CHAPTER III
PROCEDURE

The procedures adopted for the selection of subjects, selection of variables, selection of test, pilot study, reliability of data, instrument reliability, tester competency and reliability of test, subject-reliability, orientation of testers, test administration and the statistical techniques employed for computing norms have been described in this chapter.

The research scholar contacted the Director of School Education, Pondicherry, for permission to conduct the physical fitness test in selected schools. The Director of School Education was kind enough not only to give permission, but also issued a common circular to the Heads of the selected high and higher secondary schools of the Union Territory of Pondicherry (Appendix A).

Selection of Subjects

The aim of this study was to compute the physical fitness norms for school boys from the age 13 to 16 years, studying eighth to eleventh standards in the Union Territory of Pondicherry. It consists of four enclaves namely
Pondicherry, Karaikal, Yanam and Mahe. Out of 62 schools (High and Higher secondary schools both rural and urban, Appendix-B), only 12 High schools and 13 Higher secondary schools were selected at random keeping in view the strength of students on roll. From the total population of 8682, belonging to 25 schools, only 1683 subjects were drawn randomly.

Since the subjects selected for the study belonged to different regions of the Union Territory of Pondicherry, they were considered to be as representative samples. All the subjects were day scholars attending schools from 8.45 a.m. to 3.45 p.m. The schools considered for this study, were under the control of Director of School Education, Government of Pondicherry.

In order to ensure full co-operation from the subjects, the scholar had a brief meeting with the respective heads of institutions and physical education teachers. The requirement for the study were explained to all the subjects in the presence of their physical education teachers and all the subjects voluntarily agreed to undergo the prescribed tests.

Physically handicapped boys were not included as subjects. The selected schools and the number of students from each schools are given in Appendix C.
The age wise break-up of students is presented in Table 1.

Table 1

<table>
<thead>
<tr>
<th>S. No</th>
<th>(Age group) Years</th>
<th>No.of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>13 years</td>
<td>417</td>
</tr>
<tr>
<td>2.</td>
<td>14 years</td>
<td>433</td>
</tr>
<tr>
<td>3.</td>
<td>15 years</td>
<td>418</td>
</tr>
<tr>
<td>4.</td>
<td>16 years</td>
<td>415</td>
</tr>
</tbody>
</table>

Selection of Variables

Physical fitness is an essential factor for performance, and it requires the ideal combination of numerous abilities which are to be developed to a certain extent. Fleishman\(^1\) has identified the dimension underlying human performance in two categories. They are (1) physical proficiency (fitness) area and (2) the psychomotor domain. The factors of strength, power, speed, agility, coordination, cardio-vascular endurance and flexibility

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constituted the physical proficiency area. A more limited phase of physical fitness is "motor fitness". It is gauged by performance and this performance is based on a composite of many variables. The most commonly mentioned fitness variables are strength, endurance, power, speed, agility, balance, flexibility and stamina.²

The investigator reviewed the available scientific literature and on the basis of discussion with experts, feasibility criteria, availability of instruments, equipments and the relevance of the variables to the present study, the following variables were selected for the construction of norms.

1. Strength
2. Endurance
3. Speed
4. Power
5. Agility

**Selection of Test**

Standardized tests are often used in educational research projects to measure factors such as school...
achievement, aptitude, self concept and attitudes. Most of the tests used in educational research are norm referenced. In the field of physical education also, norm referenced research is more appropriate and useful. Thus the AAHPER Youth fitness test was selected for the purpose of the study. This test measures most of the physical fitness components satisfactorily. Moreover, the items were not complicated but were simple and easy to be operated upon the subjects. The test items and components in AAHPER Youth fitness test are as follows:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Test Items</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pull-ups</td>
<td>Arm/Shoulder muscular strength and endurance</td>
</tr>
<tr>
<td>2.</td>
<td>Bent-knee sit-ups</td>
<td>Abdominal/Hip muscular strength and endurance</td>
</tr>
<tr>
<td>3.</td>
<td>Shuttle run</td>
<td>Speed and change of direction (agility)</td>
</tr>
<tr>
<td>4.</td>
<td>Standing long jump</td>
<td>Explosive power of leg extensor muscles</td>
</tr>
<tr>
<td>5.</td>
<td>50 Yard dash</td>
<td>Speed</td>
</tr>
<tr>
<td>6.</td>
<td>600 Yard run/walk</td>
<td>Circulatory respiratory endurance</td>
</tr>
</tbody>
</table>
Pilot Study

The investigator has conducted a pilot study for 75 school boys in Jeevanandam higher secondary school, Pondicherry, in order to know the practical difficulties in the administration of test, to gain additional knowledge, ideas and approaches. Based on the experiences of the pilot study, individual score sheet system was introduced to record all the test results as well as individual particulars. This system minimised the time of recording and expenditure. A sense of competition was also created in the minds of school boys.

