CHAPTER II

REVIEW OF RELATED LITERATURE
CHAPTER – II

REVIEW OF LITERATURE

The survey of the related literature is a crucial aspect of planning a research study and the time spent on such a survey is a wise investment. The review of literature is an exacting task calling for a deep insight and a closer perspective of the overall field. Emphasizing the importance of the survey of the related literature, C.V. Good and others have pointed out that "survey of the related literature help to show evidence already available so solve problem. It contributes by providing ideas, theories and explanations valuable for formulating the problem and may also suggest the method of research".

The review of literature in this study is concerned with physical fitness, fitness and games and sports and norms of physical fitness. Quite a good number of fitness tests have been conducted in different countries and particularly in U.S.A. Efforts have also been made in India. Review of the literature on fitness tests will augment our knowledge in this field and to take guideline for further development of the programme of fitness.
Tuteja (1929) administered the AAHPER Youth Fitness Test and N.P.E.D. Test of 100 rural and 100 urban school male students in Delhi. They are subjects ranged from 14 to 17 years. He has reported that the mean score on AAHPER test was lightly higher in case of urban high school students. Whereas the mean score of the rural high school students was slightly higher than the urban high school students in N.P.E.D. test, however, none of the differences in the mean score were found statistically significant.

Nerman (1933) administered the AAHPER Youth Fitness Test of 100 rural and 100 urban boys. The urban boys were superior to the rural boys and the difference was significant at .01 level. The samples were weaker for the same components of physical fitness. The performance was poor.

Gutteridge (1933) reported that boys increase their jumping ability from 5 years of age to 17 years of age. Boys have been found to be better than girls in running, jumping and throwing ability.

Keithly (1939) found that increase in strength of boys during adolescent period is greater than expectation. Dimock
also stated that physical strength as measured by Roger's test increase rapidly throughout the adolescent years.

**Indiana Motor Fitness Test (1944)** A popular test of physical fitness devised in 1944 was Indiana Motor Fitness test for high school and collegemen. Test consisted of 12 items involving two measures each of strength, velocity, motor ability and endurance. Test items were staddle chinning, push ups (for boys) push ups (for girls). Squat thirts (Burpe Test) vertical jump, standing broad jump. Norms based upon a Sigma scale were applied in developing the Indiana norms. Later adopting the Indiana Motor fitness test Franklin and Lehstein prescribed norms for boys and girls in grade 4 through 8.

**Corner and Cureton (1945)** developed a motor fitness test for high schools girls. The test consisted in two forms, a single period test of 6 items and a couble period test of 12 items. The test comprised of following parried items foot and toe balance and dizziness recovery, trunk extension and trunk flexion kneeling and jump and Illinois agility run, sits-ups and kneeling push-ups, basket ball throw and standing broad jump and squat thrust (30 seconds) and Brouka step test. Test item
correlation with the composite item scores ranged from .39 to .62 percentile norms based on a limited sample available.

A motor fitness test battery with thirty test items for lower classes of elementary school boys was constructed of motor fitness as it was only 63 percent of the total variance result oriented.

A modified form of the American Alliance for Health, Physical Education, Recreation and Dance (AAHPER) Health Related Physical Fitness Test (1990) was administered to a sample of 200 College physical education majors by Dinvcci et al. The skin fold measures were changed from the original test, and the flexed arm hang was added to the physical fitness test battery. The validity & readability of the test battery has already been established for middle schools boys & girls. The study determined the multivariate reliability of the modified test battery using a canonical correlation model. The university interclass reliability of the test item ranged from .91 to .99. The total redundancy for the modified physical fitness test battery was 87.
Espenshade (1947) administered the brace motor ability test on 325 girls and 285 boys ranging in age from 10 \( \frac{1}{2} \) to 16 years. In the result, boys were found to increase the ability to perform the varied activities. Girls improved in agility upto 14 years and performance declined thereafter. Changes were also observed in the test items of flexibility, balance and control in case of girls. Boys and girls were quite similar in performance upto 14 years of age but after this period boys superiority increased rapidly at each successive age level.

Cozen (1948) remarked that age should be a base for physical fitness comparison. He also advised classification on the basis of height and weight within each age group. Mccloy also indicated that age and weight were the most influential factors in physical education performance among elementary and high school pupils.

Philips (1956) employing Kraus Weber test of boys and girls of 6 to 12 years of age found that both sexes tend towards a rapid decrease in flexibility with increasing age. The flexibility in Phillips (1956) employing Kraus Weber test of boys and girls of 6 to 12 years of age found that both sexes tend towards a
rapid decrease in flexibility with increasing age. The flexibility in girls decrease more rapidly. Hupprich and Sigerseth (1950) found that flexibility increases in most joints until the age of 12 years of age and reported the effect of age on these performances. He reported that upto 12 years there are no marked differences between their performance. After 12 years males show superiority in performance over females. Rarick (1973) reported that speed increase with age in both sexes upto the age of adolescence. The girls decline in speed whereas boys continues to improve.

**Henry and Nelson (1956)** compared the performance of 10 and 15 years old boys in a motor skill task. The result clearly indicate superior performance of the older boys although the younger group improve more with practice than the older boys. Seils (1951) in a study reported the effect of age on running, throwing, balancing, striking and jumping. Jenkin (1930) and Latshaw (1954) had also reported similar results.

**Flack (1956)** prepared norms of physical fitness in the age group of 12,13,14,15. He prepared norms for watch of the following items.

1. Sit ups.
2. Side stepping
3. Squat thrusts
4. Standing Broad jump
5. Modify Pull ups

National plan of physical education and recreation (1956) tests items under this scheme were as fellows:

Boys 10 to 12 years
1. 1.50 meters run
2. High jump
3. Long jump
4. Cricket ball throw

Boys of 13 to 17 years
1. 100 meters run
2. High Jump
3. Long jump
4. Cricket ball throw

Girls 10 to 12 years
1. 1.50 meters run.
2. Skipping 30 seconds
3. Ball bouncing 30 seconds
4. Cricket ball throw
5. Sit ups 30 seconds

Girls 13 to 17 years

1. 100 meters run
2. Cricket ball throw
3. Long jump
4. High jump
5. Sit ups (one minute)

AAHPER (1957) launches a youth fitness project in 1957. A national survey of 8500 boys and girls from 5th to 12th grade (10 to 17 years of age) was conducted to determine the general fitness level of the American youth. The AAHPER test battery consisted of pull up, sit ups, 40 yards shuttle run, 50 yards dash, 600 yards run and walk, standing broad jump and a soft ball throw. For girls flexed arms hand was introduced. Norms were prescribed and the test became very popular.

