CHAPTER III

METHODOLOGY
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The methodology used in this study involved the procedure adopted for the selection of subjects, the selection of experimental variables, instrument reliability, tester reliability, orientation of the subject, training programs, experiment design, administrating of standard tests, using the relevant tools, collection of data and statistical analysis made are explained below.

1. SELECTION OF SUBJECTS

The study was designed to analyze the effect of various physical fitness training programs on health related physical fitness of high school children. Two hundred and forty students at the age group of 13-16, were randomly selected from high schools of Ernakulam and Kottayam District for the purpose of this study.

1. Nursrathul Islam Higher Secondary School, Marampally
2. Govt. Higher Secondary School, South Vazhakulam
3. Holy Ghost High School, Muttuchira, Kuravilangad
4. Govt. High School, Muppathadam

2. SELECTION OF VARIABLES

The investigator reviewed the variables, scientific literature pertaining to the different components of health related fitness and was convinced that the under mentioned components were so vital to measure the health related physical fitness. The variable chosen for this study was taken from the AAHPERD (1980) and also from the unpublished thesis of A.M. Antony (2004) and also supported by the unpublished thesis of M. Bernard Sing (1993). The components and test items are (AAHPERD 1980).
a. Cardio respiratory function: It is measured on the basis of one mile run.

b. Body Composition: It is measured on the basis of the sum of triceps and sub-scapular skin folds.

c. Abdominal and low-back hamstring musculoskeletal function: This can be measured on the basis of a) modified timed sit-ups and b) sit and reach.

3. EXPERIMENTAL DESIGN

The random group design was employed for this study. Three groups were subjected to the experimental training and one group is the control group. Each group consists of 60 students. Pre-test was conducted to all four groups and after training post-test was conducted to both experimental and control groups. During the period of training, first group is given training on selected yoga, second group is given training on Aerobics and the third group is given training on Calisthenics. All the groups except control group were given training for one hour in the evening for all the days, excluding Saturdays and Sundays, for a period of eight weeks.

4. INSTRUMENT RELIABILITY

Standard equipments were used for this study. Instruments were manufactured and supplied by recognized firms and the calibrations of the instruments were accepted as accurate enough for the purpose of the study.

a. Stop Watch : Casio manually operated digital stopwatch

b. Skin fold caliper : Lange skin fold caliper supplied by Novel Products, Inc USA

c. Flexometer : Flex tester supplied by the Novel Products, Inc USA
5. RELIABILITY OF DATA

The reliability of data was ensured by establishing the testers’ competency, reliability of the test, the subject reliability and the instrument reliability.

5.1 Testers competency

To determine the testers competency 10 subjects were selected at random and was first tested by this scholar and then by an expert under identical condition. Pearson’s product movement correlation was computed between two measures of each variable separately and the correlation co-efficient have been calculated. It is shown in TABLE3.1.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Test</th>
<th>Co-efficient of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>One Mile Run</td>
<td>0.90</td>
</tr>
<tr>
<td>2.</td>
<td>Sit and reach</td>
<td>0.94</td>
</tr>
<tr>
<td>3.</td>
<td>Sit-ups</td>
<td>0.83</td>
</tr>
<tr>
<td>4.</td>
<td>Sum of Skin folds</td>
<td>0.94</td>
</tr>
</tbody>
</table>

The scholar had a number of practice sections in the testing procedure and various authorized books were refereed to, in order to acquire knowledge of the testing procedure. The tests were conducted by the scholar with the help of physical education teachers and well competent officials.

5.2 Subject reliability

It is also established from the test-retest method that the subject reliability was significant as the same subjects were used under similar condition without any motivation techniques.
5.3 Subject Orientation

In order to get the co-operation from the subjects, the scholar explained the purpose of the study, prior to the administration of the tests, the procedure to be adopted is explained to the subject in detail. Model tests by a few subjects were done in the presence of the students to make the subjects understand the AAHPERD health related physical fitness test.

