CHAPTER - III

PROCEDURE
CHAPTER - III

PROCEDURE

In this chapter, the selection of subjects, selection of variables, criterion measures, reliability of Data, the administration of tests and the statistical techniques for analysing the data have been discussed.

SELECTION OF SUBJECTS:

The study was confined to all the male students, who were majoring in the physical education profession or joined physical education as a profession for the session 1988-89 at graduate and post graduate level were selected as subjects. The students, who were medically unfit due to injuries or some other cause were exempted from the tests. The sample was selected from the colleges and departments of physical education of Punjabi University, Patiala; Panjab University, Chandigarh and Guru Nanak Dev University, Amritsar. They belonged to more or less same socio-cultural background. Most of them hailed from middle and upper middle class status of the family. And hence, this study was conducted on a total of 157 subjects of B.P.Ed., D.P.Ed., M.A. (Physical Education/M.P.Ed. and M.Phil (Physical Education) of the three Universities.

SELECTION OF VARIABLES:

The investigator thoroughly went through the
available scientific literature related to physical education profession and professionals, magazines, journals and periodicals. Keeping in view the relevance of the variables to the physical education profession (Feasibility Criteria), the following variables were selected for the study:

1. **Selected Motor Fitness Components**

   The following variables are taken from the AAHPER Youth Fitness Test (Revised, 1976):
   - Power.
   - Agility.
   - Speed.
   - Cardio-vascular Endurance.

2. **Selected Psycho-Physiological Variables**

   The word 'Psycho' is a learned borrowing from Greek, used to represent 'Psyche' (Psychology and Psychological in compound words) (Random House Dictionary, 1986). Whereas in this study 'Psycho' is used as an Adjective before the term Physiological to represent a term known as 'Psycho-Physiological variable'. So two separate variables i.e. Selected Psychological Variables and Selected Physiological variables, were undertaken for the investigation.

*Selected Psychological Variables*

The following questionnaires/scales were used for investigation:

(ii) Physical Activity Attitude Scale (Bhuller, 1976).

**Selected Physiological Variables:**

(i) Blood pressure (Systolic-Diastolic) (Lying Position).

(ii) Blood Pressure (Systolic-Diastolic) (Standing position).

(iii) Sitting Pulse Rate.

(iv) Haemoglobin Content in the blood.

3. **Body Composition:**

The following tests and measurements were taken for investigation:

(i) Body weight.


(iii) Percentage Body Fat. Measured from the skinfold method, restricted to two skinfold measures i.e. (a) Scapula Skinfold (b) Thigh skinfold.

**CRITERION MEASURES:**

The criterion measures chosen for testing the hypotheses were:

(i) Explosive Power was measured by the distance leaped by the subject in standing long jump to the nearest \( \frac{1}{8} \) of an inch.

(ii) Agility was measured in terms of time taken by the subject to run shuttle run according to the instructions, recorded to the nearest 1/10 of a second.
(iii) Speed was measured in terms of time taken by the subject to run a distance of 50 yards recorded to the nearest 1/10 of a second.

(iv) Cardio-vascular Endurance was measured in terms of time taken by the subject to run a distance of 600 yards by Run-Walk Method, recorded to the nearest 1/10th of a second.

(v) Personality Questionnaire by Eysenck, J.M., P.K. (1985) was used to measure the personality.

(vi) Physical Activity Attitude Scale by Bhullar (1976) was used to measure the Attitude towards Physical Activity.

(vii) Blood pressure, systolic and diastolic in the lying position and standing position, was measured with the help of sphygmomanometer in mm of Hg.

(viii) Number of Pulse beats per minute during sitting position were counted as Sitting Pulse Rate.

(ix) Sahil's Acid Haemometer method was used to measure Haemoglobin content in grams per 100 millilitres of blood.

(x) Weight of the subject was measured to the 1/2 of the Kg.

(xi) Skinfold thickness was measured in millimetres using skinfold caliper method.
Before proceeding to collect the actual data, the reliability of the data was ensured by establishing instrument reliability, the tester's competency and the reliability of both the tests and the subjects.