Barrow (1958) constructed a test of motor fitness for collegemen. First an analysis of a number of recognized tests of motor performance were made to determine the test items found to be most valid measures of motor ability. Finally, two test batteries were devised one short battery for indoor and other for out-door.
The first is a six items battery of standing broad jump, soft ball throw, Zig zag run, was pass, medicine ball put and 60 yards dash.

This battery consisted of 3 items for indoor testing. The items are standing broad jump, medicine ball put, and zig zag run.

**Sloan (1959)** also propounded a modified Harvard step test suitable for women. Slaon recommended 17" high bench and cadence of 30 step per minute and the pulse is counted three times in thirty seconds e.g. from 1 to 1 ½ minutes and 3 to ½ minutes minutes.

<table>
<thead>
<tr>
<th>Fitness Index</th>
<th>Duration of exercise in secs. X 100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 (sum of pulse count in recovery)</td>
</tr>
</tbody>
</table>

Norms were:

Below 55 Poor

56 to 79 Average

80 to 89 Good

Above 90 Excellent
Later Sloan also recommended the short form as followed in Harvard Step Test for his test.

**Carter (1959), Cocker (1965) & Weiny (1967)** worked with subject of different ages and sexes and concluded that as a result of participation in different kinds of training programme and also as a result of participation in different games and sports, the physical fitness level of the subject is significantly increased.

**National Physical Efficiency Drive (1960)** was first launched in the country in 1959-60 by the Ministry of Education to bring about fitness consciousness and to arouse among people a desire to achieve higher standard of physical efficiency. Although the scheme was welcomed, it did not make much head way during the first two years of its inauguration. The pattern of the scheme was revised in 1961-62 and there was substantial improvement over the achievement in previous two years.

It was hoped that the drive would arouse interest in young and old men and women, to check their performance abilities
and stimulated in them a keenness for physical fitness. The drive was organized throughout the country in first two years on experimental basis. The response from all quarters exceeded all expectations. However, certain difficulties were experienced while conducting these tests. The ministry of Education thus revised the test battery on the recommendations of the experts in the field.

The test items are different for men and women and are further classified into tests for juniors and test for seniors. Juniors are those who are below 18 years. Each item of test has three standards laid down from moderately easy to fairer and difficult. The highest standard are the three stars and next two stars and easiest one star. The idea is that those who pass all the prescribed items at the three star level will be awarded three stars and so on for two star and one star. The details are given in appendix. Norms for national award were also prepared. Percentile norms were prepared under the guidance of Laxmibai National College of Physical Education, Gwalior under the National Physical fitness programme. Standard for one star, two stars, three stars were also prepared for different
age groups. The detail of the test items and standard fixed for stars are as under:

**BATTERY – A**

**Sub-Junior Boys – 14 to 16 years**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100 meter run</td>
<td>16.5 sec</td>
<td>15.00 sec</td>
<td>13.5 sec</td>
</tr>
<tr>
<td>2.</td>
<td>Long jump</td>
<td>3.30 mtrs</td>
<td>3.90 mtrs</td>
<td>4.50 mtrs</td>
</tr>
<tr>
<td>3.</td>
<td>Shot put (5.45 kg)</td>
<td>4.50 mtrs</td>
<td>6.00 mtrs</td>
<td>7.50 mtrs</td>
</tr>
<tr>
<td>4.</td>
<td>High jump</td>
<td>1.00 mtrs</td>
<td>1.20 mtrs</td>
<td>1.35 mtrs</td>
</tr>
<tr>
<td>5.</td>
<td>600 mtrs run</td>
<td>3.30 min</td>
<td>3:00</td>
<td>2:40</td>
</tr>
</tbody>
</table>

**Junior Boys 16 to 18 years**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100 meter run</td>
<td>15.5 sec</td>
<td>14.00 sec</td>
<td>13.0 sec</td>
</tr>
<tr>
<td>2.</td>
<td>Long jump</td>
<td>3.50 mtrs</td>
<td>4.20 mtrs</td>
<td>4.85 mtrs</td>
</tr>
<tr>
<td>3.</td>
<td>Shot put (4.5 kg)</td>
<td>5.50 mtrs</td>
<td>7.00 mtrs</td>
<td>8.50 mtrs</td>
</tr>
<tr>
<td>4.</td>
<td>High jump</td>
<td>1.10 mtrs</td>
<td>1.30 mtrs</td>
<td>1.45 mtrs</td>
</tr>
<tr>
<td>5.</td>
<td>800 mtrs run</td>
<td>3.20 min</td>
<td>2.50 min</td>
<td>2.30 min</td>
</tr>
</tbody>
</table>
### Senior 18+ to 35 years

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100 meter run</td>
<td>15.00 sec</td>
<td>13.50 sec</td>
<td>12.5 sec</td>
</tr>
<tr>
<td>2.</td>
<td>Long jump</td>
<td>3.80 mtrs</td>
<td>4.50 mtrs</td>
<td>5.20 mtrs</td>
</tr>
<tr>
<td>3.</td>
<td>Shot put</td>
<td>5.60 mtrs</td>
<td>7.00 mtrs</td>
<td>8.50 mtrs</td>
</tr>
<tr>
<td>4.</td>
<td>High jump</td>
<td>1.20 mtrs</td>
<td>1.40 mtrs</td>
<td>1.50 mtrs</td>
</tr>
<tr>
<td>5.</td>
<td>800 mtrs run</td>
<td>2:50.0</td>
<td>2:30.0</td>
<td>2:20.0</td>
</tr>
</tbody>
</table>

