

## CHAPTER -III

### *Materials and Methods*

In this chapter subjects of the study, criteria measured, procedure for data collection, design of the research work and statistical treatment employed have been described.

#### **3.1. Subject :**

The subjects of the present study were 18 female students aged 22 through 24 years. They were undergoing physical education training course (1994-95) in the Department of Physical Education Kalyani University, West Bengal. Since the course is a residential one they were all boarders of the University hostel and the physical environmental condition and diet was almost identical. The admission to the physical education course was on the basis of performance in a fitness and skill tests suitable for the course. Most of the subjects, had past experience in sports and games at college level. Four students had the credit of representing their university in their respective specialised field of sports in the inter university level. They had the training age of about three to four years. Others had the experience of participation in sports and games. The subjects were actual habitants of seven districts of West Bengal state. They had similarities in many aspects and at the same time they were different in socioeconomic and cultural background. In overall review the group may be considered as a homogeneous group in respect of sports and physical activity background. There were no visual abnormalities among the subjects and they may be considered as possessing normal psychological state of mind and mental make up. Academic background was also indential.

#### **3.2 Criteria Measured :**

Physical fitness, performance in selected activites, status in selected physiological and psychological variables and psycho-physiological reactivity were considered as criteria to assess the influence of organised physical education programme on trainee-females and accordingly to justify the hypothesis.

### 3.2.1. Physical fitness :

Physical fitness was measured by following tests adopted from AAHPER Youth fitness test;

- |                    |                        |
|--------------------|------------------------|
| 1) Flexed Arm Hang | 4) Standing Broad Jump |
| 2) Sit -Up         | 5) 50 Yard Dash        |
| 3) Shuttle Run     | 6) 600 Yard Run-walk   |

### 3.2.2. Physical Activities :

Selected physical activities in which performances were measured, are as follows;

- |                          |  |
|--------------------------|--|
| 1) Formal Activities     | 3) Individual Activities               |
| 2) Rhythmical Activities | 4) Group Activities (Small Area Games) |

### 3.2.3. Physiological variables : The variables were;

- 1) Resting Heart Rate
- 2) Exercise Heart Rate (Following Submaximal Exercise)
- 3) Physical Efficiency Index (P.E.I)
- 4) Maximum O<sub>2</sub> uptake capacity. (Vo<sub>2</sub> max.)

### 3.2.4. Psychological variables : The psychological variables considered were,

- 1) Sports Achievement Motivation
- 2) Anxiety Level (State & Trait)
- 3) Leadership Quality

### 3.2.5. Psycho-physiological Reactivity : Psycho-physiological reactivity was measured by ;

- 1) Reaction Time (simple and choice)
- 2) Galvanic Skin Response

### **3.3. Procedure for Administering Tests**

The tests were conducted in the Human Performance Laboratory of the Department of Physical Education and the play ground of the same department of Kalyani University, Kalyani, West Bengal, India. The procedure for administering the tests/measurements are presented below.

#### **3.3.1. Measurement of personal data**

To initiate the study the recording of the age, height and weight are essential since all these three factors have immense influence on human performance. Even in case of evaluating some physiological variables the variation of age, height and weight give rise to variation of results.

##### **3.3.1.1. Age**

The researcher had collected the date of birth of the subjects from their birth certificates. After collecting their date of birth, age was calculated in nearest years.

##### **3.3.1.2. Height**

The height of the subjects was measured in the standard stadiometer, available in the Department of Physical Education. The reading of the scale was taken in centimeter.

##### **3.3.1.3. Weight**

The weight of the subjects was taken by a standard weighing machine kept in the departmental laboratory and during the measurement the subjects had minimum garments. The recording was taken in nearest kilogram.

#### **3.3.2. Measurement of Physical Fitness**

Physical fitness was defined as the ability to carryout daily tasks with vigour and alertness, without undue fatigue and with ample energy to enjoy leisure time persuit and to meet emergences. The lack of agreement regarding the concept of physical fitness basically centres around whether items involving skill and ability should be included in a physical fitness test battery. Some authors were of the opinion that relatively basic physical fitness elements, such as strength, muscular endurance and cardiovascular endurance be included in a test battery, others intended to include items of agility, flexibility, power, balance, speed and neuromuscular co-ordination.

All measurements in physical education are of either structural or functional traits. Anthropometric measurements deals with structural traits. Test of functional traits fall into four categories : interpretive, impulsive, neuromuscular and organic traits. Neuromuscular tests include measurements of strength, specific skill, agility, power, speed, balance, flexibility and other qualities of performance which depend primarily upon the effective functioning of the nervous and muscular systems. Endurance fall under the organic trait. Endurance is divided into muscular and cardiorespiratory, and it is very much correlated with neuromuscular functioning. Important components that were measured are as follows.

### **3.3.2.1. Measurement of strength.**

Muscular strength is defined as the contractive force of muscles. Strength is a prerequisite to muscle movement. The components of motor performances depend on some degree of strength, since they all depend on some degree of muscle action. The greater the contraction of a muscle, the greater the force exerted, and the greater the strength.

Strength can be increased through training. The greatest amount of muscular strength is applied for the movement, but in the range of movement may only be required to apply 60% of maximum strength.

Fleishman (1964) determined that strength is made up of three main factors, which was called static strength, explosive strength and dynamic strength. He defined static strength as the maximum force that a subject can exert for a brief period when the force is executed continuously upto his maximum. This type of strength is also termed as isometric strength.

In the present study the static strength has been considered as a strength measure and flexed arm hang, a standard test, was conducted for the purpose.

#### **Flexed Arm Hang.**

The purpose of this test was to measure the strength of the arms and shoulder girdle in the flexed arm hang position. The Reliability and validity were .90 & .99 respectively.

Materials used : The equipment needed is a horizontal bar (1½ inches in diameter) raised to a height so that the tallest girl cannot touch the ground from the flexed arm hang position. A stop watch is also needed for testing.

**Procedure :** With an overhand grasp and the assistance of two spotters, the performer should raise the body off the floor so that the chin is above the bar and the elbows are flexed. The performer should hold this position for as long as possible.