6. DETAILS OF TRAINING

6.1 Yoga Training

In order to find out the influence of yogasana on strength, flexibility, body composition and endurance, sixty students aged 13 to 16 from Nusrathul Islam Higher Secondary School, Maramapally, and sixty students aged 13 to 16 from Government Higher Secondary School, Muppathadam, were selected as subjects randomly. The students from Nusrathul Islam Higher Secondary School, Maramapally, and Government Higher Secondary School, Muppathadam were selected as yoga experimental group and control group respectively. Yogasana training was given for experimental group and the control group was not allowed to participate in the training programme. The subjects were tested on the selected physical fitness AAHPERD youth fitness test (American Alliance for Health Physical Education Recreation and Dance) at the beginning (pre-test) and at the end of the training period of two months post test will be taken. Asanas training has been given to the experimental group on working days for eight weeks from 4pm to 5pm. Pre- test and post- test of control group is also taken in respective periods.

The following are the asanas selected for training:

The details of yoga training and procedures are explained below:

1. PADMASANA

Padma means lotus in Sanskrit, in this asana position of the legs look like blooming lotus. This asana has been given a great importance in the Yogashastra as it is best suited for Pranayama, Meditation & concentration. Practiced daily, this beautiful, contemplative asana steadies the body and calms the mind, taking a person to the higher realms of realization.

Steps for Practice

1. Sit down with both the legs spread straight in front of the body and keep them at a distance of 1 to 1.5 feet and keep the spine erect.
2. Slowly and carefully, bend the right leg and place the foot on top of the opposite thigh, the sole facing upwards and the heel close to the pubic bone.

3. When this feels comfortable, bend the other leg and place the foot on top of the opposite thigh. Ideally, both knees should touch the ground in the final position. The head and the spine should be held erect and the shoulders and arms should be relaxed.

4. Keep the elbows slightly bend and place the wrists of both the hands on the respective knees palms facing upwards (Dhyana Mudra). Continue normal breathing.

5. You could also join the tips of the index fingers with the thumb, forming a small circle called "Jnana Mudra". The index finger represents the individual soul and the thumb, the universal one. The union of the two symbolizes Supreme Knowledge.

6. Lastly, close your eyes relax the entire body and breathe deeply through the nose. On each inhalation, visualize the life-giving breath entering and nourishing the body. On each exhalation, visualize the toxins leaving the same.

7. In the final posture, the torso is perfectly balanced and aligned. Hold the pose for five to fifteen minutes.

2. VIJRASANA

Like Padmasana, this is also the Asana for meditation. One can sit comfortably for a prolonged period in this Asana. Vajra or the thunderbolt, the powerful weapon of Indra is the allegory behind this asana.
Steps for Practice:

1. Fold the left leg in the knee and place the toe on the floor.
2. Fold the right leg in the knee and place the toe on the floor and join the two toes.
3. Sit on the pit formed by the parted heels.
4. Place the palms on the knees.

Position

It is important to keep the spine, the neck and the head, upright in one straight line in this Asana. Keep the sight fixed at the level of the height. Do not have any pressure on the hands. The whole weight of the body be set on the spine. Continue smooth breathing, when the final position is attained.
Remember

1. While sitting on the bent feet, the heels should remain out and toes inside. Soles upward.

2. Do not sit on the heels.

Duration

After a little practice, this Asana can be maintained for a long time. In the daily routine it should be kept for five minutes to experience good results. With more practice it can be kept for three hours.

3. MATSYASANA

Matsya means fish. Unlike other asanas which are named after the resemblance of the body to a particular creature during the final position of the asana, the body does not resemble a fish during this asana. But one would be able to float on water while in this asana. The term matsyasana conveys that while in water, one would be as comfortable as a fish if he/she are in this asana.
Steps for Practice:

1. Sit in Padmasana.

2. Slowly take the help of your elbows to lie down on your back.

3. Slowly lie on your back completely.

4. Now with the help of elbows or palms bend your head backward and place middle of the head on the ground.

5. Catch hold of the toes with your index fingers and place the elbows on the ground.

6. While returning to original position, release the toes and taking the help of your hands straighten your head.

7. Now taking the help of elbow sit in padmasana.

4. BHUJANGASANA

In Sanskrit Bhujanga means Cobra. The final position of this Asana resembles the Hooded Snake hence, it is called Bhujangasana.

