Chapter III

PROCEDURE

In this chapter the Selection of the Subjects, Selection of Variables, Reliability of Data, Criterion Measure, Collection of the Data, Administration of the Tests and Statistical Technique used for analyzing the data have been described.

Selection of the Subjects

Total forty four disabled male school going children acted as subjects for the study. Among them twenty two were male Blind schools going children and rests of twenty two were male Deaf-Dumb schools going children. All of the subjects were in between the age of 9-13 years. Subjects were selected from different disabled schools of different district of West Bengal.

Table – 3

Selection of the Subjects from Different District

<table>
<thead>
<tr>
<th>NAME OF THE DISTRICT</th>
<th>NAME OF THE SCHOOL</th>
<th>CATEGORIES OF DISABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>DEAF-DUMB</td>
</tr>
<tr>
<td>Purba Midnapur</td>
<td>Moyna Ramkrishnayan Association</td>
<td>8</td>
</tr>
<tr>
<td>Bankura District</td>
<td>Bankura Sammilani Blind School</td>
<td>X</td>
</tr>
<tr>
<td>Malda District</td>
<td>Pipla Residential School for Deaf and Dumb</td>
<td>5</td>
</tr>
<tr>
<td>Birbhum District</td>
<td>Suri Deaf and Dumb School</td>
<td>9</td>
</tr>
</tbody>
</table>
Selection of the Variables

On the basis of literature available, expert’s opinion and according to the feasibility of the study, considering the limitation of disabled children, availability of instrument and equipments following Psychological and Physiological variables were selected for the present study.

Psychological Variables:

i. Self Concept
ii. Self Confidence
iii. Intelligence
iv. Memory Retention

Physiological Variables:

i. Blood Pressure (arterial)
ii. Vital Capacity
iii. Cardio Vascular Endurance
iv. Maximum Oxygen Uptake

Reliability of the Data

The reliability of the data was established by ensuring instrument’s reliability, reliability of subjects and the tester’s competency.
Instrument’s Reliability

The various instruments used in this study such as Dry Spirometer, Stop Watch, Skinfold Callipers, Sphygmomanometer, Stethoscope, Hand Grip Dynamometer, Measuring Tape etc. in recording data for selected Physiological variables and Physical Performance Capacity test were assumed to be reliable as they were from the standard manufactures who had certified these instruments with regard to their calibration. Therefore all the instruments were considered to be accurate and reliable for the study.

Reliability of Subjects

All the subjects selected for the study were informed and explained all the details regarding the study and about the test and provided more than one chance where possible. They were requested to explore their best possible performance for various tests to make the study reliable.

Tester’s Competency

All the measurements were taken by the research scholar and other experts who were all ISAK-level -1 accredited anthropometrists and well acquainted with tests and the testing procedures. In spite of that to establish the reliability of tester TEST-RETEST was applied. The same test was conducted twice on different day with an interval of one day in between under the identical condition. The score of same tests taken on different days were correlated by
using Product Moment Method and coefficient of correlation indicated in the Table 4 which showed that tester competency was highly satisfactory.

**TABLE –4**

**Reliability Coefficient of Test Retest Score**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Variables</th>
<th>Test/ Instruments</th>
<th>Coefficient of Correlation (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Blood Pressure (Systolic)</td>
<td>Sphygmomanometer</td>
<td>0.94*</td>
</tr>
<tr>
<td>2.</td>
<td>Blood Pressure (Diastolic)</td>
<td>Stethoscope</td>
<td>0.96*</td>
</tr>
<tr>
<td>3.</td>
<td>Vital Capacity</td>
<td>Dry Spirometer</td>
<td>0.98*</td>
</tr>
<tr>
<td>4.</td>
<td>Cardio Vascular Endurance</td>
<td>Harvard Step test</td>
<td>0.93*</td>
</tr>
<tr>
<td>5.</td>
<td>Maximum Oxygen Uptake</td>
<td>1 mile walk test</td>
<td>0.92*</td>
</tr>
<tr>
<td>6.</td>
<td>Physical Performance</td>
<td>Eurofit Test</td>
<td>0.91*</td>
</tr>
</tbody>
</table>