### Battery – A: Girls

### Sub-juniors 14 to 16 years

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100 meter run</td>
<td>18.5 sec</td>
<td>17.00 sec</td>
<td>16.00 sec</td>
</tr>
<tr>
<td>2.</td>
<td>8 min. run/walk</td>
<td>1200 mtrs</td>
<td>1400 mtrs</td>
<td>1600 mtrs</td>
</tr>
<tr>
<td>3.</td>
<td>Sit ups</td>
<td>10 nos.</td>
<td>15 nos.</td>
<td>20 nos.</td>
</tr>
<tr>
<td>4.</td>
<td>Long jump</td>
<td>2.50 mtrs</td>
<td>3.10 mtrs</td>
<td>3.70 mtrs</td>
</tr>
<tr>
<td>5.</td>
<td>Throwing the ball</td>
<td>9.00 mts</td>
<td>12.0 mts</td>
<td>15 mts</td>
</tr>
</tbody>
</table>
### Junior Girls 16 to 18 years

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100 meter run</td>
<td>17 sec</td>
<td>16 sec</td>
<td>15 sec</td>
</tr>
<tr>
<td>2.</td>
<td>8 min. run/walk</td>
<td>1400 mts</td>
<td>1600 mts</td>
<td>1800 mts</td>
</tr>
<tr>
<td>3.</td>
<td>Sit ups</td>
<td>15 nos</td>
<td>20 nos</td>
<td>25 nos.</td>
</tr>
<tr>
<td>4.</td>
<td>Long jump</td>
<td>3 mtrs</td>
<td>3.50 mtrs</td>
<td>4.00 mtrs</td>
</tr>
<tr>
<td>5.</td>
<td>Throwing the ball</td>
<td>12 mts</td>
<td>15 mts</td>
<td>18 mts.</td>
</tr>
</tbody>
</table>

### Women Senior 18+ to 35 years

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100 meter run</td>
<td>16.5 sec</td>
<td>15.50 sec</td>
<td>14.5 sec</td>
</tr>
<tr>
<td>2.</td>
<td>8 min run/walk</td>
<td>1600 mts</td>
<td>1800 mts</td>
<td>2000 mts</td>
</tr>
<tr>
<td>3.</td>
<td>Sit ups</td>
<td>20 nos</td>
<td>25 nos</td>
<td>30 nos</td>
</tr>
<tr>
<td>4.</td>
<td>Long jump</td>
<td>3.25 mtrs</td>
<td>3.75 mtrs</td>
<td>4.25 mtrs</td>
</tr>
<tr>
<td>5.</td>
<td>Throwing the ball</td>
<td>15 min</td>
<td>18 mts</td>
<td>21 mts</td>
</tr>
</tbody>
</table>
**ADULT FITNESS PROGRAMME**

**MEN**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>12 meter run/walk</td>
<td>1400 mts</td>
<td>1600 mts</td>
<td>1800 mts</td>
</tr>
<tr>
<td>2.</td>
<td>Sit ups</td>
<td>10 nos</td>
<td>20 nos</td>
<td>30 nos</td>
</tr>
</tbody>
</table>

**WOMEN**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>8 meter run/walk</td>
<td>800 mts</td>
<td>1000 mts</td>
<td>1200 mts</td>
</tr>
<tr>
<td>2.</td>
<td>Sit ups</td>
<td>5 nos</td>
<td>10 nos</td>
<td>20 nos</td>
</tr>
</tbody>
</table>

**BATTERY – B**

**Boys Sub-Juniors 14 to 16 years**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100 mts run</td>
<td>16.5 sec.</td>
<td>15.00 sec.</td>
<td>13.5 sec.</td>
</tr>
<tr>
<td>2.</td>
<td>12 min run/walk</td>
<td>1600 mts</td>
<td>1800 mts</td>
<td>2000 mts</td>
</tr>
<tr>
<td>3.</td>
<td>Dands</td>
<td>15 nos.</td>
<td>20 nos</td>
<td>25 nos</td>
</tr>
<tr>
<td>4.</td>
<td>Long jump</td>
<td>3.30 mts</td>
<td>3.90 mts</td>
<td>4.5 mts</td>
</tr>
<tr>
<td>5.</td>
<td>Cricket ball throw</td>
<td>3 mts</td>
<td>40 mts</td>
<td>50 mts</td>
</tr>
</tbody>
</table>
## Juniors 16+ to 18 years – Boys

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100 mts run</td>
<td>15.5 sec.</td>
<td>14.00 sec</td>
<td>13.00 sec</td>
</tr>
<tr>
<td>2.</td>
<td>12 min run/walk</td>
<td>2000 mts</td>
<td>2200 mts</td>
<td>2400 mts</td>
</tr>
<tr>
<td>3.</td>
<td>Dands</td>
<td>20 nos.</td>
<td>30 nos</td>
<td>40 nos</td>
</tr>
<tr>
<td>4.</td>
<td>Long jump</td>
<td>3.50 mts</td>
<td>4.20 mts</td>
<td>4.85 mts</td>
</tr>
<tr>
<td>5.</td>
<td>Cricket ball throw</td>
<td>40 mts</td>
<td>50 mts</td>
<td>60 mts</td>
</tr>
</tbody>
</table>

(Dands are to be performed continuously)

### Men 18+ to 25 years

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Event</th>
<th>1 Star</th>
<th>2 Star</th>
<th>3 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100 mts run</td>
<td>15.00 sec.</td>
<td>13.50 sec</td>
<td>12.5 sec.</td>
</tr>
<tr>
<td>2.</td>
<td>12 min run/walk</td>
<td>2400 mts</td>
<td>2600 mts</td>
<td>2800 mts</td>
</tr>
<tr>
<td>3.</td>
<td>Dands</td>
<td>30 nos.</td>
<td>40 nos</td>
<td>50 nos</td>
</tr>
<tr>
<td>4.</td>
<td>Long jump</td>
<td>3.80 mts</td>
<td>4.50 mts</td>
<td>5.20 mts</td>
</tr>
<tr>
<td>5.</td>
<td>Cricket ball throw</td>
<td>50 mts</td>
<td>60 mts</td>
<td>70 mts</td>
</tr>
</tbody>
</table>
Elizabeth (1960) prepared percentile norms for girls, age, 12 to 15 years on the North Carolina American Alliance for Health, Physical Education and Recreation (AAHPER) test. The norms were prepared for each of the five test items: sit-ups, side stepping, standing broad jump, modified pull-ups and squat thrust. The sit-ups item provided effective differentiation on the percentile scale for each age group.

