CHAPTER – III

METHODOLOGY

The procedure adopted for the selection of subjects, selection of variables, orientation of the test, reliability of tools, orientation of subjects and statistical technique employed in analyzing the data have been described in this chapter.

3.1 SELECTION OF SUBJECTS

For the purpose of this study hundred boys from four schools in rural areas and hundred boys from four schools of the urban areas in KADAPA District were selected randomly. The age ranged between fourteen years to sixteen years. The subjects were selected from the schools as noted below.
### RURAL AREAS:

1. Z.P.H.SCHOOL G.K. ACHAPALLI
2. Z.P.H.SCHOOL T.SUNDUPALLI
3. Z.P.H.SCHOOL RAYAVARAM
4. Z.P.H.SCHOOL PINCHA
5. Z.P.H.SCHOOL MADITHADU
6. Z.P.H.SCHOOL THIMMASAMUDRAM
7. Z.P.H.SCHOOL PEDDINENIKALVA
8. Z.P.H.SCHOOL CHANDRAJU PALLI
9. Z.P.H.SCHOOL KONDAUTHURPU
10. Z.P.H.SCHOOL CHERUVUKINDAPALLI

### URBAN AREAS

1. C.S.I.HIGH SCHOOL KADAPA
2. MUNICIPAL HIGH SCHOOL KADAPA
3. NAGARJUNA HIGH SCHOOL KADAPA
4. St. JOSEPH HIGH SCHOOL KADAPA
5. NEW MODAL HIGH SCHOOL KADAPA
6. PUSHPAGIRI HIGH SCHOOL KADAPA
7. VIKAS HIGH SCHOOL KADAPA
3.2 SELECTION OF VARIABLES

In Urban Schools, admissions for X classes were made on the basis of some physical tests. Students seeking admission were tested in youth fitness test variables besides written test. No uniform norms were followed to give marks for the AAHPERD youth fitness test variables. Hence it has become necessary to construct a general uniform norms of the AAHPERD youth fitness test variables as the norms are to be followed by the urban schools during the admission and also at the end of the year of all classes in testing annually. Taking into consideration of the importance of the variables used for selecting the students every year for VIII class and annual testing for IX class to X classes.
AAHPERD\footnote{G. Alan Stall, Encyclopedia of Physical Education, Fitness sports Training Environment Nutrition (Brighten Publishing Company; Salt Lake City; Utah 1980), P.412} youth fitness variables were selected for the norms construction. The variables are as follows:

1. Speed
2. Shoulder strength
3. Abdominal strength
4. Agility
5. Endurance
6. Power
3.2.1. Speed

Speed is the ability to move the entire body rapidly from one place to another.

Even though speed and reaction time are somewhat related, they are distinct characteristics and it is possible for people to be looking in one of the traits and still have an abundance of the others. There are speed different forms viz.

1. Speed of every movement of body segments.
2. Running speed for a very short distance (Acceleration are)

Speed of movement is highly specific to areas of the body. An individual with fast arm movement may have slow leg movements. In fact these specificity extends even to the type of task and the direction of movement. Running speed can be discussed in terms of two factors related to how fast a person can accelerate such as the change of Hockey runner or the acceleration of a sprinter. This fact is the most important consideration in speed for distance up to 20 yards and is very essential in court and field games and short races. On the other hand, for distance greater than 20 yards maximal-running speed is more important factor.
Therefore an individual may be slow starter and he will achieve a maximal speed after 20 yards. Indeed a person may be proficient in Hand ball, Foot ball, Basket ball, or Tennis where quick acceleration is involved but may be a poor 20 yard sprinter and vice versa.

Taking into consideration of the above importance speed was chosen as one of the variables for the norms constructions.

**3.2.2 Shoulder Strength**

Performance in sports events depends on strength, skill and endurance. The development of strength endurance would have served to evaluate the skill and sustain it. It is an elevated skill packed by great strength and endurance paved the way for better performance. Strength is the prime important factor in track and field and in various games and sports. Without strength, success is not possible in sports. For any vigorous physical activity such as running, throwing, jumping and in major games strength is an essential factor.