**Scoring :** The number of seconds to the nearest second that the performer maintains the proper position is recorded as the score.

### **3.3.2.2. Measurement of Muscular Endurance :**

Muscular endurance is the ability to continue muscular exertions of sub-maximal magnitude. It may be either dynamic or static in nature and concerns the ability of a muscle to repeat identical movements or pressure or to maintain a certain degree of tension over a period of time. The performer executes identical repetition of a movement through a designated distance and over an unlimited amount of time. The test is the score in terms of the number of correct executions completed. Muscular endurance is closely associated with strength, it also associated with the number of active capillaries within the working muscles.

In this study sit-up has been used as a measure of muscular endurance. Harvey and Scott (1967) found that a positive relationship exists between bent knee sit up and dynamometer scores. McCraw and Mc Clenney (1965) studied the reliability of the straight leg sit-up test and found that the use of a single trial was just as reliable as the better of two trials or the average of two trials. The reliability coefficients ranged from .80 to .90. Fleishman (1964) found the reliability of 30 second sit-up test to be .71 based on the test-retest method.

#### **Sit-up**

The purpose of this test was to measure the endurance of the abdominal muscles. The Reliability and Validity were .94 and .98 respectively.

**Materials used:** The only equipment required is a mat and yard stick.

**Procedure :** The student lies flat on the back with knees bent and feet on the floor with the heels no more than 1 foot from the buttocks. The knee angle should be no less than 90 degrees. The fingers are interlocked and placed behind the neck with the elbows touching the floor. The feet are held securely by a partner. The student then curls up to a sitting position and touches the elbows to the knees. This exercise is repeated as many times as possible in the time requirement.

**Scoring :** One point is scored for each correct sit-up. The score is the maximum number of sit-ups completed in 60 seconds.

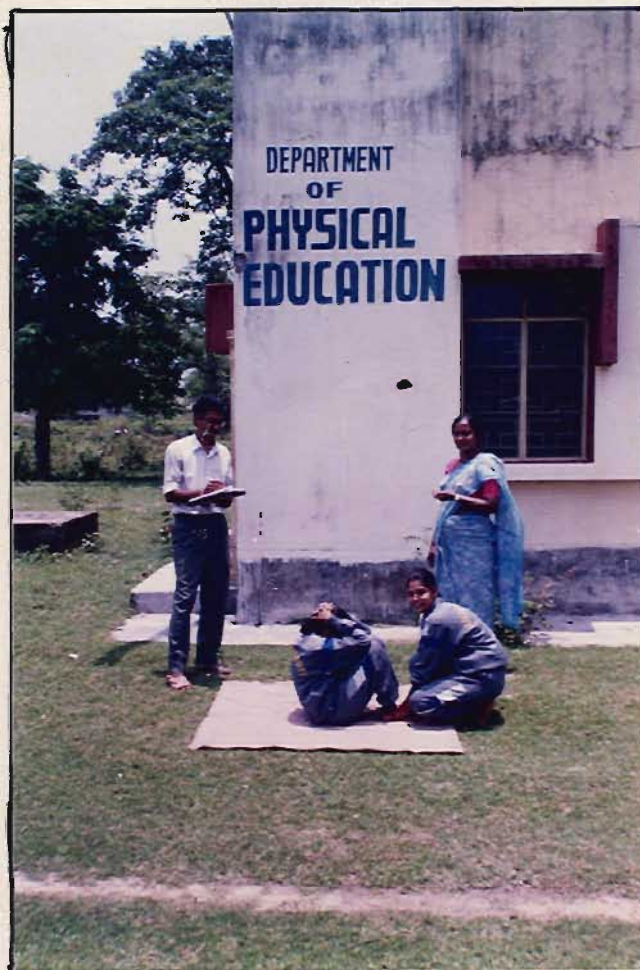


Fig. 1. A subject is performing sit up test.  
Measurement of muscular endurance.



Fig. 2. Subjects are performing the shuttle run test.  
Measurement of agility.

### 3.3.2.3. Measurement of Agility

Agility refers to the maneuverability of the body or body parts. It is the ability of rapid changing the direction of the whole body or its parts. It is combined construct of speed, strength and balance. It tends to be specific for different motor performance. The Dodge Run is a standard test for evaluating the running agility which comprises zigzag running where as the shuttle run test is an effective test for assessing agility. Marmis et al. (1969) concluded in a study that three trials should be given in the shuttle run test. Fleishman (1964) obtained a reliability co-efficient of .85 on shuttle run. Shuttle run test was included in the AAHPER youth fitness Test (1976), and was selected in this study for measuring agility of the subjects.

#### Shuttle Run

The purpose of the test was to assess the agility of the subjects.

Materials used : Two wooden blocks (2" x 2" x 4") and a stop watch, subjects ran barefooted.

Procedure : Two parallel lines were marked on the ground 30 feet apart. The wooden blocks were placed behind the line opposite to the starting line. The subjects started running from the starting line on the signal of whistle. The subjects ran and picked up the wooden blocks of their respective positions and came back as fast as possible and places the blocks behind the line, he then ran back to pick up the second block and crossed the starting line. Time was recorded by the time keeper by the stop watch of 1/100 sec. Two subjects were subjected to run at a time to maintain the competitiveness in order to motivate them for better timing. Two trials were taken.

Scoring : After half an hour rest in between, time of better trial was recorded in seconds.

### 3.3.2.4. Measurement of Power

Athletic power measurement, as expressed in terms of the distance through which the body of an object is propelled in the space. Such tests as the sargent jump, broad jump and pull test are common tests of athletic power. Such tests involve both force and velocity. However the factors of force and velocity are not measured as such; thus only the resultant distance (inches or feet ) is recorded in athletic power. In this study standing broad jump is used for test of power.