The concentration of scores in the middle of the distribution for the side stepping test and the squat-thrust test resulted in effective discrimination in the center of the ranges for all age groups. The standing broad jump test provided the greatest ranges and the test differentiated the lower end of the distribution for all age groups but did discriminate above the 20th percentile.

Ikedia (1962) computed the physical fitness norms in order to compare the physical fitness of children in IOWA and TOKYO in Japan. The IOWA test of motor fitness was given to 395 Tokyo children and 355 IOWA children, 9 to 12 years of age. The test battery included sit-ups, standing broad jump, Shuttle run, forward bend, grasshopper, pull ups for boys, bend
arm hand for girls and 50 yard dash. Anthropometric measurements were taken in height, weight, knee finger length and leg length. It was concluded that IOWA children were heavier, taller and had longer legs than TOKYO children but Tokyo children but Tokyo Children scored better in all the motor performance tests excepts sit-ups.

Ikeda (1962), took the IOWA test of motor fitness in order to compare the physical fitness of children in IOWA and Tokyo, Japan. The result indicated that Tokyo children scored better in all motor performances tests except one i.e. sit up. He also found that Tokyo children had more chances for participating in activity through physical education class than the IOWA group.

Glover (1962) developed a physical fitness test for the primary grade children. The items of the test were: 1) Standing Broad Jump; 2) 400 feet shuttle run. 3) Sit ups; and 4) Seal Crawl.

Oregon(1962)Motor fitness test for Oregon school grade 4 to 12, boys and girls was established for realization of –

1. Physical fitness status according to grade level.
2. To identify those who are below standard and so as to prescribed a programme of physical fitness for them.

3. To determine effectiveness of the physical education as regard to fitness objectives.

4. To motivate youngsters to improve their fitness the test battery includes following items:
   a) Standing Broad Jumps
   b) Push ups
   c) Sit ups
   d) Jump and Reach
   e) Pull ups
   f) Potato race
   g) Hanging in arm flexed position
   h) Standing Broad Jump
   i) Cross arm curl up

Norms based on T-test were framed of the above test items:

Skubic and Hodgkig (1963) modified the Harvard step for girls and women and found that a three minute test using 18" bench and stepping rate of 24 per minute is reliable and valid.

John (1965) prepared national norms for one minute basket ball throw for goal, pull-ups, potato race, standing hop,
step and jump, push up, standing broad jump and soft ball target throw, test items of the Young Men's Christian Association (YMCA) under ‘National Athletic Achievement Programme’s at different centers of young Men's Christian Association (YMCA) tested on 2000 boys in each age group of 8, 9 and 10 years throughout the United States.

The American Alliance for Health, Physical Education and Recreation Youth Fitness Test Project, started in the first attempt to establish the national norms for physical education profession. It was evolved and developed in 1957 under the chairmanship for Dr. Paul a Hunsicker. The National Percentile-norms computed in 1958 and were revised in 1965. The test consisted of the items pull-ups (for boys), flexed arm hand (for girls), sit-ups, shuttle run, standing broad jump, 50 yards dash, 600 yards run/walk, for boys and girls of age group of 10 to 17 years and college men and women.

Singh (1966) constructed physical fitness norms for four thousand male students belonging to pre-university classes of Punjab University, Chandigarh, Flishman's Physical Fitness Test Battery was administrated on them. The three scales namely percentile scale, Hull scale and T-scale were prepared.
It was also concluded that the physical fitness improved linearly with age and the students belonging to rural areas were significantly superior in their performance when compared to the students of urban areas.

**Singh (1988)** constructed physical fitness norms for male teenagers of Jammu and Kashmir state. He used American Alliance for Health, Physical Education and Recreation's Physical Fitness Test Battery to measure physical fitness which included: pull-ups, bent knee sit-ups, standing Broad jump, shuttle 50 meter dash, 600 meter run/walk. The study concluded that the subjects belonging to age group from 16 to 19 years showed better performance in all the test items, over the other age groups from 13 to 15 years. On an average, physical fitness improved linearly according to age. The scales: Percentile-scale, Hull-scale and T-scale were also prepared for each age group separately.

**Benard, Gutin & Dominick (1966)** reported that physical fitness improves in those who take regular physical activities. The New York State physical fitness test is designed to provide school with a convenient instrument of periodic evaluation of
status and progress in the fitness of boys and girls in grade 4 to 
12. The tests are:

1. Side Stepping

2. Sit ups

3. Shuttle run

4. Squat thrusts

Ross (1966) found significant gain in abdominal strength, 
power, co-ordination, flexibility, speed as result of participation 
in physical fitness programme, Alexander, Martin and 
Metz(1968) in their study on 17 player from the university of 
Minnesota observed participation in a four week training 
programme, significantly improved muscular strength and 
endurance of the subjects.

Ponthiew, Barker & Hettinger (1966) compared black 
and white students on a test of power. Similar, type of studies 
were conducted by Hippie and Rholes on different age groups.
John N.Dowatzby and Charles J. Maney defvised Oregon fitness 
test. This test was conducted on 3400 boys and girls in grade 
4th to 12th.

Ronald J. Saunders, Henry J. Montoye; David 
A. Cunningham & Andrew J. Kozeor (1966) in their study in
physical education during all semesters were marked superior to age matched girls who had never enrolled in physical education or had partially enrolled in physical education.

