Chapter III

PROCEDURE

In this chapter, the selection of subjects, selection of variables, criterion measures, reliability of data, details of physical education programme, procedure for administration of tests and statistical procedure have been presented.

Selection of Subjects

The subjects for the present study were sixty students: thirty male and thirty female admitted to the first year bachelor degree course in physical education from the Degree College of Physical Education, HVP Mandal, Amravati (University of Amravati) Mahharashtra. The age of the subjects were ranging between 17-21 years.

All the subjects voluntarily agreed to co-operate in the testing procedure explained to them in the interest of promotion of knowledge. The requirements of the testing procedure were explained to them in details so that there was no ambiguity in their minds regarding the efforts required on their part.

The necessity of taking blood samples and the harmless nature of taking such samples under strict conditions of hygiene and sterility was explained to them so that the students would not have any reservation in this matter.

No special technique were used to motivate the subjects to put in their best efforts, but the subjects were quite mature and participated whole heartedly in testing.
Selection of Variables

Keeping in mind the feasibility criteria and the purpose of the present investigation, the following variables were found appropriate and selected:

1. ICHPER. SD-ASIA Health Related Physical Fitness Test Comprising:
   a) Endurance Run – 1 mile run.
   b) Muscular Endurance – Flexed Knee sit ups in sixty seconds.
   c) Muscular Strength – Pull ups/Modified pull ups.
   d) Flexibility - Sit and reach test (From sitting position)
   e) Body composition (sum of triceps and calf skinfolds)

2. Body composition variables:
   a) Total Body Weight
   b) Fat Weight
   c) Lean Body Mass.

3. Cholesterol Components:
   a) Total Cholesterol
   b) High Density Lipoprotein Cholesterol
   c) Low Density Lipoprotein Cholesterol
   d) Triglycerides.


**Criterion Measures**

The criterion measures adopted for the present study will be:

(i) For the items of ICHPER S.D. ASIA Health Related Physical Fitness Test items:

a) Endurance run performance will be assessed by the time taken in second for one mile run.

b) Muscular endurance will be assessed by flex knee sit ups and recorded the total numbers of sits – ups performed in sixty seconds.

c) Muscular strength will be assessed by the total numbers of pull ups performed.

d) Flexibility will be determined by the sit and reach test and recorded in centimeters.

e) Body composition will be assessed by the sum of triceps and calf skinfolds.

(ii) Body composition variables:

a) Total body weight will be determined in nearest kilogram using a standard weighing machine.

b) Fat weight calculated in kilograms from percentage of body fat and body weight.

c) Lean body mass was recorded in kilograms.
(iii) Cholesterol components:

a) Total cholesterol will be recorded in mg. dl.

b) Triglycerides will be recorded in mg. dl.

c) High density lipoprotein cholesterol will be recorded in mg. dl.

d) Low density lipoprotein cholesterol will be recorded in mg. dl.

**Reliability of Data**

The reliability of data was ensured by establishing the instrument reliability and tester’s competency. All the instruments used in the study were procured from reliable manufacturers most of whom cater to the needs of research laboratories.

High correlation co-efficients ranging from 0.87 to 0.99 for the test re-test method adopted for the data on health related fitness test items and body composition variables collected by the investigator and an expert on a same sample ensured the tester’s competency in collecting the data. The biochemical variables were analysed in a recognised pathological laboratory, following standard techniques.

**Details of Physical Education Programme**

The physical education programme of HVP Mandal, Amaravati was similar to the programme of physical education followed in any of the professional college in the country providing the three years bachelor degree course in physical education.
The programme consisted of practical classes in various sports disciplines in the morning and evening sessions, and theory classes in the day hours. The morning and evening sessions of practical classes consists of three periods (thirty-five minutes each) of instructional and practice in the various disciplines, and special practice for an activity of individual’s choice. The activities in the first fourteen weeks (period of programme assessed in the study) consisted of athletics, gymnastics, yoga, basketball, volleyball, kabaddi, wrestling and formal activities (lezzium, dumb bells, Indian clubs, drill marching and bands).

**Collection of Data**

The data on the selected health related fitness variables were collected on thirty male and thirty female students admitted to the first year bachelor degree course at HVP Mandal, Amaravati, Maharashtra. The pre test data were collected by the second week of July 2000, immediately on the commencement of classes, and the post test data were collected after the third week of October, 2000. The data on the ICHPER SD. Asia Health Related Fitness test and body composition were collected in the campus and at the post-graduate department of physical education, HVP Mandal, Amaravati. The biochemical variables were analysed at Shri. Ram Pathology Laboratory (computerised), Amaravati.
Procedure of Administration of the Tests

The tests in all the selected ICHPER S.D. ASIA Health Related Physical Fitness items, body composition variables and cholesterol components were administered in the campus of Degree College of Physical Education, HVPM, Amravati. All the subjects were properly oriented to the testing procedure and the use of equipment was explained and clearly demonstrated prior to the administration of the test.