Bhujangasana, is rudimentary not only for the spine but for movement as an integrated whole. Bhujangasana is an essential pose for developing the strength and flexibility of the entire back, while toning the legs and buttocks, increasing circulation, and assisting in kidney function.
Fig. 3.4. Bhujangasana

Fig. 3.4a. Bhujangasana
**Steps for Practice:**

1. Lie on your belly, while your head rests on your lower arms. Raise your forehead, look upwards and stretch your hands backwards.

2. Let your weight rest on your chest. The head falls a little backwards towards your back and the backward movement proceeds from the neck and the chin.

3. Move your belly further backward as if someone is pulling your arms. The weight is more and more shifted towards the belly and the lower back does the real work.

4. If you cannot raise your chest any further, you put your hands and your arms next to your chest on the mat without losing the bend.

5. Stretch your arms so that they stand perpendicular on the floor and at the same time turn your arms a little inward.

6. Relax your lower back and bear your weight with your arms. The buttock muscles remain relaxed during the exercise.

7. Move your chest further upward with breathing out. Do this in a relaxed way instead of using force. At the same time move your head backwards.

8. The shoulders are broad in front and the shoulder blades remain low.

**Remember**

1. Fingers of the hands must remain together.

2. Do not give jerk to raise your body.

3. Navel or lower part of the navel must not be raised.

4. Put minimum weight on hands. Divide weight on spine and arms.

5. While in final position, the thumb should touch the chest near armpit.

6. In the beginning weight can remain on hands.
7. While coming back some persons bend their head first but it should be avoided. The part of the body which leaves the ground first will return to the ground last.

5. Dhanurasana

This posture gets its name from the bending of the body, like a Bow. The bow posture is a combination of the cobra and the locust. ‘Dhanusha’ means a bow. The hands are used like a bowstring to pull the head, trunk and legs up and the posture resembles a bent bow. Therefore, this asana is called Dhanurasana. This asana bends the spine backwards. This asana works contrary to Halasana and pashchimottanasana which bend the spine forward.

Lie prone position on the floor, face downwards. Relax the muscles. Keep the arms and hold the ankles with hands. Raise the chest and the head. Fill the lungs with air. Straighten and stiffen the hands. Stiffen the legs also. The body now assumes the posture of the convex arch. Hold the breath and then exhale slowly. Attempt to keep the knees together. Hold the position for the stipulated time in the series.
6. SALABHASANA

Salabha means locust. The body resembles a locust while in the final position of the asana; hence this asana is known as salabhasana.
**Steps for Practice:**

1. Take prone lying position, legs together, toes of the legs backward, sole towards the sky, Hands by the side, palms upward, and fingers together the ground.

2. Folding both the hands at elbows bring them under the shoulder (as in Bhujangasana) fingers together, pointing forward.

3. Now raise both the legs upward slowly without bending them at knees, and maintain.

4. Then bring the legs down slowly.

5. **Salabhasana (Second technique)**

   The only difference in Salabhasana practiced traditionally is in the position of hands. In this technique the legs are raised keeping hands straight by the side, palms open upward. The remaining technique is same.

**Precautions**

1. The legs should not bend at knees.

2. While coming back to the original position bring the legs on the ground very slowly.

3. People suffering from Back problems, TB in intestine, Ulcer in stomach, hernia should consult Yoga expert before practicing this asana.

4. Jerks and unbearable strains should be avoided.

7. **HALASANA**

   Hala, in Sanskrit, means Plough. It is known as Halasana because in its final position the body resembles the shape of a plough.

**Steps for Practice**

1. Take supine position hands straight by the side of thighs, palm resting on the ground.
2. Slowly raise your legs together without bending at knees by pressing your hands and stop at 30° angle.
3. After few seconds raise your legs further up to 60° angle and maintain.
4. Now slowly bring the legs at 90° angle.
5. Pressing both the hands bring the legs little towards the head.
6. Continue the bending of legs till toes touch the ground and then stretch your legs backward as far as possible.
7. Now place both the palms together and straight over the head, try to touch the toes.
8. While returning back to the original position first release the hands. Stretch the hands straight and place them on the ground by the side of the body.
9. Lower the waist and raise the legs from the ground. Slowly let the waist rest on the ground and stop bringing the legs at 90° angle.
10. Slowly come back to the original position.