**Instrument Reliability**

All the instruments required for the collection of data had been obtained from the reputed suppliers of standard equipment, which were procured by the Department of Physical Education, Panjab University, Chandigarh (India) and State Yoga Health Organisation, Chandigarh (India). The blood pressure apparatus was also calibrated from the Post Graduate Institute of Medical Education and Research, Chandigarh (India). Thus, their calibration was accepted as accurate enough for the purpose of this study.

**Tester's Competency and Reliability of Tests**

The tester's competency was evaluated together with the reliability of the tests. To determine reliability of the tests, the performance of 10 subjects (selected at random from the selected variables) was recorded twice under similar conditions by the investigator. Pearson's Product Moment Correlation was calculated between the two measures of each variable. The reliability coefficient thus obtained have been presented in Table I.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Test Item</th>
<th>Coefficient of Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standing long Jump</td>
<td>.93</td>
</tr>
<tr>
<td>2</td>
<td>Shuttle Run</td>
<td>.92</td>
</tr>
<tr>
<td>3</td>
<td>50-yard Dash</td>
<td>.94</td>
</tr>
<tr>
<td>4</td>
<td>600-yard Run Walk</td>
<td>.86</td>
</tr>
<tr>
<td>5</td>
<td>Blood Pressure, Lying (Systolic and Diastolic)</td>
<td>.94</td>
</tr>
<tr>
<td>6</td>
<td>Blood Pressure, Standing (Systolic and Diastolic)</td>
<td>.94</td>
</tr>
<tr>
<td>7</td>
<td>Sitting Pulse Rate</td>
<td>.99</td>
</tr>
<tr>
<td>8</td>
<td>Haemoglobin</td>
<td>.97</td>
</tr>
<tr>
<td>9</td>
<td>Skinfold measurement</td>
<td>.87</td>
</tr>
<tr>
<td>10</td>
<td>Weight</td>
<td>.98</td>
</tr>
</tbody>
</table>

N = 10.

From the test-retest coefficient of correlation (Table 1), it is obvious that the tester reliability was significantly high, establishing competency of the investigator to administer the tests.

The correlation coefficient also indicated the reliability of the tests selected as very high correlations was obtained, when the tests were repeated.

The above test-retest co-efficient of correlation also established that the subject reliability was significant at .01 level of confidence, as the same subjects were used
under similar conditions by the same tests and no motivational techniques were used.

COLLECTION OF DATA

After selecting the sample of the study and before conducting various tests, the investigator had a meeting with the subjects in the presence of their class teacher incharges, to ensure maximum cooperation on each occasion. The purpose of the study was explained to them, so that there was no ambiguity among the students regarding the efforts they had to put in for the successful completion of the investigation. All the students were convinced and agreed to extend full cooperation. Classwise data was collected. The teacher incharge was present during the administration of tests and helped the investigator to conduct and collect the data etc.

Standard procedures were adhered to in order to obtain the information from the subjects. Selected motor fitness tests were conducted in the colleges and departments of physical education of the universities in respective athletic tracks. Sufficient time for warming up was provided before administering the tests. Strict adherence of the AAHPER Youth Fitness Test's instructions were followed. Each test was properly demonstrated by the investigator himself and each subject was given a trial attempt to be familiar with the test, where required.
The two questionnaires/scales given below were also administered to all subjects under the direct supervision of the investigator. So, in order to measure selected motor fitness components, selected psycho-physiological variable and body composition of the subjects—selected AAHPER Youth Fitness Test items, Personality Questionnaire by Eysenck, Jatinder Mohan and Paramjit Kaur, Physical Activity Attitude Scale by Bhullar, Dial Type Sphygmomanometer to measure blood pressures (lying and standing) systolic and diastolic, Sahil's Haemometer to measure haemoglobin, Electronic Stop Watches to have time and to count sitting pulse rate, weighing machine to measure body weight and Lange Skinfold Caliper to have skinfold measurement, were used. The two hundred and twenty five copies of bio-data, scoring sheet and the questionnaire/scale were cyclostyled.