* = Significant at 95% confidence.  Tab r (13) = 0.514

**Criterion Measure**

The following tests and questionnaires were selected as criterion measures keeping in the view the feasibility of the study.
Criterion Measure of Physiological Variables

1. Blood Pressure was measured by Sphygmomanometer and Stethoscope and recorded to the unit mmHg.

2. Vital Capacity was measured by Dry Spirometer and recorded in liter.

3. Cardio Vascular Endurance was measured by Modified Harvard Step Test.

4. Maximum Oxygen Uptake was measured by 1 mile Walk Test and recorded in ml/kg/min.

Criterion Measure of Psychological Variables

1. Self Concept was assessed by Self Concept Questionnaire standardized and developed by Dr. Raj Kumar Saraswat.

2. Self Confidence was assessed by Pandey Self Confidence Inventory Questionnaires which was standardized and developed by D.D. Pandey.

3. Intelligence was measured by Group Test of Intelligence (9 -13 years) which was standardized by Dr. (Mrs.) Pramila Ahuja.

4. Memory Retention was assessed by P.G.I. Memory Test for children which was standardized by Dwarka Prasad and Narendra Nath Wig.
**Criterion Measure of Physical Performance Capacity**

To assess the Physical Performance Capacity Eurofit test was applied. Eurofit was sub divided in to two sectors i.e. Anthropometric Measurement and Physical Fitness Test. BMI and Fat Percentage were measured under the sector Anthropometric Measurement and Physical Fitness tests were designed with seven different dimensions i.e. Balance, Speed, Flexibility, Strength, Muscular Endurance, Agility and Cardio Vascular Endurance. To measure these components following tests were recommended.

i. BMI was calculated from height recorded in Meter and weight of particular subject in kilogram in corresponding their age and sex.

ii. Percentage of Fat was measured by calibrated skinfold caliper from two sites, Triceps and Sub-scapular; suggested by Slaughter\textsuperscript{28} and recorded in nearest millimeter.

iii. Flamingo Balance Test was applied to assess the Single Leg Balance and recorded the number of fall in one minute.

iv. Plate Tapping Test was applied to assess the speed of upper limb movement and recorded in second of complete 25 cycles.

v. Sit and Reach Test was applied to assess trunk flexibility and recorded in nearest centimeter.

vi. Standing Broad Jump Test was applied to assess the Leg Explosive Strength and recorded in nearest centimeter.

vii. Handgrip Test was applied to assess the Static Arm Strength and recorded in nearest kilogram.

viii. Sit up Test was applied to measure the Trunk Strength and recorded in maximum number in 30 seconds.

ix. Bent Arm Hang Test was applied to measure the Muscular Endurance and Functional Strength of arm and maximum duration was recorded in seconds.

x. 10X5 mt Shuttle Run was applied to measure the Running Speed and Agility and recorded in seconds to cover 50mt course.

xi. 20 mt Endurance Shuttle Run was applied to measure the Cardio Respiratory Endurance and recorded the level and number of shuttle covered.

Collection of Data

For the present study, all the data were collected from the schools named Moyna Ramkrishnayan Association in Purba Midnapur District, Bankura Sammilani Blind School in Bankura District, Pipla Residential School for Deaf and Dumb in Malda District and Suri Deaf and Dumb School in Birbhum District. Research scholar communicated to the in-charge of those schools and made them aware regarding the purpose and significance of the study. On
assurance of the concern authority research scholar visited mentioned schools and collected data. All the requirements, necessary equipments, ground marking were arranged beforehand. The objectives and procedure of the test were briefed to the subjects by research scholar before the administration of the tests.

Administration of the Test

In this part administration of the tests are briefly described. The instrument required for the test, procedure of the test and scoring method of each test, tools of the study are illustrated. All the tests were conducted in very flexible and improvised manner due to the impairment of the subjects.