Muscular strength and performance have linear relationship and is directly proportional to each other. When the leg has good strength and better sprinting ability, the performance would be more.

Strength helps the muscle to exert force because force is generated through the contraction of muscles. The primary sources of force is
strength and is directly proportional to the cross sectional area of the muscle. No physical activity can be performed without strength. When strength is less, other functions are handicapped. The functioning capacity of vital organs such as respiratory, circulatory and digestive systems, depend upon the condition of involuntary muscles. Strength in leg helps to carry body weight and to carry extra burden. Muscular strength is reduced by inactivity. The main criterion of muscular contraction is muscle’s increasing tension, which can be associated with the several of muscle length.

3.2.2. Abdominal Strength

Abdominal Strength is the force that an abdominal muscle of muscle group can exert against a resistance in one maximal effort. The abdominal strength helps the diaphragm to contract for the better respiration. Abdominal strength is inversely proportional to fat at the abdomen. Greater the abdominal strength and lesser the fat at the abdomen, helps for the better excretion. When the abdomen is strengthened the vital and visceral organs which are present inside the abdominal region are also strengthened through which the digestive system, endocrine system, reproductive system etceteras are improved. Abdomen strength is related to the Aerobic activities. Most of the games
and sports activities are aerobic type of activities in the field of physical education. Those who perform aerobic type of activities may have better abdomen strength capacity.

Taking into consideration of the above importance the abdominal strength was selected as one of the AAPHERD youth fitness test variables for the norm construction.

3.2.3. Agility

Agility is the ability to change the direction of the body and its parts rapidly and accurately. The ability of the performer may be influenced by either a reaction of a known type and in an unknown direction, that is anticipated or a reaction of an undetermined type and in an unknown direction to set of stimuli that may vary widely. A sprinter reacting to the starting gun and a defensive half-back in soccer reacting to the changes in the speed or direction of a pass receiver respectively.

Agility is a Combination of several athletic traits including strength, reaction time, and speed of movement, power and co-ordination. Agility is very important in all activities involving quick changes in direction such as hand ball, soccer, Basket ball and base ball. Co-ordination involved in the specific movement is obtained by the most
important components of agility. If a person is poorly coordinated, he will lack agility regardless of the other traits he possesses.

Taking into consideration of the above importance the agility was selected as one of the AAHPERD youth fitness test variables for norms construction.

3.2.4. Endurance

Endurance is defined as the capacity to continue to work under strain for a long period of time without undue fatigue. It is the ability to persist in strenuous activity. This definition may be applied to the body as a whole, to a particular body system or to a local area of the muscular system. Endurance is one of the basic components of general athletic ability and it is usually considered to be the most important component of physiological fitness. Some activities in which endurance is of prime importance are running (except for short distance), swimming, cycling, wrestling, basketball, handball, soccer and rugby. In all these activities endurance occupied an important place.

Muscular endurance is the ability to continue successive movements with a heavy load at a maximum speed for a short period of time. Such endurance can be improved by increasing the strength through
some form of overload principle. As muscles are taxed beyond the point of comfort any aerobic activity or the longer time duration activity is involved with the endurance.

Taking into consideration of the above fact endurance was selected as another variable for the norms construction.

3.2.5. Power

Most of the anaerobic activities are related to the leg power. Greater the leg power, better the anaerobic performance in the field of games and sports. Leg power is essential with muscular strength. Muscular strength can be developed through maximal load of weight training. Muscle strength and explosive power are increased due to the increase in the size of the muscle fibers, which are present in the leg muscle. The muscle fibers are developed as a result of increase in action myosin and other myofibrular proteins in the muscle fiber.

The leg explosive power is also associated with the fast twitch muscle fibers. Greater the percentages of fast twitch muscle fibers, better the leg explosive power and speed. Hence the leg explosive power plays the vital role in most of the anaerobic activities.
In the game of soccer a player must jump high to head the ball, run fast frequency and change his direction abruptly during the play. Power is the basic factor for the most of the above activities.