The subject characteristics in term of age, height, and weight was determined by following the standard procedures following the school records, using a stadiometer, and standard weighing machine respectively.

To determine the health related physical fitness the ICHPER S.D. Health Related Physical Fitness was adopted. The items of the test are:

One Mile Run (Endurance)

Objective:

To measure the cardiovascular endurance

Equipment:

Athletic Field/ground, stopwatches, paper, pencil, etc.

Description:

The tester gives the signal ‘On your marks’ and all the subjects stand with one foot behind the starting line. When ready, the tester gives the command ‘Go’
and subjects start running the one mile distance. Subjects are asked to keep a steady pace and finish the run as fast as possible.

Scoring:

The time taken to complete the distance of one mile run recorded in minutes and seconds (later converted to seconds for analysis purpose) was the score of the subjects.

Flexed Knee Sit Ups (Muscular Endurance)

Objective:

To measure the strength and endurance of the abdominal muscles:

Equipment:

Clean floor mat, stop watches, paper, pencil, etc.

Description:

The subjects were instructed to assume a prone lying position knees flexed, feet on the floor and heels not more than twelve inches away from the buttocks, with the knee angle less than 90 degree. Then he was asked to put his hands at the back of his neck clasping fingers and placing his elbows squarely on the mat. A partner was asked to hold his feet to keep them in touch with the floor surface. Then by tightening his abdominal muscles and bringing his head and elbows forward he curled up and touched the knees with elbows. After touching the knees he returned back to starting position and repeated the same.
Scoring:

The total number of sit ups performed in 60 seconds was recorded as the score of the subjects.

Pull – Ups (Muscular Strength)

Objective:

The measure the arm strength.

Equipment:

Horizontal bar (diameter of the bar should be 4 centimetres), stool for easy access to bar, paper, pencil, etc.

Description:

The horizontal bar was adjusted in such a height that the subject could hang free on the bar without touching the floor. The subject grasped the bar with his palm facing away from his body (over hand grasp). The subject then raised his body until his chin touched over the bar and then lowered it again to the starting position with his arms fully extended. The subject was instructed not to tilt his knees or assist the pull-up kicking or swinging.

Scoring:

One point was scored each time the subject completed a pull-up. The total number of pull ups performed was recorded as the score of the subject.
Modified Pull-up: (Female)

Description:

(i) The subject grasps the bar with palms outward and slides her feet under the bar until the body and arms form approximately a right angle when the body is held straight. The weight rest on the heels.

(ii) Pull the body up until chin is above the bar, the body held perfectly straight then lower the body in starting position with the arm fully extended. A mat was laid on the floor to prevent the feet from slipping.

(iii) The bar is adjusted to approximately the height of the apex of the sternum, thus requiring each girl to pull approximately the same proportion of her weight.

(iv) The test is to pull up to the bar with the body straight as many times as possible.

Scoring:

One point was scored each time the subject completed a pull-up. The maximum numbers of modified pull-ups performed was recorded as score.

Sit and Reach Test (Flexibility)

Objective:

To measure the flexibility of the hip and back as well as the extension of the hamstring muscles.
Equipment:

Flexomeasure case, centimetre stick, paper, pencil, etc.

Description:

The 30 centimetre mark of the centimetre stick was lined up with a line on the floor and the stick was taped to the floor. The subject was directed to sit down and to line up his heels with the near edge of the 30 centimeter mark and to slide his seat back beyond the zero end of the centimetre stick. With the subject’s heel not more than 12 centimetre apart, he was asked to stretch forward slowly with knee locked and touch the finger tips of both hands as many centimetres down the stick as possible.

Scoring:

The best of three trials measured to the nearest centimeter was the test score.

Skinfolds (Sum of Triceps and Calf)

Objective:

To assess the fat component at specified sites, on the body.

Equipment:

Lange’s skinfold caliper, recording materials, etc.

Description:

The skinfold of the following sites were measured:
(i) Triceps

(ii) Calf

The dominant side of the body was used to determine the percentage of fat. The thickness of the skin fat was grasped between the thumb and index finger and measurement was taken to the nearest half millimeter and recorded.

Triceps Skinfold

The skinfold thickness was taken over the triceps muscle at a point half between the tip of the shoulder (acromial process) and the tip of the elbow (olceranon process). The point was located with forearm flexed to 90 degree. While taking the measurement the arm was kept hanging free. The fold was lifted parallel to the long axis of the arm.