Psychological Variables

Tools of the Study

1. **Self Concept:** The variable Self Concept was measured by Self Concept Questionnaire. This inventory was constructed and standardized by Dr. Raj Kumar Saraswat. It consisted of 48 items and six dimensions which were physical, social, intellectual, moral, educational and temperamental. Each dimension had eight items. Each item was provided with five alternatives. Responses were obtained on the test booklet itself. There was no time limit. Very easy scoring system was given by the author. The maximum obtained score was 240 and minimum 48. High score in this inventory indicated a
higher self-concept, while a low score showed low self-concept. Reliability of the inventory was 0.91 for the total self-concept measure. The reliability coefficient of various dimensions varied from 0.67 to 0.88.29

**Scoring**: The scoring system of Self Concept questionnaire, where alternatives or responses were arranged in such a way that the scoring system for all the items remained the same i.e. 5,4,3,2,1, whether the items were positive or negative. The summed score of all the items was regarded as total Self Concept score.

2. **Self Confidence**: The variable Self Confidence was measured by Pandey Self Confidence Inventory Questionnaire which was prepared and standardized by D.D. Pandey. The test consisted of 60 items, arranged in a systematic and random order. The dimensions selected were subject’s perceived ability about himself in the areas namely, Social and emotional matureness, intellectual adequateness, satisfaction, optimismness, independence, self assuredness, self feelingness, evaluation about self, decisiveness. Only two responses were provided for each item either ‘Yes’ or ‘No’. Reliability of the inventory was 0.882 for the total Self-Confidence measure and split half reliability was 0.892. Face validity and construct validity were also established.30

Scoring: Key of Self Confidence questionnaire was ‘all the positive item answered positively would be received zero mark and all the negative item answered negatively would be received zero mark’. Whereas ‘all the positive item answered negatively and negative item answered positively would be awarded one point each’. The sum of the score was obtained as the score of the Self Confidence score. Key fashions in such a way that lower the score, higher will the Self Confidence.

3. Intelligence: The variable Intelligence was measured by Group Test of Intelligence (9 -13 years) which was prepared by Dr. (Mrs.) Pramila Ahuja. This questionnaire was standardized on 10,373 students of both sexes. It contained seven sub-tests, scrambled words, analogies, classification, disarranged sentences, same opposite, series and best answers. The time limit was 35 minutes for completion of the questionnaire. The reliability Coefficient for the test was 0.943 and validity coefficient with other Intelligence test showed as r =0.731.

Scoring: The scoring of the Group Intelligence Test was designed in very simple manner. Right answer was awarded ‘1’ mark and wrong answer was awarded ‘0’ mark. There were seven sub-set in the questionnaire and total marks awarded in all seven sub set was the final score of individual subject.

32 P. Ahuja, Manual for Pramila Group Test of Intelligence (9 to13), Agra: National Psychological Corporation, 2003
4. **Memory Retention**- The variable Memory Retention was assessed by P.G.I. Memory Test which was standardized by Dwarka Prasad and Narendra Nath Wig. Minor modification was made to three questions as these questions were not concerned with the subjects for the present study. This questionnaire was short, simple, objective and valid test of memory for both the sexes. The reliability of the test was established through test-retest Method. Spilt-Half reliability coefficient was found to be 0.91 for organic psychotic group and 0.83 for neurotic normal group.\(^{33}\)

**Scoring:** P.G.I. Memory Test also had easy scoring system. For a right answer ‘1’ Mark was awarded and ‘0’ Mark was given if the answer was wrong. Grand total of all the questions was the final score of the particular subject.

**Administration of the Questionnaire**

The Blind subjects filled-up the questionnaires with the help of brail system. Verbal support was given by research scholar as and when required. In case of picture card, it was made up in inflamed nature to help the Blind subjects to understand the Picture and diagram clearly. Deaf-Dumb subjects answered the Questionnaire normally. Help and support was given by mediator

as and when required by them. Extra loose sheets were provided for conducting the test efficiently.

Physiological Variables

Measurement Blood Pressure

Purpose: The purpose was to measure the Systolic and Diastolic Blood Pressure. The Systolic Pressure is the maximum pressure in an artery at the moment when the heart is beating and pumping blood through the body. The Diastolic Pressure is the lowest pressure in an artery in the moments between beats when the heart is resting.

Equipment/Requirement: Sphygmomanometer, Stethoscope.