Motor fitness tests were conducted during the evening activity periods. Questionnaire and scale were filled class-wise during the theory periods in their respective colleges and universities between 9 A.M. to 1 P.M. Physiological tests were conducted and skinfold measurements were taken in the afternoon in their science laboratories, before evening activity periods.

ADMINISTRATION OF TESTS

(1) Selected Motor Fitness Components:

Selected motor fitness components were chosen from the AAHPER Youth Fitness Test (Revised, 1976). After going
through the literature pertaining to the fitness tests, the researcher selected the components from AAHPER Youth Fitness Test. The selected motor fitness tests were conducted on the subjects strictly following the instructions given in the AAHPER Youth Fitness Test manual. They are: Standing long jump - for judging explosive muscle power of leg extensors; shuttle run - for judging speed and change of Direction (Agility); 50 yard dash - for judging speed; and 600 Run-Walk - for judging cardiovascular efficiency (Endurance).

Detailed instructions for administering each test item were given below:

1. Standing Long Jump:

   **Equipment:** Outdoor jumping pit, and measuring tape.
   
   **Description:** Subject stood just behind the take off line, preparatory to jumping. The subject swung the arms back ward and bent the knees. The jump was accomplished by simultaneous by extending the knees and swinging forward the arms.
   
   **Rules:** (i) The subjects take off from the both feet simultaneously jump as far forward as possible and should land on both feet.

   (ii) Three trials were allowed.

   (iii) Measurements were taken from the take off line to the heel or other part of the body that touched the pit nearest to the take off line.
Scoring: The best of three trials was recorded in feet and inches to the nearest one fourth of an inch.

2. Shuttle Run:

Equipment: Two blocks of wood - 2 inches x 4 inches and stop watch. Subject wore sneakers or ran barefooted.

Description:
Two parallel lines were marked 30 feet apart on the ground. The blocks of wood were placed behind one of the line. The subject started from behind the other line on the signal 'Ready', 'Go'. The subjects ran to the blocks, picked one up ran back to starting line and placed the block behind the line; he then ran back, and picked up the second block, which he carried back across the starting line.

Rules: Two trials were allowed with some rest in between.

Scoring: The time of the better of the two trials to the nearest one tenth of a second was recorded.

3. 50-yard Dash:

Equipment: Two stop watches with split timer.

Description: Two subjects ran at a time. Both of them took position behind the starting line. Starter gave the start using the command 'Are you ready?' and 'Go'.
The latter will be accompanied by a downward sweep of the start's arm to give a visual signal to the timer, who stands at the finish line.

Rules & Scoring: Amount of time between the starter's signal and the instant, the subject crossed the finish line was recorded. Time should be recorded in the 1/10th of a second.

4. 600-Yard Run-Walk

Facilities and equipment: A track. Stop watch.
Description: Four hundred meters track was used for running 600-yards distance. Subjects used standing start. At the signal, 'Ready', 'Go', the subjects started running the 600-yard distance. The running could be interspersed with walking.

Rules: Walking was permitted, but the object was to cover the distance in the shortest possible time.

Scoring: Time was recorded in minutes and seconds.

Scoring for Selected Motor Fitness Tests:

The raw scores of the each selected motor fitness components were used as by converting feet into inches and minutes into seconds for statistical treatment.

(2) Selected Psycho-Physiological Variables:

Selected Psychological variables: The selected psychological variables used are - Personality, and Attitude towards Physical Activity. Standardised questionnaires/
Scales of the respective variables were used and the authors' instructions were strictly adhered to.


To know about the personality dimensions of the physical education majors, a personality questionnaire which is standardised on the Indian Professional students by Eysenck, Jatinder Mohan, Paramjit Kaur (1985) was used. The questionnaire consists of 81 questions. It consists of questions, which help to measure the Extraversion, Neuroticism, Psychoticism and lie (Social desirability) scores of the individual. The personality questionnaire has been found to be highly reliable questionnaire. Its test and retest reliability has been found to range from +.87 (Psychoticism), +.91 (Extraversion), +.97 (Neuroticism) and +.91 (Lie Scores). However, the internal consistency has been found to be within the range. The Questionnaire has two response categories: yes/no. Scoring was done by putting the scoring sheet on the questionnaire response column and total responses for Extraversion, Psychoticism, Neuroticism and lie scores were counted for statistical treatment.