Fig.3.7. Halasana
Fig.3.7a. Halasana

Precautions

1. Do not bend legs at the knees while raising them up.

2. Do not raise the legs by giving jerk.

3. After reaching the angle of 90° go ahead carefully balancing your weight. Sometimes due to gravitational force, the legs may fall backward on the ground with jerk, therefore, control you.

4. While stretching the legs backward balance your weight on the hands and also while returning use hands for balancing the weight.

5. Do not forcibly stretch your legs if they are not in a position to touch the ground. Stretch them as far as they are stretched easily. Maintain it. Gradual practice will make body capable of moving forward and flexibility will be developed.
6. People suffering from spleen and lever complaints should do this asana after consulting Yoga expert.

7. Those suffering from cervical spondilitis or stiffness in spine should practice it very carefully.

8. Do not bend the legs in knees.

9. Do not move the neck or overstrain it in chin lock position.

**8. PAVANAMUKTHASANA**

This yoga pose removes extra gas from your belly and helps in reducing extra fat from your abdominal regions. Moreover it increases the flexibility of your knee and hip joint. To perform this pose lie down on your back, inhaling fold the right leg from the knee. Hold the fingers tight and bring the folded leg to touch stomach. Lift the hand and touch the nose to the knee. The other leg remains straight. Hold the breath for few moments and get back to original position. Do the same with other leg.

![Fig.3.8. Pavanamukthasana](image)
9. GOMUKHASANA

Placing both the feet on the ground by the side of the buttocks and keeping the body steady is Gomukhasana, resembling the face of a cow. Notice that the crossed legs look a little like the lips, and the bent-elbow arms, one up and one down, are the ears, which resembles the face of a cow. "Placing the right ankle on the left side and the left ankle on the right side makes Gomukha-asana, having the appearance of a cow." Says Swatmarama in the Hatha Yoga Pradipika.

Steps for Practice

1. Sit erect stretching both legs together in front, hands by the side, palm resting the ground, fingers of the hands together.

2. Fold right leg at the knee and place it on the ground by the side of the left buttock.

3. Similarly bringing the left leg from above the right leg, place it on the ground by the side of the right buttock. The two soles will remain out towards left and right side.
4. Place the palms on the knee one above the other and sit erect.

5. Or place the right palm above the left sole and left palm above the right sole, so that it will resemble the shape of a cow’s ear. Gaze in front.

6. After some time return to the original position. Afterwards practice it by changing the position of the legs i.e. by placing the right knee above the left knee.

![Fig.3.9. Gomukhasana](image)

**Remember**

1. To start with, first place the right leg by the side of the buttock then left above the right.

2. Hips remain straight.

3. One knee should remain just above the other knee.

**10. NAUKASANA**

"Nauka" means "boat" in Sanskrit. The final position of this asana resembles a boat, so it is called naukasana.
Steps for Practice

1. Lie straight on your abdomen and chest with your forehead resting on the floor.

2. Keep the feet together and the arms on the sides.

3. Stretch out the arms on both sides of the head and keep them parallel.

4. Turn down the palms on the floor with fingers straight.

5. Keep your forehead on the floor between the upper arms.

6. Inhaling, raise the arms, head, neck, shoulders, trunk and legs all together slowly and simultaneously as high as possible without bending the knees and elbows and without any jerk.

7. While doing this, keep the upper arms touching the ears and the feet together.

8. Bring the head up as high as possible and keep it between the raised upper arms.
9. Bend the extremities as far back as possible, and the back should be well arched.

10. The whole body should be curved from the fingertips to the toes, both of which should be on the same level.

11. Balance the entire weight of the body on the lower part of the abdomen which alone should touch the ground.

12. Maintain the posture motionlessly, as long as you can comfortably hold your breath.

13. Exhaling return slowly to the starting position.

Remember

1. Do not bend legs at the knee.

2. Release the Asana before you get pain in abdominal muscles.

Precautions

Those suffering from hypertension, heart disease a lumbar spondilitis should not practice it.