Procedure: Subjects sat on the chair straight with both feet flat on the floor. They exposed their upper right arm, elbow slightly flexed, forearm with the palm facing upwards and supported on a flat surface. The cuff of machine was placed just above the elbow of the subject, centered over the brachial artery. The cuff of the instrument was wrapped snugly around the upper arm area of the subjects and attached to the sphygmomanometer and then located the brachial artery. The stethoscope was put on the artery. Then the outlet valves were closed and inflated the cuff while palpating the radial artery pulse until the pulse was obliterated, so that flow of blood through artery was arrested and radial pulse disappeared. The sound of the pulsation was monitored by keeping the ‘chest piece’ of the stethoscope over the brachial artery and paid attention on
the sound through ear piece. The pressure was then gradually lowered by opening the valve. As soon as the pressure in the cuff felt just below the systolic pressure, it allowed the passage of small amount of blood through the compressed artery into the distal segment. This produced a clean tapping sound; the pressure shown on the dial was noted as soon as this sound was heard as a score of individual subject. This denoted systolic blood pressure. As the cuff pressure was lowered still further, more blood flowed through due to rebounded relaxation of the arterial vessel and this was indicated by the louder sound. The pressure at which this sound could be muffled the pressure pump was read on the machine scale. This denoted the measure of diastolic blood pressure and it was noted as the score of individual subject.

**Scoring:** The blood pressure was measured in terms of millimeters of mercury (mmHg)

**Vital Capacity Measurement**

**Purpose:** The purpose was to measure the total amount of air that the subject can breath out after completely filling their lungs.

**Equipment /Required:** Dry spirometer, nose clip.

**Procedure:** Before start of the test first the end of mouthpiece was set into nozzle and confirmed that indicator points at zero. Subjects stood comfortably and inhaled deeply by stretching the body upwards. When the lungs became full
of air then set the mouthpiece between the lips and breathed out strongly in one motion, without leaking, until all air had been expelled. Subjects used nose clip to prevent the leaking through nose.

**Scoring:** After breathing out the measurement was read on the indicator. The test was repeated for 3 times and the maximum score was recorded in liter as individual score.

**Cardio Vascular Endurance**

*(The Modified Harvard Step Test)*

**Purpose:** The purpose was to measure the Cardio Vascular Endurance or aerobic fitness of an individual subject.

**Equipment /Required:** 14 inches high Platform, Stop Watch, and Metronome.

**Procedure:** According to the age of the subjects Modified Harvard Step Test was conducted which was proposed by Lucien Brouha and M.V. Ball. The subject stepped up and down on the 14 inches high platform. The stepping process was performed by the subjects in four counts, as follows; 1. One foot was placed on the platform, 2. Other foot was placed on the platform, 3. One foot was placed on the floor, 4. Other foot was placed on the floor. Stepping rate was performed according to the metronome signal and was set at a rate of 30

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steps per minute (every two seconds). The stepping exercise was continued for 3 minutes or until exhaustion. Exhaustion was defined as when the subject could not maintain the stepping rate for 15 seconds. After completion of the stepping exercises the subjects immediately sat on the chair and the total number of heart beats was counted for 30 seconds in between 1 to 1.5 minutes after finishing of the step test.

Scoring: Short form of Fitness index formula was used to determine the actual raw score of Fitness Index of the subject.

Formula of Fitness Index (short form) = (100 x test duration in seconds) divided by (5.5 x pulse count between 1 and 1.5 minutes)

Maximum Oxygen Uptake Capacity
(One Mile Walk Test)

Purpose: The purpose of the test was to measure Maximal Oxygen Uptake capacity of the individual subject.

Equipment Required: Stop watch, 1 mile marked track or path on level ground with firm and smooth surface.

Procedure: The subjects were briefed about the aim of this test that was to complete one mile course in the shortest possible time, while maintaining a
constant walking pace throughout the entire distance. At the start, all subjects were to line up behind the starting line. On the command ‘go’ or signal by flag the stopwatch was started, and the subjects began walking at their own pace. Blind children started the race by the sound of clapper and Deaf-Dumb children started the race with the signal of flag. Deaf-Dumb children walked normally and blind subjects were supported through rope lane and waist belt to maintain their direction of marking. Verbal support was also provided as and when required. At the end of walk, the heart beat of each subject was checked for 15-second by using the manual method. The walking time and the heart beat were recorded in minute and seconds and number respectively.