Klesius (1968) reported a reliability coefficient of .94 with 150 tenth grade boys as subjects. Kane and Mcrideth (1952) found .97 to .99 reliability coefficient with both girls and boys from 7 to 9 years of age. For the 7 years old boys the coefficient was .97 and for 7 years old girls .98, for both boys and girls in the 8 year category .98, for the 9 year old boys & girls .99 & .98 respectively.

### **Standing broad jump**

The purpose of the test was to measure the athletic power. The objectivity of the test is 0.96 which was established by Jack Clayton (1972). The reliability and validity were .963 & .667 respectively.

Materials required : Plain surface of the ground, marking materials, take off line and measuring steel tape for recording the distance covered.

Procedure : Body weight of the subject was equally distributed on both feet, placed little apart and parallel behind the take off line. With the signal of the tester the subject flexed the knees, lowered the centre of gravity (CG) little ahead and jumped ahead by taking off with both feet following an armswing. The subjects were motivated to jump as far as possible. Three successive trials were provided to each subject.

Scoring : The distance from the inner edge of the take of line and the nearest point of contact of any part of the body after jump was measured in centimeter. The best jump was recorded.

### **3.3.2.5. Measurement of speed**

Speed is defined as the velocity of a body; body parts or an object; that is, it is the rate of motion. The speed may be divided in to two components, reaction time and movement time. Reaction time is the time it takes to respond to a stimulus. This is the elapsed time between the presentation of the stimulus and the movement of the body. Movement time is the time between the initial movement of the body, body parts or objects and the completion of the movement. The components of movement time may be analyzed in terms of acceleration velocity, average velocity and maximum velocity. Speed tends to be specific for each movement. In laboratory speed is measured through cinematography and timing devices. But in the field or outside lab situation 50 yards sprint was best as described by many authors and have been widely used in research studies (Verducci 1980).



The 50 yard dash has been accepted as a valid measure of general total body speed. This acceptance has not been challenged beyond the study by Fleishman (1964) in which as a result of factor analysis he chose the 50 yard dash as one of the better tests for measuring general explosive strength. Klesius (1968) reported a reliability coefficient of .86, Fleishman (1964), .86 and Baumgartner and Jackson (1970), .94.

### **50 yard Dash**

The purpose of the test was to measure running speed of the subjects.

Materials used : Three electronic digital stop watches of 1/100 (Modet GEM, Licience, Hanhert, Germany), one whistle and clapper for start. Three marked lanes of 1.25m width on track with scratch line at both ends between 50 yard was made. Those two marked lines were considered starting and finishing line.

Procedure : Three runners assume starting position on the starting line. With the sound of the clapper they start running and cross the finishing line as fast as possible. The time is recorded by the time keepers. The reliability of the time keepers were high. Three trials were given with adequate rest of 40min. in between. A recall starter was deployed to avoid foul start by the subjects.

Scoring : The distance of 50 yard covered in time (in sec) was recorded for each subject. The best time for each subject was recorded as score for 50 yard dash.

### **3.3.2.6. Measurement of Cardiorespiratory Endurance**

CR-Endurance is the resistance ability against fatigue. it denotes not only the ability to delay the on-set of fatigue for a long time, but also the ability to recover quickly from fatigue. In simple word, it is the ability which enables the man to do an activity effectively without getting tired and to recover quickly from fatigue during and after the activity. Endurance enable the human to maintain an optimum pace or tempo during the activity. It is important for ensuring good quality of the technical skills eg. accuracy, precision, rhythm etc. CR-Endurance depends more than 90% on the aerobic capacity. Doolittle and Bigbee (1968) found a validity co-efficient of .62. Klesius (1968) reported a reliability of .80 and Askew (1966) found .76 on the 600yard run/walk test.

### **600 yard Run-walk**

The purpose of the test was to measure the cardiorespiratory endurance.

Materials used : A running track , stop watches.

Procedure : In a running track, subjects used a standing start. At the signal Ready Go ! the subject starts running the 600 yard distance. The running may be interspersed with walking. Six subjects ran at a time with having the subjects pair off before the start of the event. Then each subject listens for and remembers his partner's time as the latter crosses the finish line. The timer merely calls out the times as the subjects cross the finish line. Walking is permitted, but the object is to cover the distance in the shortest possible time.

Scoring : Time was recorded by stop watches in minutes and seconds.

### **3.3.3. Assessment of performance in selected activities:**

Assessment of skill and performance potentiality in selected games & physical activities were assessed through rating system. Barrow and McGee (1979), Johnson et al (1992), Marey et al (1991) and Verducci (1980) have discussed in length about such rating system. In the present study one such method of rating was adopted. The teachers and coaches of Kalyani University who were conducting the physical activity and games classes for the trainee students were asked to grade their students through subjective rating and selected skill tests. Therefore the method of rating may be said to have a combination of objective tests and subjective rating. When no objective measurement technique is available for measuring a quality, to supplement objective measurement by subjective opinion, observation techniques are used. Rating are based on subjective opinions and estimates.

For each activity and for each subject the researcher herself being a teacher of the Department of Physical Education, and one teacher / coach who actually conducted the class for the stipulated period, had rated simultaneously on the basis of actual performance in a specific activity. The raters had rated all subjects in each activity on a ten point scale ranging from 1 to 10 score. The average of the two ratings was considered as the score of the subject in a particular activity. In this manner all the subjects were rated in the following physical activity and games separately.

a) **Formal Activity** :

- i) Callisthenics
- ii) Marching
- iii) Dumbbell

b) **Rhythmics** :

i) Lazium [A classical Indian light apparatus drill in combination with rhythmic movements]

ii) Bratachari [A traditional Bengali physical culture, combined with vigorous movements of body parts, folk dance and traditional martial art.]

c) **Individual Activity** :

- i) Gymnastics
- ii) Track & Field
- iii) Tenikoit
- iv) Badminton

d) **Group Activity** (small area games) :

- i) Kabaddi (Indian national game)
- ii) Kho-Kho (Indian national game)
- iii) Netball
- iv) Volleyball

Ratings in each activity was made twice, first in the first week of the introduction of the activity i.e., after conducting 2-3 classes and second at the end of specified activity session. The Final scoring was made within 7 to 10 days of the completion of the specific activity course. Virtually the scoring procedure conducted through out the year. The time span between the first and second test was according to time allotted to the specific activity. The detailed programme is given in the design of the study.