**Bitcon (1966)** undertook a normative study for high school boys in the state of IOWA. The four test items and the American Alliance for Health, Physical Education and Recreation (AAHPER) Youth Fitness Test were conducted on eighty-four high school boys. The degree of relationship between the two tests are found by computing and correlating the composite scores. The reliability of the four test items was determined by test-retest technique. The co-efficient of correlating the composite scores. The reliability of the four test items was determined by test-retest technique. The co-efficient of correlation between the American Alliance Health physical Education and Recreation (AAHPER) Physical Fitness Test items composite scores and between the test-retest composite scores of the four items tests were from 0.934 to 0.961 respectively. Percentile norms were constructed for each of the item and composite scores.

**Joseph, P.M. (1967)** a well known physical educationist in India devised a test for Bombay school boys. The events
included in the test for boys. The events included in the test for boys are:

1. a) 50 yards run for elementary and sub-juniors
   b) 75 yards run for sub-senior and senior
2. Jumps and reach (vertical jump)
3. Ball throw for distance
4. Pull ups
5. Running broad jump

Terrel (1968) studied the relationship of pre and post puberty anthropometric measurement and physical fitness test scores of American Nigros and Canadian females. To measure the physical fitness, AAHPER Youth Fitness Test was used. It was concluded that Negros are better than Canadians in 50 years dash and soft ball throw for distance, because they have significantly longer legs, longer arms and hands, longer feet, a side shoulder girdle and narrower pelvic girdle than Canadians.

The Bengal Athletic Test (1968) for physical efficiency of high school students included following items. Those who qualify the standard were given merit certificates.

100 yard run = 13.4 seconds
50 yard run = 7 second
880 yard run = 3 minutes 30 seconds
High Jump = 4'
Running Broad Jump = 14'
Press ups = 8 times
Pull ups = 5 times

Students were also required to know cycling and swimming.

The Bengal physical efficiency test for college students included the following items:

1. 100 yard run
2. Shot put
3. High jump
4. Long jump
5. Half mile run
6. Javelin throw
7. Cricket ball throw

Berger and Paradise (1969) compared the physical fitness scores of white and black servant grade boys of similar socio-economic levels. It was concluded that black male students have a higher level of physical fitness.

Abraham C.C.Ribon (1970) test is a well-known test and
very reliable for Indian school and colleges. The introduction of the name of the colours in place of standard has a great appeal to students. The events are as follows:

**SUB JUNIORS**
1. 50 meter run
2. High jump
3. Long jump
4. Cricket ball throw
5. Pull ups

**JUNIORS**
1. 75 meters run
2. High jump
3. Long jump
4. Cricket ball throw
5. Hop step and jump
6. Pull ups

**INTERMEDIATE**
1. 100 meters run
2. High jump
3. Long jump
4. Shot put 8 pound
5. Hop step and jump
6. Pull ups

**SENIORS**
1. 100 meters run
2. High jump
3. Long jump
4. Shot put 12 pounds
5. Hop step and jump
6. 100 meter hurdle
7. Pull ups

**California Physical Fitness Test (1970)** was devised during the years 1969 to 1970. The test included the items of standing long jump, bent knee, sit-ups for time, side step, chair push up, pull ups and jog walk. These tests were devised for boys and girls of grade 5 to 12. Norms were established and this test also became very popular.

The President Council on Physical Fitness of American youth emphasized the importance of Physical fitness and President; John F.Kennedy took interest in improving the physical fitness of American youth. The President Council in 1961 recommended fitness test consisting of three items – pull-
ups, sit-ups and squat thrust. The council recommended that all pupils be retested at the beginning of the school year and those who fail is retested every six weeks they pass.

Astrand (1970) and Wilmore (1974) have reported that women have substantially lesser strength than men. Burley (1961) studied the difference among 7th, and 9th grade subjects in power, speed and flexibility and relation between power and flexibility and speed and flexibility. They reported that power speed and flexibility did not increase with the increased age and grade of the subjects. They also reported low degree of relationship between flexibility and power flexibility and speed.

Kirchner (1970) devised a test for elementary school children with five items battery.

1. Standing broad jump
2. Bench push ups
3. Curls ups (Bent knee sit up)
4. Squat Jumps
5. 30 yards dash

Bhole (1970) found that short term yogic training improves vital capacity. Gharote (1970) reported significant increase in strength and endurance of the abdominal muscles in
case of female as a result of yogic training for three months. Giri (1966) found significant improvement on the tests performance of national physical efficiency drive as a result of yogic training.

Therrier (1968) compared influence of 5 BX programme and a hath Yoga training programme for eight week on selected fitness measure and found both programme effective in increasing parameters of Iowa physical fitness test.

Delhi (1971) administrated the AAPHER Youth Fitness Test on 400 Negro boys obtained higher mean scores as compared to the white boys on gross body coordination (soft ball throw). Negro boys scored significantly higher than white boys on muscular explosiveness (standing broad jump). A longer mean difference was obtained at .05 level of confidence.

North Caroline Fitness Test (1972) was developed for the elementary and secondary school boys of North Caroline. The test consist of 5 items which are as follows:

1. 30 seconds bent knee sit ups.
2. 30 second side stepping
3. Standing Broad Jump
4. 30 seconds squat thrusts for boys and girls
5. Pull ups for boys and girls for 30 seconds

Gharote (1973) using Fleishman Battery of Basic fitness tests on adult male and female found that basic fitness improves significantly as a result of short term yogic training.

Rao, V.S.M. & Chakraborty, T.M (1973) found significant improvement on physical fitness as a result of Bratachari dance. The group practicing the Sing dance showed gain in pull ups, long jump, shot put and agility run.

Veerawasami (1973) conducted a study to evolve physical fitness norms for higher secondary of Greater Gwalior 2121 male students from four higher secondary schools and 793 male students from remaining 23 schools were selected. The American Alliance for Health, Physical Education and Recreation (AAHPER) Youth Fitness Test, International Council for Health.

Physical Education and Recreation (AAHPER) Physical Fitness Tests were administrated on them respectively. The Percentile norms for each test items were evolved for the boys of age groups from 13 to 17 years. It was also concluded that in all items, except pull-ups of the American Alliance for Health, Physical Education and Recreation (AAHPER) Youth Fitness
Test, the mean scores of Indian boys in all age groups were revealed lower than the 50th Percentile of American Norms. There was a positive but low order of relationship between physical fitness and participation in physical activities. There was a positive correlation however, it was observed low Values ($r=.13$) between physical fitness and academic achievement.