11. SARVANGASANA

It is considered as the best asana among all the asanas, as it activates most of the important glands and help to improve their function. Even old books on Yoga proclaim importance of this asana. Sarvanga means every part (Sarva + anga). Since this asana involves every part of the body, it is called sarvangasana.

Steps for Practice

1. Exhale and inhaling start raising both the legs upward and stop when they make angle of 90 degree with the floor. Attain the Uttanpadasana posture.

2. Exhaling raise the waist and push the legs backward over the head.
3. Support the waist with both the hands, using your hands get the legs, waist and back in one straight line and stabilize them in this position, stretch the toes towards sky. Keep the sight on the toes.

4. Continue normal breathing.

![Fig3.11. Sarvangasana](image)

**Precautions**

1. People suffering from headache, brain diseases, blood pressure, heart related ailments etc. should not do this. Do not bend the legs in knees.

2. Do not take the legs over your head in the position, but you can take the legs over your head while taking & releasing the position.

3. Do not move the neck or overstrain it in chin lock position asana without expert guidance.

**12. SHAVASANA**

`Shavam` in Sanskrit means a corpse and this asana resembles the posture of a dead person. This posture is basically meant for relaxation after doing any other difficult asanas. "Lying down on the ground, like a
corpse, is called Sava-asana. It removes fatigue and gives rest to the mind”, is according to the Hatha Yoga Pradipika, by Swatmarama.

Fig.3.12. Shavasana

**Steps for Practice**

1. All the parts of the body are completely relaxed in this position.
2. The legs are to be kept at 30 degree, and the arms at 15 degree away from the body.
3. Keep the elbows in prone position with fingers half-bent.
4. The feet are kept 18 inches apart. The hands should be about 6 inches away from the body.
5. Keep the eyelids closed, but the eyeballs should move freely within.
6. Breathing should be slow, rhythmic and abdominal.
7. The mind should concentrate only on breathing. This kind of breathing is called "Praanaadhaarana".
6.2 Aerobic Training

This Aerobic dance is a fun way to get fit. This group consists of 60 students randomly selected from Holy Ghost High School, Muttuchira, Kuravilangad, Kottayam Dist in the age group of 13-16. Class duration is eight weeks. Five days in a week 1 hour per day in the evening. Pre-test and post-test will be taken.

The structure of the classes as below (Susan K. Willmoth, 1955)

1. Warming-up and pre-stretch (5 – 10 minutes)
2. Aerobic activities (dance) (30 - 40 minutes)
3. Cool-down (5 - 10 minutes)

The aerobic segment consists of movement patterns with singing action choreographed to music. Aerobic dance movements and steps are common to other dance forms including Jazz, Modern Folk, and Ballet or by borrowing movement patterns used in sports and games.

The common steps used in aerobic dance classes include Jobs, marches, hops, jumps, knee lifts, kicks, twists, step touches, jumping jacks and lunges. By changing the rhythm (half time and double time) the direction of movement (forward, backward, side ways, diagonally, or in circles) and by adding arm positions to accompany the leg movements these steps can be varied (Susan, 1955).

Detailed aerobic dance procedures and methods (Fig.3.13-3.41)

1. Subjects in attention position. Palms placing on the hips, elbows pointing outward. Heels rise up and down alternatively with rhythmic action. Attention stands, arms forward stretch, elbows fully extended, and fingers interlock, palms facing forward, heels up and down alternatively with rhythmic and bouncing action (Fig.3.13 & 3.14).

2. Attention position, fingers interlocked and palms facing downward, elbows fully extended, heels raise up and down alternatively with rhythmic and bouncing action. Come to the starting position, Arms upward, elbows fully extended, palms facing towards the sky, fingers
interlocked, heels raise up and down with bouncing action (Fig. 3.15 & 3.16).

3. Attention position, stretch the arms forward, bend the elbows, palms facing downward, at the same time left knee bend and lift the left leg with a small jump. Then right knee bend and lift the right leg with a small jump (Fig.3.17 & 3.18).

