CHAPTER 3

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MATERIALS AND METHODS

After receiving the studies of the distinguished scholars, the procedural methods with specific operations, directed towards logical conclusions has been planned and performed. Such procedural details are presented in this chapter.

This was a descriptive study, a survey in which the investigator made an attempt to evaluate and compare the health related physical fitness and the anthropometric measures of the school going boys at the age group of 11 and 12 years, studying in Class VI & VII respectively.

3.1 Choice of subjects

‘Bankura’, the district located in the western part of West Bengal and in the middle-east region of India, is totally dry area throughout the year. The climatic temperature is around 45°C - 48°C in summer and 2°C - 4°C in winter. A little shower noticed in rainy season. Just a hilly area with laterite type soil. Socio-economic condition is very poor. Traditional village culture remains. Religious bindings and castism prevailed.

There are 450 (app.) junior high, high and higher secondary schools in this district. Among them 17 schools were considered from the three sub-divisions, Bankura, Khatra and Bishnupur.

366 (three hundred sixty six) school going boys of class VI, completed 10 years but not cross over 11 years of age and 365 (three hundred sixty five) boys of class VII, completed 11 years but not cross over 12 years of age were taken from that 17 schools in the district as the subject of the present investigation. The students were voluntarily accept the stress of the tests. Concerned schools physical education teachers, the headmasters and the other three assistants were cordially accepts the presence of the researcher and the importance of the study.

3.2 Design of the study

Students were habituated in engaging themselves in natural playing but even not regularly. Some of them have got some coaching / training. As sampling were random some of them were also sedentary.
SCHOOL
BANKURA DISTRICT

Temperatures (Degree Celsius) -

<table>
<thead>
<tr>
<th>Month</th>
<th>Maxi</th>
<th>Mini</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan.</td>
<td>29</td>
<td>11</td>
</tr>
<tr>
<td>Feb.</td>
<td>33</td>
<td>18</td>
</tr>
<tr>
<td>March</td>
<td>39</td>
<td>15</td>
</tr>
</tbody>
</table>

Block Boundary

Schools

Bankura - Sadar Divn.
1. Baliara High School
2. Bankura Town High School
3. Barjora High School
4. Bankura Christian Collegiate School
5. Kenduasihi High School
6. Purandarpur High School
7. Rajagram High School
8. West Sanabandh Jawaharlal Smriti Vidyamandir

Khatra Divn.
9. Moulasole High School
10. Panchmura High School
11. Rajpur High School
12. Simlapal High School
13. Taldangra High School
14. Tilaboni High School

NRDMS Bankura
The health of the students were very poor. Some of them were suffering from malnutrition. The scarcity of water is a burning problem. Although the present researcher have not take any estimate of daily food intake quantity, but it is clear that almost 50% of the student having a lac of balanced diet, even proper quantity of carbohydrate only.

With the help of the physical education teachers of concerned schools and three other assistants, the tests were administered and the measurements were taken. It was very difficult to motivate the students to give their best for the tests. The presence of the physical education teacher helps a lot in this regard.

The soil character were very bad. For this it was to much difficult to the boys to run 1 mile on bare foot. They were run in two groups for each class. Other measurements were taken one by one in the class room.

Data were taken from a single school in a day and the total time taken were near about 4½ to 5 hours daily. Within 1½ - 2 months total data were collected. It was collected in the late winter season (February – March) when the temperature was nearly about 10-12°C (min.) & 30°-35°C (max.) humidity were very low.

The researcher himself was present with his associates in each and every schools and directly supervise the test procedures and sometimes record the data as required. The anthropometric measurements were taken first and then the fitness variables in the classroom. After that, the 1 mile run test were taken outside the classroom, in the playground of the schools which were previously marked as a 300/350/400 m track as the size of the ground.

3.3 Criteria measured

Health related physical fitness variables and anthropometric measurements were the criteria.

To find out the health related physical fitness variables and the different anthropometric measures, different authors suggested different methods.

In the present study according to the five (5) assessment items of the Health Fitness Award (HFA) of the President’s Council on Physical fitness and sports, U.S.A., the fitness variables were measured as the cardiorespiratory endurance, abdominal strength endurance, upper body strength endurance, flexibility and the
body composition. The anthropometric measures were the measurements of different body parts.

3.3.1 Health related physical fitness variables
   a. Flexibility; measured by V-sit & Reach (in m.)
   b. Abdominal strength endurance; measured by partial Curl ups (in no.)
   c. Upper body strength endurance; measured by right angle push ups (in no.)
   d. Cardio-respiratory endurance; measured by one mile run/walk (in min. & sec.)
   e. Body composition by Body Mass Index (in kg./m.²)

3.3.2 Anthropometric measures
   a. Weight (in kg.)
   b. Standing height (in m.)
   c. Sitting height (in m.)
   d. Lower Limb Length (in m.)
   e. Thigh Circumference (in m.)
   f. Chest circumference (in m.)
   g. Abdomen circumference (in m.)