Banerjee et al (1983), Goswami et al (1984) have adopted the procedure of rating the performance in their research work on sportsmen and disabled person respectively.

### **3.3.4. Measurement of Physiological potentialities**

Performance evaluation of a person should be made during static as well as during dynamic condition, specially physiological potentialities of a person is best studied when the body exposed to some stress of muscular activity. The basic information and the range of functional capacity of different organ systems is best evaluated

when the organ is subjected to functional loads.

Most of the measurements in physical education are of either structural or functional traits. In functional, organic traits include the physiological functions of internal organs and systems, of circulatory, respiratory, digestive, eliminative and heat regulating mechanisms etc. Physical educators are primarily interested in the efficiency of the circulatory and respiratory processes of organic systems. Exercises, induce physiological change in almost every system of the body, particularly the cardio-respiratory, including the oxygen transport system.

For the evaluation of physiological potentialities heart rate (resting and exercise), physical efficiency index, oxygen uptake were considered as the variables.

#### **3.3.4.1. Heart rate**

It is the simplest and most extensively applied way of testing the circulatory functional capacity. The blood is thrown by the heart (to the circulatory system) produced sound called beat. How many beats are coming in one minute period is called heart rate.

Training has a very pronounced effect on heart rate, even at rest. Trained athlete have a lower resting heart rate than untrained and even on the exercise condition also. The resting-brady-cardia resulting from training is most evident when trained and untrained are compared.

##### **Resting heart rate :**

In the morning the subject were given a 10-15 mins bed rest before administering the test. Then the pulse beat (radial artery) were counted at close intervals for about 3-4 times. Time taken per 30 beats were counted with the help of a stop watch. Determination of resting heart rate continued untill a constant level was reached, where upon the lowest reading was taken.

#### **3.3.4.2. Exercise heart rate following a submaximal exercise.**

For measurement of physiological parameters during dynamic condition step test was chosen because it is a standard test for exercise tolerance and it is a common test of performance evaluation suitable in the field as well as in the laboratory.

In the present study for obtaining peak heart rate following a submaximal exercise the standard step up exercise test was conducted for all the subjects. The



Fig. 3.

Recording of heart rate from carotid artery following submaximal exercise.



Fig. 4. A subject is performing step test for P. E. I.

subjects were asked to step up a bench of 18 inch (45 cm) height for three minutes. The stepping rate was 24 per minute. The test procedure was adopted from Verducci (1980).

After three minutes stepping up and down test exercise; the heart rate was taken just on cessation of the work. The time of ten heart beats was taken with a stop watch from carotid artery. Then it was converted to beats per minute.

The test was conducted twice at the beginning of the training session at the month of July and after completion of ten months training session, April next year.

### **3.3.4.3. Determination of Physical Efficiency Index**

The Harvard step test is a popular test for measuring physical efficiency index. In this test recovery heart rate is used to indicate physiological assessment of maximal performance. The purpose of this test was to measure cardiovascular efficiency.

Materials used : An 18-inch (45 cm) bench, stop watch and one metronome.

Procedure : The subjects were asked to step up and down a bench of 45 cm height. The cadence was 24 steps per minute. The body should be erect when the subjects are asked to step up and down on to the bench. The subject continued to exercise at the prescribed cadence for 3 minutes. Only one pulse count was taken from carotid artery. The pulse was counted for 30 seconds after one minute of rest. The test procedure was adopted from Verducci (1980).

The equation (Corbin 1972) for determining cardiovascular efficiency score for female is as follows.

$$\text{P.E.I} = \frac{\text{Number of seconds completed} \times 100}{5.6 \times \text{recovery pulse}}$$

### **3.3.4.4 Determination of Maximum O<sub>2</sub> uptake from Heart Rate response. (Predicted Vo<sub>2</sub> max).**

The maximum oxygen consumption test is perhaps the most valid means of determining a person's maximal aerobic power (Vo<sub>2</sub> max). It is also assess a person's cardiorespiratory fitness. There are direct and indirect procedure for assessment of maximum O<sub>2</sub> capacity. Direct assessment of Vo<sub>2</sub> max is limited in that the test is

difficult, exhausting and often hazardous to perform regardless of the type of ergometer used.

For this reason several methods of predicting  $\text{Vo}_2$  max from submaximal data have been developed. Astrand - Rhyming nomogram is a popular test and have been widely used in physical education profession. The subjects were familiar with the step up test. In the present study this procedure was adopted for prediction of maximum  $\text{O}_2$  uptake.

The subjects were asked to step up and down a bench of 33 cm height (for female). The stepping frequency was 30 steps per minute and subjects were asked to continue the exercise for 5 minutes maintaining the stipulated stepping rate. Heart rate for one minute was recorded from carotid artery after completion of 5 minutes of work. The  $\text{O}_2$  uptake data of each subject was obtained from the Astrand-Rhyming nomogram. The subjects weight and heart rate were applied to the nomogram to predict the maximum  $\text{O}_2$  uptake or  $\text{Vo}_2$  max in litres per minute.

### **3.3.5. Measurement of Psychological variables :**

Physical activity elicits neurophysiologic responses, which has clear overlap in bio-mechanics, exercise physiology & to those who seek an effective understanding of the psychology of exercise and sport. The scientific study of human behaviour in exercise and sport are relatively new and the area in which scientific endeavour have been initiated are:

i) motor learning ii) motivation iii) anxiety-tension iv) aggression v) leadership, team cohesion and vi) psychosocial aspects. In the present study achievement motivation, level of anxiety and leadership have been considered as the psychological variables.

#### **3.3.5.1. Sports Achievement Motivation.**

Achievement based competition not only brings in material advantage to the participant but also enhance the prestige of the individual socially. Further, achievement motivates and motivation rejuvenates the urge and effort for higher achievement : the vicious circle continues indefinitely like a spire.