Hunt (1975) student the relationship between age, height, weight and ability to perform Manilobas physical and motor performance test for junior high school students. He concluded that age, height and weight are of little value as far performance is concerned.

Clarke (1976), defined as “Physical fitness is the ability to carry out daily task vigorously alertly without undue fatigue, and which ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies. The lack of agreement of what actually comprises physical fitness is exemplifies by the great variety of tests, all of which purpose to measure it. He identified three components namely: a) Muscular Strength b) Muscular endurance, c) Cardio respiratory endurance.

Gregor and Barrie (1976), tested 14 years old boys who had lived in typical rural and urban setting on Prince Edward
island provided the sample population. It was hypothesized that urban would score better on selected fitness tests of running, jumping and set ups. The hypothesis proved valid except for 50-yard dash and flexed arm hang.

Were and Miller (1976) studied the relationship of physique and developmental level as determined by performance in fitness tests of junior high school boys. They found subjects with medium physique and normal in development were the best performer and the subject of heavy physique were the poorest performer.

Back ford (1976) conducted a study to evaluate the physical fitness level of Narajo girls through American Alliance for Health Physical and Recreation youth Fitness Test. Navoja Girls from 14 to 16 years were selected from seven schools to measure physical fitness level. Also percentile norms were established on the basis of scores obtained from test results. These norms were compared to national Norms found in the manual accompanying the American Alliance for Health, Physical and Recreation youth fitness Test. The results provided an indication of the overall fitness level of 14, 15 and 16 years Navajo girls of the seven test items. The Navajo
norms were found to be below the 'National Norms' of five items and above of the softball throw and 600 yards run/walk.

Robson, M.; Uppal, A.K.; Thirumalai, G & Brar T.S. (1977) in their comparative study of physical fitness of elementary school children (boys and girls) of defence and non-defence personnel conducted following test of physical fitness: 1) 50 mts dash; 2) 4 x 10 mts shuttle run; 3) Sit ups; 4) Modified push ups; 5) Vertical jump; and 6) 600 mts run/walk. It was found that boys and girls belonging to defence personnel had shown higher performance in physical fitness tests.

Uppal, A.K. & Pal, Ramesh (1978) studied the relationship of physical fitness to selected anthropometric measurements. AAHPER Youth Fitness Test was administered to obtain physical fitness index.

Robson, M.; Uppal, A.K. and associate studied cardiovascular efficiency of professional students in physical education using 12 minutes run/walk test. They concluded that students of senior classes show better performance level. The cardiovascular efficiency of track and field group was better than football and basketball.
Jom D. Whitelay & Leon E. Smith (1978) studied the effect of Isometric and Isotonic exercise on strength and speed of the lateral arm movement on 26 collegemen. Reliability of co-efficient for both speed and strength of movement were found to be high. There were significant improvement in speed with both the exercises. However, the difference in speed gain between two conditions was no-significant.

The effect of isometric and isotonic strength training on strength and speed on single movement were studied by Chui. He found that the significant gain in limb strength resulting from performing resistive and no-resistive exercise in a specific range of movement were accompanied by significant gains in speed of the movement.

Smith observed a strength increase of 17 percent and speed increase of 8 percent while using a combination programme of isometric and isotonic strength training. Similarly, in another study Smith and Whitley found a strength increase of 22 percent and speed increase of 6 percent using both the isometric and isotonic training method.

Jacques Vrijens (1978) studied the influence of the interval circuit exercise on physical fitness of adolescent.
Favourable effect on both functional and morphological group of 11 who participated in a circuit training sessions per week. Improvement of oxygen intake, pulse rate, and cardiovascular system, muscular development was noticed in the experimental group.

Robson M. Thirmelai, Uppal, A.K. & Dutta, A.K. (1978) devised a simple physical fitness test battery for elementary school children. Percentile norms were also worked out. The test items were:

1. 50 meters dash
2. 600 meters run/walk
3. Straight leg sit ups
4. Vertical jump
5. 40 meters push up

Watson (1978) conducted a study to construct norms for Nebraska boys and girls. The test items for the Nebraska Elementary physical fitness test were standing long jump of vertical jump 50-yard dash, sit-ups, stick jump and 300 yards distance run. The items for secondary test were pull-ups, or flexed arm hang, 50-yard dash, standing long jump, sit ups, side step and a mile or 9 minutes or 12 minute run. The schools in
Nebraska (1%) were selected by random sampling to participate in the establishment for these norms. The norms were established for each test items for girls, boys and the groups according to the chronological age. The following recommendations reformulated on the basis of the results: a) there should be a test item included in Elementary test grade I to VI, to evaluate shoulder girdle strength, b) norms need to be established for the one and half mile or 12 minute run and c) the secondary girls need to establish norms for the girl’s chin-ups.

Physical fitness norms in the form of percentile norms for Nigerian boys and girls of 11 to 18 years of age were constructed by Anyanwu. The test item include were shuttle run. Push-ups (for boys), chair push ups (for girls), flexed arm hang (for girls), nine minute run for subjects 11 to 12 years and 12 minutes run for subjects 13 to 18 years. A comparison of the mean scores of the united States of America and the Nigerian youth showed that at the upper age levels, the United State youth had better physical fitness status than their Nigerian counter parts whereas, at the lower age level there was not much difference.
Rober L. Compbell (1979) studied the effect of supplemental weight training on the physical fitness of athletic squads. In general, the resulting statistics show that weight training adds significantly to the physical fitness produced by normal training.

Barrow and Mc Gee (1979) have reported that Glover, constructed a physical fitness test battery for primary grade children. The battery included four items: Standing Broad Jump (to measure power and leg strength, speed and endurance) Seal Crawl (to measure arm and shoulder girdle strength, endurance and speed), sit-ups (to measure abdominal strength and endurance). The testers were meant for measuring status in physical fitness items. The Percentile norms were prepared for four items and were also used for classifying the children into ability groups by assessing the physical fitness along with a table of expected movement of 4500 girls in 25 different high schools.