**The Physical Activity Attitude Scale**

To know about the attitude of the student's attitude towards Physical Activity, Bhullar's (1976) Physical Activity Attitude Scale was used. The attitude scale represents
seven broad-dimensions of physical activity.

The final scale consisted of 70 items, 10 in each sub-dimension. Scoring was done on the basis of "Scale Product Technique" by giving weight for each response category in the likert position and then multiplying the same with the scale value of the statement. Each statement is accompanied by six response categories. The author of this test (Bhullar) established the test-retest reliability .87 and split half reliability ranged from .66 to .87. The factorial validity was obtained by employing the varimax rotation technique, whereby the noted factors ranged from .003 to .942.

Selected Physiological Variables:

Blood Pressure: A dial type sphygmomanometer made in Japan and a stethoscope supplied by a reputed firm was used for measuring systolic and diastolic blood pressure in lying and standing position. Measurements were taken before the evening activity periods. The left arm of the student was barred to make certain that the clothing did not constrict the blood vessels.

The subjects were asked to stand comfortably, weight equally distributed on both the legs. The cuff was wrapped firmly but not so tightly around the arm, with the lower edge approximately one inch above the antecubital space. The stethoscope receiver was placed firmly over the artery in
It should be made sure that the stethoscope was free from the contact with the cuff. The cuff was inflated until the artery was fully collapsed to the extent, no pulse beat could be heard. Pressure was then slowly released and the investigator watched the dial gauge. When the first sound of the pulse beat became audible the reading in millimeters of mercury (mm of Hg) at that instant was recorded as Systolic blood pressure. The pressure was further released gradually and as the sounds of the pulse changed in intensity and quality and completely ceased, the index of Diastolic blood pressure was recorded in mm of Hg. (Donald K. Mathews, 1973).

Then, the students were asked to lie down on the mats by following the Shav Asana pose for five minutes. The blood pressure measurement was taken with the subject in the lying position, therefore, arm was supported to the ground mat. Similar procedure as mentioned above by (Donald K. Mathews, 1973) was followed to measure systolic and diastolic blood pressure.

**Sitting Pulse Rate:**

The pulse rate of each of the subjects was recorded before the evening activity programme in the laboratory. Before recording the pulse rate, the subjects were asked to
sit along the wall of the laboratory for five minutes.
Electronic stop watch was used to measure number of pulse waves in a minute. The students were asked to locate their radial artery for self pulse counting. 'Start and Stop' signals were given by the investigator and the number of pulse palpation at the radial artery for one full minute was recorded for each subject (Johnson & Nelson, 1992).

**Blood Haemoglobin Content:**

Sahil’s Acid Haematin method was used for the estimation of haemoglobin content in the blood, using Sahil Haemometer supplied by a well known company of West Germany. The instrument was designed and calibrated in accordance with the standards laid down by the German Medical Association. The haemometer pipette, the haemometer tube and the stirrer were thoroughly cleaned and dried. In the haemometer tube, N/10 Hydrochloric acid was taken up to the 20th division on the percentage scale. The tube then was placed in the comparator in the space provided for it. The disposable pricking lycents were used. The top of the left ring finger of the subject was cleaned using rectified spirit. The finger was allowed to dry up and then punctured boldly with the pricking lycet. Exactly 20 cubic millimeter of blood was drawn into the pipette by suction. The pipette was then dipped into the N/10 HCL contained in the haemometer tube and thoroughly mixed by raising the
pipette with the acid several times. Then, the tube was allowed to stand on the comparator for about ten minutes for the maximum development of colour. Distilled water was added drop by drop to the mixture with every drop of distilled water added to the solution; it was stirred to ensure thorough mixing to get the standard colour of the Haemometer after removing the stirrer. After the colour of the mixture matched with that of the standard, the tube was taken out of the comparator and the stirrer was removed from the tube. The reading on the haemoglobin scale on the tube was read at the level of the lower meniscus of the solution avoiding parallax error. The scale was provided in grams of Haemoglobin content per 100 ml of blood.