**Scoring:** The total time taken to complete the course was recorded for each Subject, in minutes and seconds. Time taken to walk 1 mile and heart beat in 15-second for each subject was feeded in the FITNESSGRAM software and Estimated VO₂max was calculated using the Rockport Fitness Walking Test Equation\(^ {35}\). VO₂ max was recorded in ml/kg/min for every individual subject.

**Eurofit Fitness Testing Battery**

The Eurofit Physical Fitness Test Battery was a set of nine physical fitness tests and two anthropometric measurements, covering flexibility, speed, endurance, agility and strength. The standardized test battery was devised by the

Council of Europe for children of school age and had been used in many European schools since 1988. The series of tests were designed so that they could perform within 35 to 40 minutes, using very simple equipment. A similar Eurofit for adults was published in 1995.

**Table -5**

**Eurofit Fitness Testing Batteries**

<table>
<thead>
<tr>
<th>S.N</th>
<th>TYPE</th>
<th>TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anthropometric Measurement</td>
<td>BMI</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>FAT %</td>
</tr>
<tr>
<td>3</td>
<td>Dimensions</td>
<td>Test</td>
</tr>
<tr>
<td>4</td>
<td>BALANCE</td>
<td>Flamingo Balance Test</td>
</tr>
<tr>
<td>5</td>
<td>SPEED</td>
<td>Plate Tapping</td>
</tr>
<tr>
<td>6</td>
<td>FLEXIBILITY</td>
<td>Sit and Reach Test</td>
</tr>
<tr>
<td>7</td>
<td>STRENGTH and MUSCULAR ENDURANCE</td>
<td>Standing Broad Jump</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Handgrip test</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Sit up in 30 seconds</td>
</tr>
<tr>
<td>10</td>
<td>SPEED AND AGILITY</td>
<td>10X5 meter Shuttle Run</td>
</tr>
<tr>
<td>11</td>
<td>CARDIO-RES. ENDURANCE</td>
<td>20 mt Endurance Shuttle Run</td>
</tr>
</tbody>
</table>

**Body Mass Index**

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Purpose: The purpose of the test was to measure the amount of body fat based on height and weight of an individual.

Equipment Required: Stadiometer, Weighing Machine

Procedure of HEIGHT Measurement – Subject stood erect after removing their shoes with heel together and kept their arms hanging naturally by the side of the body. The subjects kept contact of their heel, buttocks and upper part of the back with vertical bar and looked straight ahead. They placed their head in Frankfort plane and maintained the normal breathing. The researcher took the measurement as the maximum distance from the floor to the vertex of head i.e. the highest point on the skull.

Procedure of WEIGHT Measurement – The subjects stepped up on the Weighing Machine and stood erect over the center of the machine with distributed their body weight evenly between both feet. The subject kept their arms hanging freely by the side of the body with palms facing the thighs and stood with face forward without any movement for better reading of the scale.

Scoring: The score was recorded in nearest Meter and Kilogram for Height and Weight respectively. To find out the BMI score following formula was applied.

\[
\text{BMI} = \frac{\text{Weight in kilograms}}{\text{Height in meters}^2}
\]

Fat Percentage
**Purpose** : The purpose of the test was to measure the percentage of Fat. Skinfold method was adopted to assess Fat measurement which was suggested by Slaughter$^{37}$, where he indicated two sites for measurement i.e. Triceps and Sub-scapular and referred an equation specially made for children.

**Equipment Required:** Skinfold Caliper.

**Procedure of Triceps Measurement:** The subject assumed the relaxed standing position and relaxed their right arm from shoulder joint by extending elbow by the side of the body. The researcher grasped the skinfold on the back of the arm with thumb and index finger, 3 inches apart on a line that was perpendicular to the long axis of the skin and lifted the skinfold directly 1 cm away from the arm. Researcher placed the jaws of the caliper perpendicular to the fold, approximately 1 cm below the thumb and index finger and released the spring handle of caliper and read the measurement.