Chaudhary, G.S. (1980) prepared norms of physical fitness for collegemen of 15 to 17 years of Haryana State. This study assesses physical fitness in relation to socio-economic status. The test items were as follows:-
1. Harward step to judge endurance.
2. Zig Zag run to judge speed and agility
3. Jump and reach to judge strength, speed and power.
4. Shot put to measure strength and power
5. Sit ups to measure flexibility and abdominal strength

Norms were prepared in terms of percentile rank for students belonging to different areas (rural and urban) and different socio economic status (high, middle and low).

Mookerjee, S. (1980) employing step test in his comparative study of physical fitness of young boys in the age group of 13 to 17 years belonging to rural and urban areas found that rural non-vegetarian body showed a significant superiority in all the parameter of physical fitness. The test is easier to perform. For normal healthy young men the scoring is as follows:-

1. Score below 50 - Poor
2. Score 50 to 80 average
3. Score above 80 Good

Malhotra et al (1981) using a test battery of the following items found significant improvement in physical fitness of the basketball player after off-season training.
1. 60 meters shuttle for agility
2. 60 meters spring for speed
3. 2.4 Kilometer for endurance
4. Standing broad jump for explosive power of legs Pull ups and push ups for arm and shoulder strength
6. Sit ups and push ups for arm and shoulder strength
7. 400 meters run for measuring speed endurance.

Medicine ball throw from sitting position to measure arms and shoulder dynamic strength

Bosen, K.O.; Hardyal Singh & Sharma, V.S. (1981) studied fitness level of Indian men Javelin thrower and compared their performance with international norms. Uppal, A.K. and associate studied effect of difference and selected strength variable. They found significant increase in fitness parameters with the use of varied frequency of training. For significant improvement in strength two training unit per week were recommended for beginners, for conditioned sports men strength training three days a week can bring better results.

Sittmann (1981) developed norms for 372 male and 648 female students enrolled in the health and physical fitness concept classes of north East Missouri State University. The
subjects were tested for the sum of six skin fold measurements, predicated 1% fat, predicated Vo2 max., grip strength, leg strength, back strength, vertical jump, distance and vertical jump power. Means, Standards Deviations and range for all variables were calculated. Percentiles in increments of five were constructed for each variable in each classification.

**Moorthy, A.M. (1982)** found a significant change on muscular fitness of the elementary school children as a result of regular yogic exercise programme for 6 weeks.

**Thirupatthi (1982)** computed physical fitness norms for boys of the junior colleges in Solarpur district. 20 days of XI and XII classes selected randomly from fifteen junior colleges were taken as subjects for this study. American Alliance Health, Physical Education and Recreation Youth Fitness Test were administered on them. The two scales namely T-scale and Hall scale, were constructed for the combined samples of the Junior College, which were employed separately for XI and XII classes.

**Mall, N.N. & associate (1983)** studied physical fitness with some physical and socio-psychological variables of school boys (13 – 15 years) possessing high academic achievement.
Guruvammal (1984) constructed norms in selected physical fitness test items for secondary schools girls in Madras city. Ten girls from each term randomly selected schools were taken as subjects and tested on the selected physical fitness test items, consisting of sit-ups, vertical jump, flexed arm hang, 4 x 10 meter shuttle run, 50 meter Dash and 600 meters Run. The percentile scale were computed for the combined samples of the girl students. It was concluded that performance of the girl students was very poor in the selected test items.

Robson, M. Uppal, A.K. & Dey, R.N. (1985) in their study of comparative effects of difference duration of training on physical fitness and selected physiological variables found that duration of training is a vital factor in improving physical fitness and physiological variables. The study shows that increase in duration of training results in better efficiency.

Robins (1985) conducted a normative study for Alabama Students. American Alliance for Health, Physical Education and Recreation Youth Fitness Test (YFT) Battery and American Alliance health, Physical and Recreation Youth Fitness Test (HRFT) Battery were given to 2,545 students, age ranging six to fourteen years boys and girls. Percentile tables were prepared
for each item based on age and sex. Alabama and national means were compared. Alabama students scored better on events measuring agility, speed and cardio-vascular endurance but the National score in abdominal muscular endurance and flexibility was better.

Richard, A.Berger & Rober, A. Layne (1986) observed a favorable attitude physical education among college men on the basis of muscular strength and motor ability. Studies by Tinkle and Montoye and Wessel and Nelson also found that strength was significantly related to physical achievement and attitude towards physical education. Elmer A. Gross and Jerome A Casciani studied "the value of age, height and weight as a classification device for secondary school students in the seven AAHPER Youth Fitness Tests." Simple correlations, multiple correlations and regression coefficients for the ten variable of age, height and weight and seven tests for each four groups of senior high school girls, junior high school girls, senior high school boys and junior high school boys were calculated. In general, age, height and weigh have negligible value for classification purpose in all four groups.
Mall, T & Mall, N.N. (1986) studied the effect of isometric exercise upon the physical fitness status of high school boys of 13 – 16 years. Following items were included in the fitness test:-

1. Verticle jump
2. Agility run
3. Endurance hand
4. 50 meter dash
5. 400 mets run

The researchers concluded that participants in isometric exercise for a period of 10 week for 5 times a week contributed more to improve in measure of physical fitness,

Malhota, M.S. & Associate (1986) in their study of the evaluation of general physical fitness of national level sportsman (18-27 years ) conducted following tests of physical fitness,

Strength

1. Bent knee sit ups
2. Flexed arm hang for women
3. Pull ups for men
4. Modified push ups
5. Standing broad jump
6. Standing vertical jump
Speed:
1. 60 meters dash
2. 2.4 kms run.

Trunk and Flexibility
1. Forward bend and reach

Isometric Muscle Strength
1. Hand grip strength
2. Back muscle strength

Lungs Capability
1. Vital capacity
2. Maximum voluntary ventilation

The performance in various tests have been classified in to 5 categories viz., excellent, very good, good, satisfactory and poor.