Performance in long jump reveals the explosive power of an athlete. Conditioning and training are required to turn at a full speed down a runway, hit the take off board and leap with the style in the air and land in the sand pit. Power is one of the most important components of physical fitness.

Taking into consideration of the above importance the power was selected as one the AAHPERD youth fitness test variables for norms construction.

3.3. RELIABILITY OF DATA

Establishing the instrument reliability, tester’s competency, reliability of the test and the subject reliability ensured the reliability of data.

3.2.3 INSTRUMENT RELIABILITY

The stopwatches and measuring tapes used for test were considered reliable as they were procured from reputed firms and were on use for research purpose. Further these instruments have been calibrated in standard units.
To determine the reliability of instruments, the measurement on each of the variables were recorded five times under similar conditions using the same instruments and the scores obtained were the same and also the scores were compared with other scores taken from the instruments procured from other reputed firms. Thus they were accepted reliable for the purpose of the study.

3.4. TESTER’S COMPETENCY

The tester’s competency was assessed together with the reliability of the tests. For this purposed the performance of ten subjects selected at random on all the chosen variables were recorded twice under identical conditions by the investigator on two different occasions. This way done by the test-retest method on consecutive days. The scores thus obtained for each variable by test retest method were correlation using Pearson’s product moment correlation as described by Garrett.

The correlation co-efficient obtained between the test and retest data were significant at 0.05 level of confidence as shown in table.1
RESEARCHER CONDUCTING 50 MTS DASH TEST
RESEARCHER CONDUCTING PULL UPS TEST
RESEARCHER CONDUCTING BENT KNEE SIT UPS TEST
RESEARCHER CONDUCTING SHUTTLE RUN TEST
RESEARCHER CONDUCTING 600 YARDS RUN & WALK TEST
RESEARCHER CONDUCTING STANDING BROAD JUMP TEST
TABLE-1

Reliability co-efficient of correlation for Test – Retest

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Variable</th>
<th>Co-efficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Speed</td>
<td>0.93</td>
</tr>
<tr>
<td>2.</td>
<td>Shoulder Strength</td>
<td>0.96</td>
</tr>
<tr>
<td>3.</td>
<td>Abdominal Strength</td>
<td>0.91</td>
</tr>
<tr>
<td>4.</td>
<td>Agility</td>
<td>0.97</td>
</tr>
<tr>
<td>5.</td>
<td>Endurance</td>
<td>0.98</td>
</tr>
<tr>
<td>6.</td>
<td>Power</td>
<td>0.95</td>
</tr>
</tbody>
</table>

Table Value at 0.05 level = 0.639

\[ Df = N - 2 \]

\[ = 10 - 2 \]

\[ = 8 \]
Since the obtained correlation values were more than the tabulated value of 'r' the reliability of tests were considered reliable at 0.05 level of confidence.

3.5. SUBJECT RELIABILITY

The above test-retest coefficient of correlation also indicated the subject reliability, because the same subjects were used under similar conditions by the same tester. No motivational techniques were used at the time of testing period.

3.6. ORIENTATION OF SUBJECTS

In order to get the full co-operation from the subjects, the investigator very clearly explained about the purpose of the study.

Prior to the administration of test, it was very clearly explained to the subjects in detail about the procedure to be followed in the test. This explanation helped very much to ensure the effective co-operation from the subject to obtain the reliable data. Model performances by some of the subjects were also done to make the subjects clearly understand norms related to AAHPERD youth fitness test variable items.
3.7. COLLECTION OF DATA

The administration of the tests and the method of collection of data are explained here.

3.8.1 Speed

Variable : Speed
Test : 50 yard dash
Purpose : The purpose of the test was to measure
          The speed of an individual

Test administration:

The subject took a position behind the starting time. The starter used the command “ready” and “go”. The latter was accompanied by a downward sweep of the arm as a signal to the timer. The subjects ran across the finish line. One trial was permitted.