3.4.1 Procedures of physical fitness tests
   Before performing the tests, all the students were taught the correct techniques with proper demonstration about the tests, including proper pacing in run. There were no limit to the number of trials of the tests. After proper warming up and low intensity physical exercise the tests were administered.

   a. V-sit & reach (in m.)
      A straight line of two (2) ft long was marked on the floor as the baseline. A measuring line perpendicular to the base line at the mid point was drawn on the floor and the intersection of these two lines was the ‘0’ point. Boys with bare foot sat keeping two legs in the two sides of the measuring line, with the feet 8-10" apart and the heel just touch the base line. Students keep one hand upon other, the palm facing downward together and touch the measuring line by the tip of the middle
V sit and reach test

Partial curl up test
Right angle push up test

One mile run / walk test
finger. With the legs keeping flat, without flexing the elbow joint, the students slowly bend and try to reach forward slowly as far as possible, keeping finger on base line. After two or three practices the students hold the tip on the measuring line for three seconds, while that distance was recorded in meter.

b. **Partial curl ups (in no.)**

Have students lie on cushioned in supine position with knees flexed and feet about 12 inch from buttocks with a reasonable gap between them on the floor. Arms were extended forward with fingers resting on thigh and pointing towards the knees. One partner was behind the head with hands cupped under the partners head. The student being tested curl-ups slowly sliding the fingers up to the knee until the fingertips touch the pattela, then back down until the head touch the partners hands. The curl ups were done and were continued until the students can do no more in rhythm. Record were taken only those curl-ups done with proper form and rhythm.

c. **Right angle push ups (in no.)**

The student lied, face down to the floor in push up position with hands under shoulder, fingers straight keeping palm on the floor and leg straight, parallel and slightly apart, with the toes supporting the feet. The student straightens the arms, keeping the back and knees straight, then lowers the body until there was a 90° angle at the elbow joint form with the upper arms parallel to the floor. The push ups were done and were continued until the students can do no more in rhythm. Record were taken only those push-ups done with proper form and rhythm.

d. **One mile run/walk (in min. and sec.)**

The ground were marked properly. Directions were given to the students that how many laps they have to run or walk as required to cover one mile. The student started their run from a starting position on the count “Ready? Go!” Walking may be interspersed with running. Students were encouraged to cover the distance in as short time as possible. They can only walk under tremendous fatigued situation. Sufficient time have given to them for proper warming up and cooling down before and after the test. Time were recorded in min. & sec.
e. **Body Mass Index (B.M.I) (in kg./m²)**

Determined by the ratio of the wt. in kg and height² in m² as the formula bears:

\[
\text{BMI} = \frac{\text{Weight (in kg.)}}{(\text{Ht (in m.)})^2} \times 100
\]

3.4.2 **Procedures to measure the anthropometric measurements**

Morphological characteristics are the very fundamental to achieve physical performances. Barry *et al.*, (1961), Wear, *et al.*, (1962), Espenhade *et al.*, (1963) and Cureton, *et al.*, (1975) found that the association of age, body size and body composition with physical performance has to vary from low to moderate in children depending on several characteristics of the investigation. Different anthropometric measures and their measurement techniques are discussed below. All measurements techniques were adopted from leading authors (Barrow and McGee 1979, Johnson & Nelson 1979).

a. **Weight (in kg.):**

The subjects were wore only a gym shorts and bare foot, stand erect on a standard weighing machine. Then the body weight were recorded in nearest tenth of a kilogram.

b. **Standing height (in m.):**

Height were measured in the wall, previously marked accordingly. The boys were stand erect on the horizontal surface with heel touch each other and touch the wall. An horizontal scale placed on the head perpendicular to the wall in the mid sagital plane and then the height was recorded from the marked wall.

c. **Sitting height (in m.):**

The subjects were on a bench keeping the back with the wall, sat as erect as possible with legs hanging down and the arms resting on the thighs. Distance was measured from the bench to the vertex (highest point on the top of the head) by keeping an horizontal scale placed on the head perpendicularly to the wall.
d. **Lower limb length (in m.):**
The difference between the standing height and the sitting height were taken as the lower limb length.

e. **Thigh circumference (in m.):**
The circumference were taken at right angles to the long axis of the body segments. The boys were asked to stand erect, legs slightly apart with proper balance. Positioning the steel tape nearer to the groin and the point of maximal thigh circumference, the reading were taken.

f. **Chest circumference (in m.):**
The boys were asked to stand erect, legs slightly apart with proper body balance. Chest circumference were taken at the end of normal expiration. The measuring steel tape were placed at the nipple level and the reading were taken.

g. **Abdomen circumference (in m.):**
Abdomen circumference were taken at the level of the umbilicus and iliac crests. In balanced and erect standing position the tape were placed in the umbilicus level and the reading were taken.

**3.5.1 Validity and reliability of the tests and measurements:**
The tests and measurements conducted in this study were all valid tests and measured the proposed criteria from the purpose. The tests of health related physical fitness were adopted from the President's Challenge Physical Fitness Program Packet of the President's Council on Physical Fitness and Sports, U.S.A. 1999-2000. The anthropometric measurement were taken from the "Practical measurements for evaluation in physical education" by Johnson & Nelson. Therefore, all the test were valid and the reliability of the tests has been established by test retest method and thereby reliability and validity of the tests were established.
3.5.2 Testers competency

To establish the reliability of the researcher and his three associates, the measurements/tests of some of the anthropometric measures and the fitness variables of all the subjects (9) were taken by the researchers and his associates independently under identical condition. Rank order correlation were computed to correlate the readings of two sets of data of each item separately.

The co-efficient obtained for each item of the said variables are presented in the following tables:

<table>
<thead>
<tr>
<th>Variability</th>
<th>Co-efficient of reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Weight</td>
<td>1</td>
</tr>
<tr>
<td>2. Standing height</td>
<td>1</td>
</tr>
<tr>
<td>3. Chest circumference</td>
<td>0.98</td>
</tr>
<tr>
<td>4. Abdomen circumference</td>
<td>0.96</td>
</tr>
<tr>
<td>5. Curl ups</td>
<td>0.99</td>
</tr>
<tr>
<td>6. One mile run</td>
<td>0.97</td>
</tr>
</tbody>
</table>

From the above table it was very clear that all the correlations were very high. Thus the competency of the researcher and his associates were established.