marked away from the starting line for the balls to be placed as shown in the figure-12.

Procedure

Six balls are placed four feet away from the starting line. On the whistle the player standing in starting line rolls the ball upto starting line and scoops it at the minimum height of four feet (which was judged by flag placed at a distance on marked lines). The players are instructed to complete all the six balls continuously one after the other.

Scoring

Points are scored according to the landing of the ball in the marked zone as shown in the figure-12 and no point is allowed if the ball does not land in the square. No binding at the square if the ball lands over thirty yards (Dilip Dureha and Akhil Mehrotra, 2003).

3.14.8 FLICK

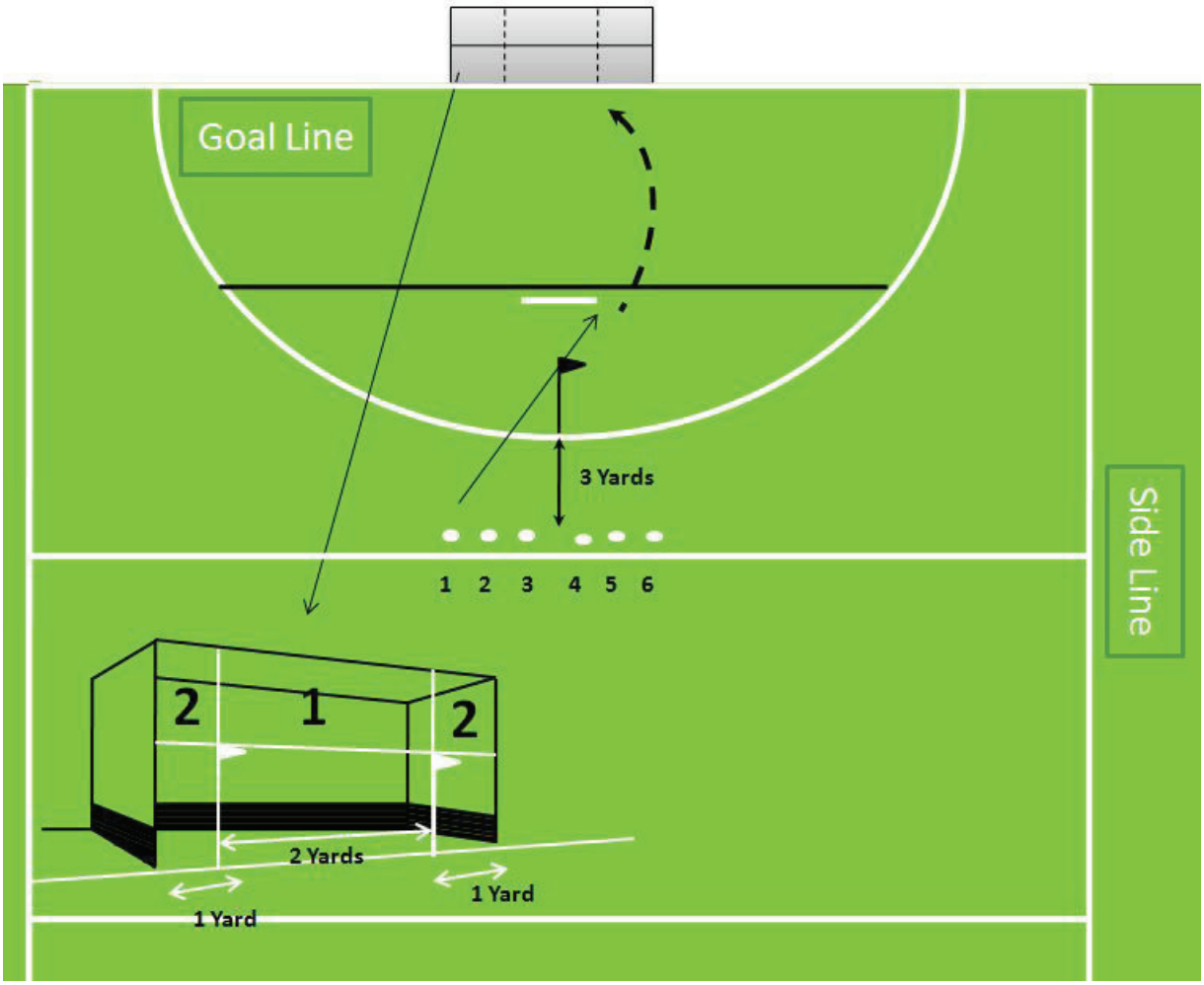

Figure – 13: Figure showing the field markings of flick Test

Purpose

To measure the flick skill ability of the hockey players.