(3) Body Composition

The following measurements were taken to find out the body composition of the subject:

1. Body weight
2. Skin fold measurements.

1. Body Weight: A reliable portable weighing machine from the standard company was used for this purpose. The machine was checked against known weights often before use. The pointer was set on zero and the subject was asked to stand erect in the centre of the platform of
of weighing machine with minimum clothing (shorts only). Wearing of alone short was kept consistent for all the subjects to maintain accuracy. All the subjects were weighed before the evening activity programme and to the same degree of accuracy. The reading was taken from vertical angle and was recorded to the nearest 0.5 of the kgm.

2. Skin Fold Measurement: Lange Skin Fold caliper of standard pressure of 10 gm/mm² was employed for measuring the fat thickness at specified areas/sites. The skin at the specific sites was held between the thumb and the index finger and pulled out to form a fold, so as to include two thicknesses of skin and subcutaneous fat in between them. The subject was asked to make appropriate movements to ensure that only the skin fold enclosing the subcutaneous fat was pinched and the muscle tissue (which freely contracted and released with movements) was not included in the fold. The caliper was applied about one centimeter from the spot pinched with thumb and finger and to a depth equal to the fold approximately. The measurement was read to the nearest millimeter. Three readings were taken and the average of the three readings was recorded as the thickness of the skinfold at that site.

The measurements as described below were taken at the following sites as recommended by Sloan’s (1967) equation for predicting density in Youngmen and lean body weight by Wilmore and Benke (1974).
The subjects were asked to stand in relaxed anatomical position. A vertical skinfold in the midline of the thigh was located (which is situated half way between the inguinal ligament and the top of the patella) and skinfold measurements were taken (McArdle, Katch & Katch, 1981).

**Scapula Skinfold**

The subject was asked to stand in anatomical relaxed position. It was measured from the inferior angle of the Scapula. The skinfold was lifted on a 45° diagonal plane parallel to the axillary border and skin fold measurements were taken (Johnson & Nelson, 1982).

**Abdominal Skin fold**

The subject was asked to stand in an anatomical relaxed position. It was measured by a vertical fold adjacent to and one inch laterally from the umbilicus and skinfold measurements were taken (McArdle, Katch & Katch, 1981).

Sample calculation of percentage of body fat for young men (Sloan's 1967), (\( r = .85 \)) was done by using two skinfold measures:

\[
\text{Body Density} = 1.1043 - .00015 (\text{Thigh skinfold}) - .00131 (\text{Scapula skinfold})
\]

Percentage of Body fat was calculated by Siri's equation (1956) to convert body density to percentage of fat.

\[
\% \text{age of Fat} = \left( \frac{4.952}{\text{Body Density}} - 4.500 \right) \times 100
\]

(Johnson & Nelson, 1982).
Lean Body weight (LBW) was calculated by the Willmore and Benke (1974), R = 0.931) by using Body weight and single skinfold measure:

\[ LBW = 10.26 + (0.793 \times \text{weight (kg)}) - (0.368 \times \text{Abdominal skinfold}) \]

(Mathew and Fox, 1985).

**STATISTICAL PROCEDURE**

(i) The relationship of selected motor fitness components and selected psycho-physiological variables and body composition was established by computing Pearson's Product-Moment Correlation (zero-order correlation).

(ii) The relative importance of selected psycho-physiological variables to selected motor fitness components was also found by eliminating or partialling out the effect of one or the other variable through partial correlation (First order).

(iii) The combined contribution of selected psycho-physiological variables and body composition was considered separately to motor fitness components, which was obtained through multiple correlation.

(iv) The level of significance chosen to test the hypothesis was 0.05.

(v) The data was computerized at Computer Centre, Panjab University, Chandigarh.