D.Mcrritt Jones, Chadwick Squires & Kaare Rodahl (1987) in their study on “effect of rope skipping on physical work capacity” observed that there was significant improvement in physical work capacity as judge by pulse response, oxygen uptake by participating in rope skipping exercise for 5 minutes daily for a period of four week period.
Uppal, A.K. & Associates (1987) found significant improvement on the physical fitness parameters of the women badminton players after four intensive training programme. The test items were 8 minutes run/walk, standing broad jump, and flexed arm long.

Gallagher & Broughe (1988) hold that to evaluated physical fitness, the subject should be observed while performing work. The test is based upon the principle that the rate at which the heart slows down after it has been accelerate by a standard difficult exercise gives an excellent measure of an individual physical fitness. The another divided boys of the age group 12 to 18 in two group on the basis of their surface are and computed taking their height and weight. Group I with surface area below 1.85 is tested on 18” platform and group-II on 20” platform. The remaining procedure is just like Harvard Step Test with the exception that pulse is counted in different manner, e.g. after 4 minutes, 1 minute rest and pulse count for 30 second and again after 7 minute pulse is counted for 30 seconds. The fitness score is computed by a formula

\[
\text{Physical Fitness Score} = \frac{\text{Duration of exercise in secs.} \times 100}{2 \times (\text{sum of pulse count})}
\]
Verma (1955) conducted a study to develop the test battery for measuring physical fitness of Indian boys among the age group of 9 to 12 years. The samples consisted of 500 boys of the central school of India. Twenty-one test items were selected for the purpose of the study covering speed, strength, agility, balance, flexibility, and endurance. The data obtained from 21 tests were subjected to two types of analysis. Under descriptive analysis, various measures were computed in order to have an idea about the characteristics of all the 21 test items. Secondly, factor analysis was applied by using the principal component analysis and the final solution so obtained was used to identify the different factors of general fitness. These factors were given an appropriate name depending upon the characteristics of variables it contained. Finally, the test battery for measuring general fitness was developed by picking up on variable from each factor having the highest loading. The battery thus, constituted for the following test items were namely 409 mt. Dash for speed 9 minutes run walk for endurance. Bars stick test (length-wise) for balance and shuttle run in standing position for agility.
American Alliance for Health, physical Education and Dance (AAHPER) (1980), inaugurated the health Related Physical Fitness test (HRPET) – The test was designed to measure the physical fitness components associated with health. The test battery includes a distances run to assess cardio-respiratory endurance, skin fold measurements to determine body composition, one minute sit ups to measure neuro-muscular function of the lower trunk and abdominal strength and endurance, and the sit and reach to determine lower back and hamstring flexibility. From 1982 through 1984 the United States, Department of Health and Human Services Office for disease prevention and Health. Promotion in joint cooperation with American Alliance for Health, Physical Education, Recreation and dance (AAHPER) and other agencies conducted the National children and youth Fitness Study (NCYFS). This was the first nationwide assessment of youth fitness in nearly a decade. The findings revealed that only half the youth participated in appropriate physical activity essential for the maintenance of cardio-respiratory function. The results of the study also revealed that youths had become better as compared to the 1960's.
A.K.Srivastva (1995) has prepared various formulae to find out ideal body weight for the different age groups. Various formulae below mention:

1. $H + 2 \frac{C}{2} + (A-25) = I.W.$ (Above 25 year age group)
2. $H + 2 \frac{C}{2} = I.W.$ (18 to 25 year age group)
3. $H + 2 \frac{C}{4} = I.W.$ (Below 18 years)

Lee (1966) was to investigate the relationships of age, gender and body size to the performance of Korean middle and high schools students one each of the six test items comprising the Korean Youth Physical Fitness Test (KYPET). The subjects were comprised of 8512 boys and girls, age 12 through 19 years, who were enrolled in middle and high schools in Korea. In this study, age and gender were found to be important factors in classifying and evaluating student’s performance on KYPET. Thus the important contribution of this study is that percentile Rank norms based on age and gender have been developed and presented for each of the six tests comprising the KYPET. Through all age groups boys performed better than girls in the 100 m dash, sit-ups, soft ball throw and standing long jump. The performance of boys continued to improve through age 17 or 19. the conclusions in agreements with findings of the study
a) Age and gender have been found to be significantly related to performance on each test; b) age alone disregarding body size is sufficient to established achievement standards on the physical fitness tests for boys and girls separately. C) Girls likewise differ on all tests except for softball throw.

Alexander (1966) presented a research paper in 1996, International pre-Olympic Scientific congress, U.S.A. in this paper, he explained regarding the development and establishment of the national norms of physical fitness level, and morphological characteristic of 7,063 subjects, (3461 males and 3602 females) from 7.5 to 18.4 years of age. The results showed a better physical fitness level profile among the 11 years ago groups. This study made possible to create the physical fitness Baker (1986), with results indicting moderate validity as a measure of hamstring flexibility, but relatively low validity as a measure of lower and back flexibility, but relatively low validity as a measure of lower and back flexibility. In this findings, he concluded that the Back Saver sit and Reach (BSR) test appear to be similar to the SR and MSR test in that it is primarily a test of hamstring flexibility.
Esteves (1996) conducted a study for Macao Population on Physical fitness. The purpose of the study was to establish the norms for youth fitness of Macao and to make comparisons of the juvenile's fitness indices between Macao and some Asian countries ranged from grade 5 of elementary.

Sudarshan (2001) found that the present physical education programmes in primary schools are not well defined and also do not cater to the developmental needs of children. There exists of general ability in children of lower primary school age group to perform motor acts. It is revealed that motor monitoring factor is a combined measure of monitoring abilities and can be qualified using MMF test battery. Eight abilities that constitute MMF are found to be imitation ability, Visual motor control ability, Static balance ability, Dynamic balance ability, Eye-hand co-ordinate ability, Grass motor coordination ability, Hand reaction time ability and distance perception ability. All these eight abilities and in turn the MMF increases as children grow from 5-9 years of age.