The starting position of the test was a back lying position with knee flexed, feet on floor and heels between one foot from the buttocks. The hands are positioned behind the neck and finger and clasped. A partner held the examinee’s feet too keep him in contact with the testing surface. The examinee curled back down to the floor until the midback contact the testing surface. Another Sit-ups completed in 60 seconds.
Scoring:

One point was scored each correct sit-up. The score was the maximum number of sit-ups completed in 60 seconds.\(^2\)

3.8.4. Agility

Variable : Agility
Test : Shuttle run
Purpose : The purpose of the test was to measure the agility.

Test administration:

Two lanes parallel to each other were marked on the floor 30 feet apart. The subject stood behind one of the lanes with the 2 blocks at the other lane. On the signal “Start” the subject ran to the blocks, took one block, and returned to starting lane, and placed the block behind that line. The subject returned to the second block, which was carried across the starting lane on the way back. Two trials were given and best trail was taken into account.

Scoring:

The score was elapsed time recorded in seconds and one tenth of seconds for the better of two trails.\(^3\)

\(^2\) Ibid
\(^3\) Ibid
3.8.5. Endurance:

Variable : Endurance  
Test : 9 minutes/12 months Run and Walk

Purpose : The purpose of the test was to find out the Cardio-vascular endurance of the subjects

Test administration:

Two subject took a position behind the starting line in a 400 m standard track. The subject was asked to run as fast as possible beginning on the signal Ready, Go". After 9/12 minutes a whistle was blown respectively and the subject was asked to stand rest wherever the test was finished. Nine minutes Run and walk was administered for the subjects below 13 years and 12 minutes Run walk was administered for the subjects above 13 years of age group.

Scoring:

The score was the distance covered on the standard 400 meters divided into 8 blocks of 50 meters each for convenience in measurement.4

4. Ibid
3.8.6. Power:

Variable : Power
Test : Standing broad jump
Purpose : The explosive power was measured through Standing Broad jump.

Test administration:

Two subjects stood behind a take off line with his feet apart of optimum distance. Before jumping, the subject flexes at the knees and swings the arms backward. The subject then jumps forward by simultaneously extending the knees and swings the arms forwards. Three trials were given. Measurement was from the closest heel mark to take offline.

Scoring:

The score was the distance between the take off line and the nearest point where any part of the subject body touched the floor. The best of the three trials were recorded.⁵

3.6. STATISTICAL TECHNIQUES

The following statistical procedures were used to analyse the Agility, Speed, Endurance and Power between Rural and Urban School boys.

⁵. Ibid
For the comparison ‘t’ ratio was used. The ‘t’ ratio is the ratio of the difference between mean, standard error. To find out the means, the standard deviation and standard error of the means the following formulas were used (Ungrouped data Method).

\[
M = \frac{\sum X}{N}
\]

Where

- \( M \) = Mean
- \( \sum \) = Summation of score
- \( X \) = Raw score
- \( N \) = Total number of subjects.

\[
S = \sqrt{\frac{\sum(X - \bar{X})^2}{N}}
\]

Where

- \( \sigma \) = Standard deviation
- \( \sum \) = Summation of score
- \( X \) = Deviation of the score from the mean
- \( N \) = Total number of subjects

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Standard Error of the Mean

\[
\sigma M = \frac{S}{\sqrt{N}}
\]

Where \( M \) = Standard error of the mean
\( \sigma \) = Standard deviation
\( N \) = Total Number of Subjects

't' ratio

\[
t = \frac{DM}{\sigma DM}
\]

Where \( DM \) = Difference between the mean
\( \sigma DM \) = Standard error of the mean difference between the mean.

\[
DM = M_1 - M_2
\]

\[
\sigma DM = \sqrt{\sigma M_1^2 + \sigma M_2^2}
\]

Where \( \sigma DM \) = Standard error of the difference between the mean

\( \sigma M_1 \) = Standard error of mean 1

\( \sigma M_2 \) = Standard error of mean 2