**Procedure of Subscapula Measurement** : The subject assumed the relaxed standing position and relaxed their right arm from shoulder joint by extending elbow by the side of the body. The researcher grasped the skinfold at the lower tip of the shoulder blade (scapula) with the crease being at about 45 degree angle from the horizontal and lifted the skinfold directly 1 cm away from the

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site. Researcher placed the jaws of the caliper perpendicular to the fold, approximately 1 cm below the thumb and index finger and released the spring handle of caliper and read the measurement.

**Scoring**: Recorded the measurement to the nearest 1 mm after the full pressure of the caliper’s jaws had been applied and ceased the drift of the scale. To calculate the final score of fat percentage, equation of Slaughter was employed through web calculator.

**Flamingo Balance Test**

**Purpose**: To assesses the ability to balance successfully on a single leg.

**Equipment Required**: Stop Watch, Metal beam 50cm long, 5cm high and 3cm wide (the beam was stabilized by two supports at each end, and had a non-slippery surface).

**Procedure**: Subjects removed their shoes and then stood on the beam. First they kept balance by holding the helper’s hand. Non preferred leg was flexed at the knee and the foot of this leg held close to the buttocks. After that stopwatch was started as helper released his support. Stopwatch was stopped each time the subject lost balance either by falling off the beam or letting go of the foot being held. The number of falls was counted in 60 seconds of balancing.
Scoring: The total number of falls or loss of balance in 60 seconds was recorded.

**Plate Tapping Test**

**Purpose:** The purpose of the test was to assess the upper body reaction time, hand-eye quickness coordination and speed of limb movement.

**Equipment Required:** Table (adjustable height), Yellow Discs (20cm diameter), Rectangle (30 x 20 cm) and Stop Watch.

**Procedure:** Subject stood comfortably in front of the discs. The two yellow discs were placed with their centers 60 cm apart on the table. The rectangle was placed equidistant between both discs. The subject placed his non-preferred hand on the rectangle. The preferred hand of the subject was moved back and forth between the discs over the hand in the middle as quickly as possible. This action was repeated rapidly for 25 full cycles (50 taps).

**Scoring:** The time taken to complete 25 cycles was recorded in seconds. Two trials were given and the best one was recorded.

**Sit and Reach Test**

**Purpose:** The purpose of the test was to measure the flexibility and specifically to measure the flexibility of the lower back and hamstring muscles.

**Equipment Required:** Sit and Reach Test Box/tool.
**Procedure:** Subjects removed their shoes and sat on the floor with legs stretched out straight ahead. Then they placed their soles of the feet at the flat against the test box/tool. Both knees should be locked and pressed flat to the floor, the tester might assist by holding them down. Palms were kept facing downwards, and the hands kept on top of each other, the subject reached forward along the measuring scale as far as possible. It ensured that the hands remained at the same level, no one reaching further forward than the other. The subject reached out and held the position for one-two seconds while the distance was recorded. Subjects were not permitted to do any jerky movements.

**Scoring:** The score was recorded to the nearest centimeter as the distance reached by the hand.

**Standing Long Jump**

**Purpose:** The purpose of the test was to measure the explosive strength of the legs.

**Equipment Required:** Measuring Tape, non-slippery floor, and soft landing area were preferred. The take off line was clearly marked.

**Procedure:** The subjects stood behind a line marked on the ground with feet slightly apart. Two foot take-off and landing was used, with swinging of the arms and bending of the knees to provide forward drive. The subject took
attempt to jump as far as possible and they landed on both of their feet without falling backwards.

**Scoring:** The measurement was taken from take-off line to the nearest point of contact on the landing (back of the heels). Distance jumped was measured in centimeter and best one out of three attempts was recorded as score of an individual subject.

**Hand Grip Test**

**Purpose:** To Measure the maximum isometric strength of the hand and forearm muscles.

**Equipment Required:** Handgrip Dynamometer.

**Procedure:** The subjects gripped the dynamometer in the hand to be tested, with the arm at right angles and the elbow by the side of the body. The handle of the dynamometer was adjusted (if required). The base should rest on first metacarpal (heel of palm), while the handle should rest on middle of four fingers. When the subjects were ready, they were asked to squeeze the dynamometer with maximum isometric effort, which was maintained for about 5 seconds. No other body movement was allowed. The subjects were encouraged to give their maximum efforts.
Scoring: Several trials for each hand were allowed with at least 15 seconds recovery in between and best one was recorded in kilogram.