Reliability of Data

The reliability of data was ensured by establishing the instrument reliability, tester competency and reliability of tests and subjects reliability.

Instrument Reliability

Stop watches calibrated to $1/100^{th}$ of a second and flexible steel tapes required for this study were all procured from reliable standard companies. These instruments are taken from the Department of Physical Education and Sports, Pondicherry University, Pondicherry. These were considered to be accurate enough for the present study.
Tester Competency and Reliability of Test

The tester competency was assessed together with the reliability of the tests. Reliability of the tests concerning physical measurement refers to the consistency with which a particular test measures. In such tests repetition of the test is a simple and sure method of determining agreement between the two sets of scores. The reliability of the test for the present investigation was established through test-retest method because all these were concerned with the physique of the subjects. A sample of thirty students were selected at random from different schools in the Union Territory of Pondicherry. Test and re-test was conducted on consecutive days for the six different items (pull-ups, bent knee sit-ups, shuttle-run, standing long jump, 50 yard dash, 600 yard run and walk). The scores thus obtained were correlated by using Pearson product-moment correlation method. The coefficient of correlations are presented in Table 2.

Subject Reliability

The test - retest coefficient of correlation also indicated subject reliability as the same subjects were used under similar conditions by the same tester.
Table 2

Reliability Co-efficient of Correlation of Test - Retest Scores

<table>
<thead>
<tr>
<th>S. No</th>
<th>Test Items</th>
<th>No of Subjects</th>
<th>Coefficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pull-ups</td>
<td>30</td>
<td>0.97 *</td>
</tr>
<tr>
<td>2.</td>
<td>Bent Knee sit-ups (one minute)</td>
<td>30</td>
<td>0.95 *</td>
</tr>
<tr>
<td>3.</td>
<td>Standing long jump</td>
<td>30</td>
<td>0.93 *</td>
</tr>
<tr>
<td>4.</td>
<td>Shuttle run</td>
<td>30</td>
<td>0.87 *</td>
</tr>
<tr>
<td>5.</td>
<td>50 yard dash</td>
<td>30</td>
<td>0.85 *</td>
</tr>
<tr>
<td>6.</td>
<td>600 yard run/walk</td>
<td>30</td>
<td>0.87 *</td>
</tr>
</tbody>
</table>

* Significant at 0.01 level of confidence

The tabulated 'r' required for significance at 0.01 level of confidence with 28 df is 0.463.

Orientation of Testers / Helpers

This study includes a wide range of sample of schools for the collection of data. It was beyond the capacity of the investigator to collect the data individually, therefore, some helpers were sought to collect data by administering the already mentioned tools. These helpers were qualified physical educationists from physical education department of Pondicherry university, Pondicherry. Seven helpers were trained to collect the data and
administer the tools. They were given training collectively for one month on the local population of Pondicherry. Inter-helper reliability at the end of the training was 0.99. This high co-efficient was very much needed because this study includes physical fitness tests which were to measure specific fitness traits and needed objective measurement to establish norms. Here it was further mentioned that for the reliability and exactness of physical fitness scores, synchronised stop watches and steel tapes were used by the helpers as well as the investigator.

Before the administration of test, the subjects were given a chance to practise the prescribed test items and knew exactly what was to be done.

**Administration of Tests**

The schedule of testing and the details of the test items of AAHPER Youth Fitness Test was put on the notice board of each school well in advance. The cooperation of physical education teachers was sought to orient the subjects to the test procedure and to give adequate training to elicit true performance on the day of testing. The subjects were urged to put in their best efforts. The tests were administered strictly observing the procedures specified for each test.
Stations for the conduct of the tests were set up. Two well-trained persons were posted at each station to record the scores.

As the classes reported for the test at 9.30 A.M. on the scheduled date, each subject was given a score card which he carried from station to station for having his scores recorded therein. The subjects were divided into small groups and the order to take the tests was fixed randomly. The test items were administered as described below.

**AAHPER Youth Fitness Test**

**Pull Ups**

**Purpose:**

The purpose of this test was to measure arm and shoulder strength and endurance.

**Equipments:**

A metal or wooden bar 1-1/2 inches in diameter or piece of pipe.