Watson (1982) states that in sports, achievement motivation is the degree to which a player is willing to approach competition situation. Murray *et al.* (1938) revealed that need achievement is manifested in behaviour expressing a desire for accomplishment, prestige, ambition, the need to overcome obstacle, to seek challenge,

to exercise power, etc. when desire for achievement becomes dominant concern for the person, it is expressed in restless driving energy aimed at achieving excellence, getting ahead, improving upon past records, beating competitors, doing things better, faster, more efficiently and finding unique solutions to difficult problems. People with strong achievement motivation generally are self confident and they set challenging goals demanding maximum effort. Lazarevic and Bacanac (1985) showed that sports motive achievement significantly correlated with emotional engagement in sports achievement situations.

### **Assessment of sports Achievement Motivation (SAMT)**

Materials used : Questionnaire of SAMT

Sports achievement motivation (SAMT) of Kamlesh (1987) is a questionnaire of 20 statements, the response value of which ranges from 0 to 40. On the basis of the percentile norms suggested in the test, subjects scoring below 24 could be characterised low in sports achievement motivation, those scoring 30 and below but above 24 as moderate and those scoring above 30 as highly motivated. The copy of the test is given in the Appendix No - A<sub>2</sub>. The Reliability co-efficient of Test was found to be .94.

Procedure : The subjects were asked to take sit in the class room and questionnaire were served. Before starting the test, the purpose and direction of the test was clearly explained to them. They were directed to tick mark 'a' or 'b' which they found appropriate against each of the 20 incomplete statements. No time limit was there for the test.

Scoring : Each correct answer carries 2 marks and the wrong answer carries 0 marks. Thus one may score for 20 statements in between 0 to 40. For statistical analysis this score was converted to standard score.

### **3.3.5.2. Measurement of Anxiety**

Anxiety is a state of emotional tension characterised by apprehension and fearfulness. Also this term is used to indicate the anticipation of a future situation or apprehension of a probable pain and loss of threat.

Hollingsworth (1965) found a strong relationship between state and trait anxiety and performance. The performance level increased with practice and anxiety level tended to decrease. Winberg and Hunt (1976) found that highly anxious subjects



performed with an excess of muscular tension, compared of less anxious subjects, when confronted with a task purporating to general athletic ability.

Singh (1982) reported that anxiety affect the performance. The optimum levels of performance can be given by the athletes if they have the optimum level of anxiety and tension.

In the present study an attempt has been made to understand the possible role of physical activity in the reduction of anxiety, if any.

Materials used : Questionnaire of State and Trait Anxiety Inventory (STAI).

For measuring the anxiety the state and trait anxiety inventory questionnaire were adopted. This inventory was designed and developed by Spielberger Grosuch and Lushane (1970) not only for the assessment of the anxiety loading of the individual but also the distinction of two aspects of anxiety viz, state anxiety and trait anxiety. State anxiety refers to a reaction which takes place at a certain time at a given level of intensity and trait anxiety indicates a latent disposition for a reaction of a certain type to occur if it is triggered by appropriate stimuli, in a stable individual characteristics. The forms of this inventory have been adopted in Bengali language on our population by Chattopadhyay, Mallick, and Spielberger (1986). The copy<sub>o</sub>test is given in the Appendix No - A<sub>3</sub>.

Procedure : Both forms were administered together. It is recomended that the state anxiety form to be administered first. This is a self administering inventory. There is no time limit to complete the form.

In both forms some items are worded in such a way that a response of 1 indicates little anxiety or absence of anxiety and a response of 4 indicates high anxiety. The rests are worded in such a way that a response of 1 indicates high anxiety. For the scoring of either scale-one has to add the rating given the direct items and reverse items separately and then to subtract the sum of the direct items and to add a constant. If the subject fails to response to one or more items, different procedure for scoring (which is more complicated) has been recommended. In this present study all the subjects responded all the items of both the scales.

Scoring : In trait anxiety the direct items (D.I) are the question, of 2,3,4,5,8,9,11,12,14,15,17,18,20 and reverse items (R.I) are 1,6,7,10,13,16,19 number questions. To calculate the trait anxiety count, score of D.I. and R.I was considered. Subtract the sum of R.I. from D.I. (D.I - R.I) and added it with a constant value, that is 35.

In state anxiety the direct items (D.I) are the questions of 3,4,6,7,9,12,13,14,17,18 and reverse items (R.I) are 1,2,5,8,10,11,15,16,19,20 number question. To calculate the state anxiety count score of D.I. and R.I was considered. Subtract the sum of R.I from D.I ( $D.I - R.I$ ) and added it with a constant value, that is 50.

The score for either form (T-anxiety and S-anxiety) range from 20 to 80, the higher the score, the greater is the level of anxiety.

### **3.3.5.3. Leadership Quality**

Leadership quality can be defined as the ability and readiness to inspire and guide others, individuals or groups, towards specific objectives. Leaders are generally selected by the followers. A leader is one who is repeatedly perceived to perform acts of leading. Generally the leader's position is occupied for a considerable time by the same individual (Sherif, 1962).

Gibb (1947) went so far as to say that leadership is not a quality which a man possess; it is an interactional function of the personality and of the social situations. Physical education can be viewed as a profession, a discipline or a programme of activity. However regardless of the view point, its central focus is human movement involving motor skills such as sport, games, gymnastics, dance, exercise and fitness activities. Progress in a profession is indispensable and the quality and amount of that progress are closely related to leadership.

### **Assessment of Leadership quality**

One of the basic purposes of physical education teachers training programme is to develop leadership quality. So that the trainee may provide appropriate leadership in their work place for a better health fitness consortium. For assessment of leadership quality among the subjects of the present study a questionnaire was provided to each subject to seek their own leader in six specific situation.

The questionnaire used in this study was adopted from Dey and Chatterjee (1989) which was in turn developed from Gibb (1947).