Bent Knee Sit Up Test

Purpose: To measure the endurance of the abdominal and hip-flexor muscles.

Equipment Required: Floor Mat - flat ground, Stop Watch.

Procedure: The aim of this test was to perform as many sit-ups as one can in 30 seconds. Subjects lied on the mat with the knees bent at right angles, with the feet flat on the floor and held down by a partner. The fingers of the subjects were interlocked behind the head. On the command 'Go', they raised the chest so that the upper body was in vertical position, and then returned to the floor. Subjects continued the action for 30 seconds. The sit up would not be counted if the subject failed to reach the vertical position, failed to keep the fingers interlocked behind the head, arched the back and raised the buttocks off the ground to raise the upper body, or let the knees exceed a 90-degree angle.

Scoring: The maximum number of correctly performed sit ups in 30 seconds was recorded.

Bent Arm Hang Test

Purpose: This test measured upper body relative strength and endurance.

Equipment Required: Stop Watch, An Elevated Horizontal Bar.
**Procedure:** The subjects were assisted into position, the body lifted to a height so that the chin was level with the horizontal bar. The subjects grasped the bar by using an overhand grip (palms are facing away from body), with the hands shoulder width apart. The stopwatch was started when the subjects were released from the support. Subjects should attempt to hold this position for as long as possible. Stopwatch was stopped when the subjects failed to maintain their correct position (chin fall below the level of the bar or the head is tilted backward to enable the chin to stay level with the bar)

**Scoring:** The time elapsed was recorded in seconds.

**10X5 Shuttle Run Test**

**Purpose:** The purpose of the test was to assess the speed and agility.

**Equipment Required:** Stop Watch, Measuring Tape, Marker Cones, A flat non-slippery surface.

**Procedure:** Two lines were marked five meters apart. Subjects started the race with a foot at one line consider as starting line. When the time keeper gave signal by flag / clapping, the subjects ran to the opposite line, turned and returned to the starting line. This complete course (to and fro) was repeated five times without stopping (covering 50 meters total). At each ending both feet of the subjects must crossed the line completely. Blind children started the race
and turned at the end of marking by the sound of clapper and deaf children started the race with the signal of flag.

**Scoring:** The total time taken to complete the 50 m course in second was measured and recorded in seconds.

### 20 Meter Shuttle Run Test

**Purpose:** The purpose of the test was to measure the Cardio Respiratory Endurance or maximal running aerobic fitness.

**Equipment Required:** Flat non-slippery surface, Marking Cones, Measuring Tape, Beep Test CD, CD player, Recording sheets.

**Procedure:** The subjects stood behind one of the lines facing towards the second line 20m apart. The subjects started continuous running between the two lines when instructed by the CD or tape. In the beginning student ran quite slow between the two lines and turned when signalled by the “recorded beeps”. This test involved continuous running between two lines in time to recorded beeps. After about one minute from starting, a sound indicated an increasing in running speed and the beeps came closer together. According to the “recorded beep” subjects increased their running speed. The speed of running increased after each minute (level). If the subject could not reached the line in time for each beep, he must ran faster to the line turned and tried to catch up with the pace within 2 more ‘beeps’. If the subject reached the line before the beep sounds, he
must wait until the beep sounds. When the subject failed to reach the line (within 2 meters) for two consecutive ends, the test was stopped by signal. In case of Blind children 20 mt track was marked by rope to maintain their running direction and verbal instruction was given to acknowledge the subjects regarding actual position in the track. For Deaf-Dumb student beep sound was indicated through flash light system.

**Scoring:** The level and number of shuttles (20m) covered by the subjects were recorded as the score of the subjects.

**Statistical Analysis**

To find out the significance difference, if any between the two group i.e. Blind and Deaf-Dumb the mean difference method (student ‘t’ ratio) was applied.

The data were further statistically treated with Product moment Correlation to find out the relationship of physical performance capacity with the physiological and psychological variables of Blind and Deaf-Dumb school going children.