Calf Skinfold

The skinfold thickness on the medial side of the leg of the subject and at the level of the maximum girth of the calf was taken as a measure of calf skinfold.

Scoring:

Sum of triceps and calf skinfold measurements recorded in millimeters.

**Body Composition Variable – Skinfold Measurements:**

(a) Total Body Weight

The purpose of the test was to be determine the total body weight in nearest half kilogram using a standard weighing machine.
Equipment:

Lever tape laboratory anthropometric weighing machine.

Description:

The subject wears shorts and T-shirt only and stood at the center of the weighing machine. The weight was read and recorded to nearest half of kilogram.

(b) Body Fat

The purpose of the test was to measure the percentage of body fat.

Equipment:

Lange Skinfold Calipers.

Description:

The investigator picked up a fold of subcutaneous tissue between the thumb and the index finger of the left hand and pulled away the under lying muscle from the mark on the body of the subject. The jaws of the caliper were then applied a little below the fingers of the left hand and allowed to exert their full pressure before taking the reading of the thickness of the fold. The muscular tissue was not included in the pinch was ensured by asking the subjects to use the muscle in appropriate movement. Measurements were taken on the right side of the body. The anatomical sites utilized were as follows:

Biceps

With the subject standing erect with arm hanging loosely, fold of skin was picked up on the anterior of the mid part of the biceps and the skinfold thickness
was measured. The position of the fold was vertical and the reading to the nearest half millimeter was recorded.

**Triceps**

The skinfold thickness was taken over the triceps muscle at point half way between the tips of the elbow (olecranon process). The point was located with forearm flexed to 90 degrees, and while taking the measurement the arm was kept hanging free. The fold of skin was lifted parallel to long axis of the arm and the reading to the nearest half millimetre was recorded.

**Subscapular**

The skinfold thickness was taken at the tip of the scapula (inferior angle) with the subject in a relaxed standing position. The fold was lifted in the diagonal plane at about 45 degree from vertical and horizontal planes and the reading to the nearest half millimeter was recorded.

**Supra-iliac**

The skinfold thickness was taken three to five centimeters above the anterior superior-iliac spine on diagonal line going downward and inward and the reading to the nearest half millimeter was recorded.

The sum of the skinfold thickness of four sites was converted into percentage body fat with the standard table suggested by Durnin and Rahaman.¹

From each subject, body weight and the weight of the fat the subject possessed was calculated by using the following formula:

\[
\text{Fat Weight} = \frac{\text{Body Weight} \times \text{Percentage of Value Fat}}{100}
\]

(c) Lean Body Weight

The total body weight minus the weight of body’s fat gave the lean body weight. The weight of the fat was deducted from each subject’s total body weight and recorded in kilograms.

\[
LBW = \text{Total Body weight} - \text{Weight of fat.}
\]

**Cholesterol Components**

The purpose of the test was to measure the blood lipid level of the subject, which mainly included Total cholesterol, Triglyceride, HDL-Cholesterol and LDL-Cholesterol.

**Equipment:**

Disposal string, cotton, spirit, tourniquet and bottle to collect blood sample.

**Description:**

The blood samples was taken from the antenatal vein, tourniquet was tied on the limb of the subject and fingers have been squeezed during blood drawing. The subject sat on the chair in relax position and about 5 mg/dl. blood was taken
from each subject. Blood samples was drawn after a 12-14 hours of fasting. The blood samples taken were analysed by the Dr. Ramawatar R. Soni, D.N.B. (Path.), M.D. (Path.) and Mrs. Kanchan R. Soni, B.Sc., D.M. L.T. at Shri Ram Pathology Laboratory (computerised) Amaravati (M.S)

Subjects had an overnight fast for 12 hours and abstained from exercise for 24 hours Prior to the blood collection for plasma lipids and lipoproteins determination. Blood samples was drawn from a vein near the antecubital fossa from each subject 5 ml. of blood samples were taken twice that in before and after the training programme. Post test blood samples were drawn 48 hours after the last exercise bout in an attempt to minimize the potential of acute exercise to mask the effect of training on the plasma lipids and lipoproteins. Plasma lipids and lipoproteins variables namely and Total Cholesterol, Triglycerides, HDL-C and LDL-C, were determined by Wybenga and Pilleggi’s method and the Enzymatic method by using the Stangen cholesterol kit at Shri Ram Pathology Laboratory (computerised) Amaravati.

**Statistical Procedure**

In order to find out the difference between the pre-test and the post test means of each group in the chosen variables, the ‘t’ ratio was employed. To find out the significance of difference from pre to post test means between the male and female subjects, the analysis of co-variance was applied. The level of significance was set at .05.