The situations were :

Choice of leaders according to preference

Situations	1st	2nd	3rd
1) Practical activity			
2) Theoretical Programme			
3) Intramural competition			
4) Camping			
5) Educational Tour			
6) Hostel			

In each situation one trainee student had to nominate three leaders among her classmates in order of preference. Accordingly all the students were asked to nominate their own leaders in six situations in the prescribed proforma. The assessment made twice, pretraining assessment at the onset of the training course (within one month, July'94) and the post training assessment was made at the last month of the training course (April 95).

Scoring : In each situation three preferences were marked. The trainee students could score five marks from each 1st preference situation. Similarly three marks were given from each 2nd preference situation and one mark for each 3rd preference situation. Accordingly one trainee leader may score maximum 30 out of six specific situation from a fellow trainee. In the similar fashion score obtained from each trainee was considered for the cumulative score of each leader. The sum of scores from 18 subjects was the final score of each individual.

Post test was conducted in similar fashion and the scoring of the post test was made in the same procedure.

### **3.3.6. Measurement of Psycho-Physiological Reactivity :**

Psychophysiology is the discipline of evaluating physiological measures in the human regarding information about behavioural concomitants.

Measurement of psychophysiological parameters through instrumentation may reveal the positive psychological responses along with physiological changes. The

psychophysiological measures can throw light on (i) the degree of alertness of individual possesses ii) the degree of stress on individual experiences iii) temporary or permanent damage that may result from stress.

For measuring the psychophysiological aspects arousal level have been considered by leading researchers (Miller 1969, Powell 1983, Chatterjee et al. 1985).

In the present study autonomic and central neural arousal have been measured by

- i) Reaction time (Central)
- ii) Skin Conductance (autonomic)

Mondal (1992) in his research work measured psychophysiological reactivity on senior citizen. The present researcher has adopted the same procedure as followed by Mandal in his dissertation.

### **3.3.6.1. Reaction time**

Every act takes time and time can be measured. We can measure the time occupied in doing certain amount of work. So the time of response plays an important role in psychological experimentation. The average velocity or speed may be divided into two components : reaction time and movement time. Reaction time is the time it takes to respond to a stimulus. This is the elapsed time between the presentation of the stimulus and the movement of the body. It is the time required to get the overt response started. The reaction time is the S - R time interval. The reaction time , also called the response latency, includes sense organ time, brain time, nerve time, and muscle time (Woodworth and Scholsberg, 1976). Geron (1979), Schubert (1981) and Khan & Khan (1987) are many sports scientists who have directed their efforts towards examining this aspect .

Procedure : Subjects were asked to sit on a table in dimly lighted room and look before a screen with a hole in it through which a light can be flashed. When the light will be flashed then the subject knows the stimulus to be used. on the table an electrical switch or key is placed. This instructions are to place his finger on the key when he gets a 'ready' signal and to press the key instantly when the light flashes. In the experimenter's bailiwick there is electronic chromoscope apparatus which measures the S-R. interval. The experiment just described deals with the simple reaction, which is simple in presenting a uniform stimulus and requiring a uniform response. The subject knows what stimulus will come and what response she will make. In another type of reaction time experiment there are alternatives. There are

different stimuli calling for different responses. The stimulus light may vary from red to green in irregular order: there are two response keys, one for each hand; and the instructions are to react to red with the right hand, but to green with the left hand. This choice reaction has a longer latency than the simple reaction.

Woodworth and Scholsberg (1976) reported that the reaction time 200-250 millisecond (ms) (1/100 second) when the stimulus is a light, when it is a sound or touch the reaction time is about 150-200ms. The choice reaction time is 100ms longer than the simple reaction time.

Simple RT : It is an experiment to find how fast one can press this key (pointing the subjects key), every time as soon as see a light here (pointing the place, where the subject was supposed to look). The subject should be attentive to this particular place and as soon as they see the light they are to press the key as fast as they can. To start with the subjects be asked to keep the key touch with their right index fingure (all the subjects were right handed person.) Every time after they have press the key, are to release the key again as soon as the light will be off. The inter-trial interval varied between 4 sec to 8sec. The RT for each trial was noted down.

Choice RT : The basic experimental design in these two stages was same as that of simple RT, except that red and green light (stimulus light) were presented at random and the subject was asked to respond to the red light by her right and green light by her left hand. The following instructions were given to the subjects, " This time you are to use both the keys, pointing to the keys kept at your right and left sides with your right and left hand respectively. You may see either red light or green light in this place(pointing the place where the stimulus light was expected to arrive). If you see red light press only the right hand and if you see green light please press the left hand key as fast as you can." In this study the method of Woodworth and Scholsberg (1976) was adopted.

Scoring : RT was recorded in terms of milliseconds unit (1/1000sec). In simple RT, 20 trials were recorded and then averaged. Also in choice RT, 20 trials were recorded and then averaged.

The lesser RT score was regarded as indicator of good cognitive ability and indicates adequate level of arousal.

### **3.3.6.2. Galvanic Skin Response.**

Recent scientific study on the sprots performance have revealed that



Fig. 5. Recording of reaction time of a female trainee.



Fig. 6. Recording of Galvanic skin response from the finger tips of a subject.

performance is very much related with innate neuromotor make up and behavioural pattern. Obviously anxiety, motivation, tension and reaction time are very much related to this pattern. It was noted by previous researchers (Mandler, 1958, Spielberger, 1972, Mc Egan and Daving, 1983) that some time subject fails to perceive his or her own feeling accurately, such as subjects who had perceived themselves in the heightened state of anxiety was found to be in a very low states on physiological measures. This does not mean that the techniques employed are invalid. Evaluation of one's feeling, subjective measure, requires proper concentration, correct understanding and exact evaluation of ones feeling and ability to quantify it. To obviate such problems one can employ indirect measures, viz. psychophysiological techniques, where one is not dependent upon the subject or the subject cannot manipulate the situation in anyway. Under such circumstances psychophysiological measures seem to be more acceptable. The electrical resistance of the skin varies spontaneously and in response to stimuli as well. Such responses to stimuli were called psychogalvanic reflex (Veraguth. 1907) and certain other terms, like Galvanic skin response (G. S. R.) electrodermal response.