Field Marking

A line is marked 3 yards (2.74m) away from the shooting circle where the balls are placed. A 4yard goal line was marked centre of the shorter perimeter line of the hockey field with a flag placed at a distance of 1 yard (0.91m) each from the two ends of

goal line towards the centre of goal line as shown in the figure 13. A line is marked on the penalty spot i.e. 6.40m from the centre of the goal line.

Procedure

Six balls are placed 3 yards (2.74m) outside the shooting circle. A player standing in the line of the balls rolls the first ball from right side of the flag towards the target and flick it into the goal must be above the 18inches board height into the net. The second ball is to be carried from the left side of the flag and continues till all the balls are played or time gets over. The balls must be flicked from within the shooting circle before crossing the penalty spot line.

Scoring

The player scores the points as shown in the figure 13 for each flick. No point is scored, if the ball touches the goal board, the goal post and rebound off in the ground. The points are allowed accordingly if the ball touches the flag or goal post and lands into the net (Dilip Dureha and Akhil Mehrotra, 2003).

3.14.9 PLAYING ABILITY

Purpose

To analyze the playing ability of the hockey players.

Description

Subjective rating of player performance involves a panel of three experts in the game of hockey. The three experts evaluated the player's performance in hockey for 100 marks. The framed score sheet has the subjects scores of dribbling / ball control, passing / serving, receiving / first touch, shooting / crossing / striking, speed / first to ball, fitness, defensive technique, game sense / knowledge of rules, positioning / spatial and

commitment to game. The average of the three experts rating was taken as a score. Thus the scoring for the playing ability were made in detailed in Table – IV

TABLE IV

SHOWING THE PLAYING ABILITY ASSESSMENT SCORE SHEET

S.No.	Playing Ability Skills	Marks
1.	Dribbling / Ball control	10
2.	Receiving / First Touch	10
3.	Passing / Serving	10
4.	Shooting / Crossing / Striking	10
5.	Speed / First to Ball	10
6.	Fitness	10
7.	Defensive Technique and understanding	10
8.	Game Sense / knowledge of rules	10
9.	Positioning / Spatial Awareness	10
10.	Commitment to Game	10
	Total Marks	**100**

Scoring

Test items **1 to 10** were scored by the experts according to the following descriptions of the playing ability skills scoring key.

Description of Playing Ability Skills Scoring Key:

1) Dribbling / Ball Control: The subject's acquisition of the technique of moving the ball quickly, while under complete control combining pace, deception and skill using the stick.

2) Receiving / First touch: Shows for the ball and receive cleanly. The subject has to use the stick to trap the ball by using their body effectively to trap even air balls. The subject does not wait for the ball, runs to the ball to receive it.
3) Passing / Serving: To accurately and concisely pass the ball at the correct pace to a teammate.
4) Shooting / Crossing / Striking: The ability to strike on goal with a variety of techniques from differing ranges and angles, with composure, showing the touch to score goals. The ability to drive long passes from proper shooting technique, on goal.
5) Speed / First to Ball: The ability to accomplish techniques quickly with efficient and fast movements in all areas on the field. Overall speed with the ball. Overall speed without the ball. Speed, quickness, reaction time
6) Fitness: Overall endurance, ability to play entire match. Athletic abilities with respect to running (Speed), quick change of pace and direction (agility), leaping, and strength on and off the ball. Game fitness and shape.
7) Defensive Technique: Understands transition to defense. Demonstrates ability to contain attackers and knows when to challenge (tackle). Wins the ball under control (not just clearing). Some level of defensive support (ball, cover, support).
8) Game Sense / Knowledge of rules: How well the subject understands the tactical side of the game. Subject understands of principles of attacking and defending, and rules of the game. Aware of situational play, transition between attack and defense, makes a different in the play.

9) Positioning / Spatial: A subject's ability to read the game as it develops and to position themselves in the most advantageous area from which to support their team effectively. A subject understands of their position and other positions on the field. Understands positions and format that the team is playing. Adjusts dynamically and accordingly.

10) Commitment to Game: Shows up for practices, listens, makes progress, shows good sportsmanship and applies lessons. Shows a desire to play hockey for the love of the game. Focused at games and practices. Eager to learn. Always makes best effort.

3.15 STATISTICAL TECHNIQUE

The collected data from the five groups prior to and immediately after the training programme on selected criterion variables were statistically analyzed with suitable statistical techniques. Descriptive statistics such as mean and standard deviation were calculated. Normality of the data of all the selected variables was analyzed to further go for analysis of covariance.

Analysis of covariance (ANCOVA) was used to find out the significant difference between experimental groups and control group. When the F-ratio indicated that there are significant differences between means, several tests may be used to identify which means are significantly different from each other. A test used for this purpose is referred to as a Scheffe's post hoc test. In all cases 0.05 level of significance was fixed to test hypothesis. (Thirumalaisamy, 1998).

The research flow chart is showed in Figure- 14