**Description:**

The bar was high enough for the subject to hang with his arms and legs fully extended and his feet free of
the floor, using over-hand grip. After assuming the hanging position, the subject raised his body by his arms until his chin was placed over the bar and then lowered his body to a full hang as in the starting position. The exercise was repeated as many times as possible (Figure 1).

Rules:

One trial was allowed. The body was not allowed to swing during the execution of the movement. If the subject started swinging, it was checked by extending the arm across the front of the thighs. The knees were not allowed to be raised and kicking of the leg was not permitted.

Scoring:

Number of completed pull-ups was recorded as the score of each subject.

**Bent Knee Sit-Ups**
*(one minute)*

Purpose:

The purpose of this test was to measure abdominal hip strength and endurance.
**Equipments:**

Clean floor mat or turf, stop watch and score sheet.

**Description:**

The subject assumed supine lying position with his knees bent, feet on the floor and heels not more than 12 inches from the buttocks. The angle at the knees was less than 90 degrees. The subjects kept his hand on the back of his neck with fingers clasped and placed his elbows squarely on the mat or turf. His feet were held by his partner to keep them in touch with the surface. The subject tightened his abdominal muscles and brought his head and elbow forward as the curled up, finally touching knees with elbows. This action was considered as one sit up. The subject returned to the starting position with his elbows on the surface before he sat up again. The timer gave the signal "ready go" and the sit-ups performance was started on the word "go" and the performance was stopped on the word "stop". The subjects continued to perform sit-ups for a period of 60 seconds (Figure 2).

**Rules:**

Only one trial was allowed unless the subject did not perform fairly. No resting was permitted between sit-
ups. No sit-ups was counted if the subject failed to do it according to the above description.

**Scoring:**

Number of correctly executed sit-ups in 60 seconds was recorded.

**Shuttle Run**

**Purpose:**

The purpose of this test was to measure speed and agility.

**Equipments:**

Two blocks of wood 2 inches x 2 inches x 4 inches stop watch, score sheet, measuring tape and chunnam powder.

**Description:**

Two parallel lines were marked on the floor 30 feet apart. Two wooden blocks were placed behind one of these lines. The subject was asked to start behind the other line after the signal "ready go". The subject was asked to run and pick up the block one by one from the starting line and then to place it behind the starting line.
To eliminate the necessity of returning the blocks after each race, races were started alternately, first from behind one line and then behind the other (Figure 3).

**Rules:**

Two trials were allowed with some rest in between.

**Scoring:**

The best time to the nearest tenth of a second was recorded.

**Standing Long Jump**

**Purpose:**

The purpose of this test was to measure the explosive power of leg extensor muscles.

**Equipments:**

Out door jumping pit, measuring flexible steel tape and score sheet.

**Description:**

The subject was asked to stand feet apart comfortably and toes were placed just behind take-off line.
For the preparation of jumping the subject was instructed to swing his arms backward and knees bent. When the jump was executed, he was asked to extend the knees, swing the arms and push against the surface simultaneously (Figure 4).

**Rules:**

Three trials were allowed and the measurement was 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 distance of the three trails from the take-off line to the nearest point where any part of his body touches the ground was recorded in metres and centimetres and to the nearest centimetres.

**50 Yard Dash**

**Purpose.**

The purpose of this test was to measure speed.

**Equipments:**

Stop watches, score sheet and Chunnam.
Description:

The subject was asked to take the starting position behind the starting line. The starter used the commands "Are you ready?" and "Go" simultaneously with the command "Ready Go". Clapper was sounded for the help of the timers who stand at the finish line (Figure 5).

Rules:

The score was the time clapped between the starter's signal and the instant the subjects crossed the finished line.

Scoring:

Score was recorded in seconds to the nearest one tenth of a second.

600 Yard Run / Walk

Purpose:

The purpose of this test was to measure circulatory - respiratory endurance.
**Equipments.**

Track or a marked area stopwatch, score sheet and chunnam.

**Description.**

Subject used standing start. At the signal "ready go" subject started running the 600 yard distance. The runners were allowed to walk if they felt tired (Figure 6).

**Rules:**

Walking was permitted but the subject was to cover the distance in the shortest possible time.

**Scoring:**

Score was recorded in minutes and seconds.

**Statistical Analysis**

The scores for each test items were gathered for all the subjects separately and then pooled age-wise for preparing the norms. The age-wise norms were computed in terms of Percentile scale, Hull-sclae and T-scale, separately for each item and analysis of variance was also used, the level of significance was set at 0.05.