It may be mentioned that through skin resistance (in terms of raw Ohms) is technically easier to measure and there is evidence (Darrow, 1932, 1934) that conductance is a better measure. Skin resistance is one of the psychophysiological measures. Lader and Wing (1966) provided with the accurate measurement of SR. The basic principle underlying this technique is that a constant current is passed through the subject via two electrodes and the voltage engendered across the skin is recorded. According to Ohms' law ( $V = IR$ ) where,  $I$  is constant and  $V$  is proportionate to  $R$  ( $V$  stands for voltage and  $R$  for Resistance ). In the present study the technique of Lader and Wing. (1966) has been employed.

The most convenient site to record it is the area of the hand having highest density of the sweat glands. Kuno (1956) in this connection has published photographs which indicate that the area of maximum density occurs on the palmar surface of the distal phalanges of the digits. In the Present experiment the right thumb of the subject was chosen as the " active" SR site, as it is a flatter and more extensive surface than the other fingers. The site of inactive electrode is immaterial (Ladder and Wing, 1966) and the lateral surface of the right fore arm about 10cm below the lateral epicondyle of the humerous was used.

Grease solvent, such as, Carbon tetrachloride has been used by many researchers to prepare the skin under the active electrode. Solvents may have a

deleterious action on the semi-permeable membranes of the sweat glands. In the present experiment the selected site of the thumb was wiped dry with a cotton wool swab, as was recommended by previous investigators.

**Procedure :**

The experiment was conducted in a room where recording instrument was kept by the side of the subjects bed. Long cables joined the connectors and the appropriate pre-amplifiers of the recording.

The procedure employed for collection of the skin resistance data may broadly be divided into the following steps.

**Step-1:** On arrival, the nature of the experiment was explained to each subject and any procedural questions answered.

**Step-2:** The subject was then prepared for the experiment i.e., SR recording. Electrode were applied in appropriate places and positioned properly.

**Step-3:** Amplifier was calibrated and all necessary arrangements were made for recording the skin resistance measure.

**Step-4:** At this stage the subject was given the instruction "Please lie down on bed comfortably and relax as much as possible. Be sure that your arms are in comfortable position. Please try to keep them without any movement. You will relax keeping your eyes closed. During the experiment if you experience any difficulty please let me know.

**Step-5:** The main light of the room was switched off leaving the illuminated by shaded wall lamp in a corner.

**Step-6:** Both the electrodes were plugged in and the SR instrument was calibrated. Then the instrument was switched to the subject and a constant current of 14amp/cm<sup>2</sup> was passed through the electrodes and the voltage across the subject was balanced. The sensitivity was increased usually 20 to 50 Kilohms if necessary. Re-adjustments were necessary during the recording session if the subjects SR altered much in either direction, or if the sensitivity was found to be inappropriate to the size of the responses. After the instrument was switched on the recording of the psychophysiological measure on the subject started, and it continued for 5 minutes, hereafter called " basal recording " in resting condition.

**Step-7:** The electrodes were removed from the subject and was asked informally if subject felt any disturbance during the testing session.



Scoring : The psycho-galvanic reflex has been measured in many units including change in resistance, change in conductance, change in log conductance and various ratios of change score to background level are raw resistance unit (Kilohms) and response with log change in conductance (microhms) as also reasonably satisfactory for the responses.

SR level were read off at 15 sec interval for a period of 5 minute. Each recording was converted into log conductance values (in microhms). The average of all the reading was calculated and noted as score for a given subject. Low skin conductance score means low ANS arousal and high skin conductance means high ANS arousal.

### **3.4. Design of the study**

#### **The training programme underwent by the subjects.**

In a physical education training course a trainee has to participate in a variety of physical activities. The prime objective is to provide opportunity to the trainee students in a variety of skills and movement which are conducive to health & fitness as well as enjoyable. The trainee students following their successful completion of course are likely to be appointed in schools or other educational institutions. As a teacher they may be required to teach basic skills, fundamental movements, organised major and minor games, small area games, recreational games etc. Accordingly it is essential that the trainee students be required to have personal experience of participation as well as skill of teaching to these variety of activities. Accordingly the training schedule of a training institution is prepared to fulfill the desired objectives. The present subjects were the trainee students (1994-95) of the Deptt. of Physical Education K.U, undergoing B.Ed physical education course.

The total duration of the training course was ten months (July 1st to May 6th next year). The structure of the training programme was two and half hours morning activity session, two hours afternoon activity session and four hours theoretical session. More over there were a number of out door education session which includes camping, picnic, officiating, tour, social service etc.

The variety of programme/ activities in which the subjects had to have personal experience and the time spent in each programme during ten months session are enlisted below:

<u>Activity/Programme</u>	<u>Time spent during the session(hours)</u>
1) General warm up and conditioning –	50
2) Formal activities –	105
a) Callisthenics–	(15 hrs)
b) Dumbbell –	(10 ")
c) Marching –	(25 ")
d) Lazium –	(25 ")
e) Indian club –	(10 ")
f) Pole drill –	(10 ")
g) Wand drill –	(10 ")
3) Weight training –	20
4) Swimming –	20
5) YOGA	20
6) Combatives	15
7) Small area games	155
a) Kabaddi –	(25hrs.)
b) Kho-Kho-	(25 ")
c) Badminton -	(30 ")
d) Tenikoit -	(20 ")
e) Throwball -	(20")
f) Netball -	(20 ")
g) Handball -	(15 ")
8) Major games -	105
a) Volley ball-	30
b) Basket ball -	30
c) Hockey -	25
d) Softball -	20

9) Gymnastics	40
10) Track & Field	60
11) Folk Dance	25
12) Intramural	60
13) Practice Teaching	20
	695

In the month of July 1994 when the training session began, after 10 days of initial introduction the physical fitness tests were conducted for all the subjects. All the tests were conducted on the same day for all the subjects. The post test was conducted in the month of March 1995 and again all the tests were conducted in the same day for all the subjects.

According to the schedule of the Department of Physical Education the subjects were introduced to various activities in a systematic manner. The total time spent for each activity has been shown in the chart above and activity was spread over 9 months period (July'94 to March'95). The pre test of each activity was concluded after the initial two, three periods and the post test was conducted in three terms. The first term post test was conducted in the month of September '94 and the activities which were introduced in the month of July and August, post test in these activities were completed in the month of September. Similarly the activities which were introduced in the second term pre test and post test was conducted in the similar fashion as in the first term. Second term post test was conducted in the month of December 94. In the similar fashion third term post test was conducted in the month of March '95.

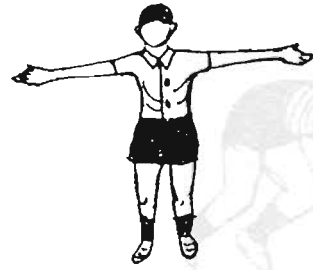
Regarding pre and post test of selected physical activities (Formal, Rhythmic, Individual and Group) the procedure adopted were identical and in each case tests were conducted for all the subjects in a fixed date and in identical conditions.

Test for physiological potentialities were conducted in Human Performance Laboratory of the Department of Physical Education. The pre test was conducted in the third week of July'94 and the post test was conducted in the month of March 1995.

Each set of tests was conducted in identical situation for all the subjects.

# Diagrammatic sketch of various activities participated by the trainee females :

## 1. Formal Activity :



Callisthenics



Marching



Dumbbell

## 2. Rhythmical Activity :



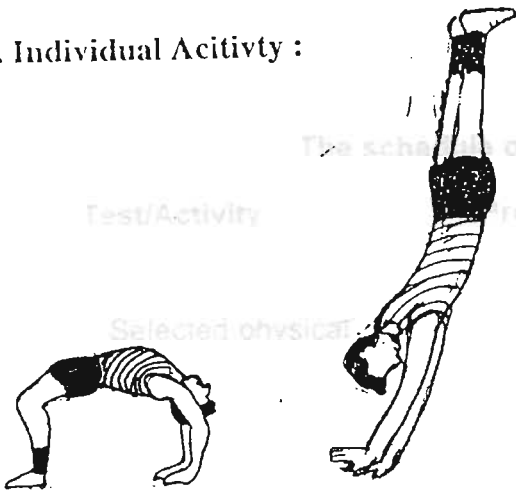
Lazium



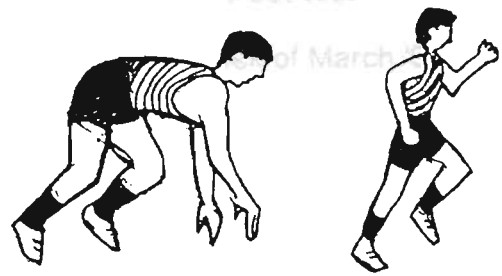
Bratachari

# Diagrammatic sketch of various activities participated by the trainee females :

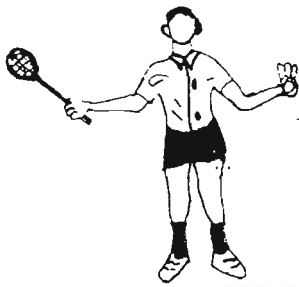
## 3. Individual Activity :



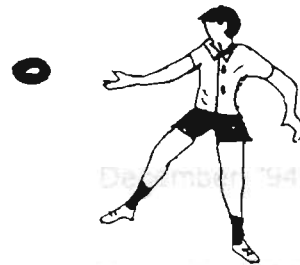
Gymnastics



Track and Field



Badminton



Tenikoit

## 4. Group Activity :



Kho-kho



Volleyball.



Netball



Kabaddi

Similarly psychological and psychophysiological reactivity were measured twice. The pre test was conducted in the fourth week of July '94 and the post test in the third week of March '95. Each test was conducted in identical condition for all the subjects.

The schedule of tests are as follows:

Test/Activity	Pre test	Post test
1. Physical fitness	2nd week of July '94	1st week of March '95
2. Selected physical activities		
<u>1st term</u>		
As per schedule of the Department		
i) Formal	1st and 3rd week of July '94	September '94
ii) Rhythmics	"	"
iii) Few group activities	"	"
<u>2nd term</u>		
i) Few individual activities	3rd week of September '94	December '94
ii) Few group activities	1st week of October '94	December '94
<u>3rd term</u>		
i) Remaining individual activities	3rd week of December '94	March '95
ii) Remaining group activities	1st week of January '94	March '95
3. Physiological Potentialities	3rd week of July '94	March '95
4. Psychological variables	4th week of July '94	3rd week of March '95
5. Psychophysiological reactivities	4th week of July '94	3rd week of March '95

### 3.5. Reliability and validity of the tests

For establishment of reliability test-retest procedure was adopted. A pilot study with five subjects was conducted for the purpose. All the tests were conducted twice, once by the researcher herself and the other by a very experienced researcher.

Both the tests were conducted under the guidance of the supervisor. Co-efficient of correlation between the two sets of test scores were computed and a very high correlation ranging from .58 to .92 were obtained in most of the cases. Thereby tester's competency and reliability of the data were established.

The tests and measurements conducted in this study were all valid tests and measured the proposed criteria for the purpose. The tests of physical fitness were adopted from standard literature (Jonson and Nelson 1982, Verducci, 1980). For the physiological parameters, methods were adopted from the standard literature (Astrand Rhyning 1954, Verducci, 1980). The variables of psychological and psychophysiological reactivity considered in this study were adopted from the publication of the leading researchers (Kamlesh 1987, Spielberger 1970. Roth 1989, Geus 1992, Steptoe et al., 1990). Therefore validity of the tests were established.

### **3.6. Statistical Procedure**

For statistical analysis standard procedures have been adopted. Mean and SD were first computed. Then pretest and post test data were analysed by paired t-test method (Garrett, 1973). For obtaining co-efficient of correlation pearson product moment method (Garret, 1973) was adopted.