4. Standing position, arms sideward, palms facing downward, fingers pointing side wards at the same time left knee bend and lift the left leg backward and touch the foot to the left palm with a small jump. Again right knee bend and lift the right leg backward and touch the foot to the right palm with a small jump (Fig.3.19 & 3.20).

5. Standing position, left arm upward raise and palm move towards the right side at the same time left knee bend and lift the left leg forward with a small jump, right palm move to the left side and touch the left foot and vice versa (Fig.3.21 & 3.22).

6. Standing position, left arm upward raise, palm move towards the right side at the same time left knee bend and lift backward with a small jump, right palm move backward to the left side and touch the left foot and vice versa (Fig.3.23 & 3.24).

7. Standing position, right leg move one step to the right side, arms sideward raise and move upward at the same time join the left leg towards the right with bouncing action. Then left leg move one step to left side and right leg move toward the left side and join the left leg at the same time arms move downward with a rhythmic action (Fig.3.25 & 3.26).

8. Standing position, elbows bend palms placing on the chest level, palms from the chest level move side wards at the same time, right leg move backward and touch the toes to the floor with a bouncing action, then come to the starting position, hands at the chest level, left leg move backward and touch the left toes to the floor with a bouncing action at
the same time palms moves side wards with a rhythmic action (Fig.3.27, 3.28 & 3.29).

9. Standing position, move three steps forward and in the fourth step turn back with a jump and clap the hands together then retain previous starting position and repeat the movements (Fig.3.30 & 3.31).

10. From the standing position, move three steps forward and in the fourth step left knee bend and lift the left leg with a small jump at the same time right elbow touch the left knee. Do this movement rhythmically in both sides (Fig.3.32 & 3.33).

11. Standing position, elbows straight, fingers interlocked and placing front, at the same time right leg move side wards with a swinging action, then left foot moves near to the right foot, then left leg move to the left side with a swinging action. Do these movements both sides rhythmically (Fig.3.34).

12. Standing position, palms placing on the chest level, move both palms towards both sides at the same time right leg move one step forward and touch the right heel on the floor with a bouncing action, then come to the starting position, palms placing on the chest level, move both palms towards both side at the same time left leg move one step forward and touch the heel on the floor with a bouncing action. Do these movements with a swinging and rhythmic action (Fig.3.35 & 3.36).

13. Standing position, lift the left leg with a small jump, thigh parallel to the ground at the same time left arm forward stretch, elbows fully extended, palms facing downward, come to the starting position then lift the right leg with a small jump, thigh parallel to the ground at the same time right arm forward stretch, elbows fully extended, palms facing downward. Do this movement rhythmically (Fig.3.37 & 3.38).

14. Standing position, lift the right leg forward, thigh parallel to the ground at the same time elbows bend and both the hands move to the right side(movements with rhythmic action).And touch the elbows to the right
knee. The left leg heels up and stands from the toes. Do this movement in both sides rhythmically (Fig. 3.39).

15. Standing position, walk three steps forward, on the fourth step, right knee bend and left heels up, toes touching the floor knee straight, at the same time hands placing on the hip, next fourth count move backward to the starting point. Then again walk three steps forward, on the fourth step left knee bend and right heel up toes touching the floor, knee straight at the same time hands placing on the hip. Do this movement rhythmically (Fig. 3.40 & 3.41).

Fig. 3.13.
Fig.3.16.

Fig.3.17.
Fig. 3.18.

Fig. 3.19.
Fig.3.26.

Fig.3.27.

Fig.3.28.
Fig. 3.31.

Fig. 3.32.
Fig. 3.35.

Fig. 3.36.
6.3 Calisthenics Training

The third group is given training for calisthenics exercises. The subject is randomly selected from Govt. High School, South Vazhakulam in the age group of 13 to 16. Calisthenics exercise is the fundamental for any physical training program. Eight weeks training was given, five days in a week for one hour each in the evening 3.30 pm to 4.30 pm. Students are directed to jog two rounds in a 200 meters track, then basic warming up exercise are given like opposite toe touching, over hand exercises, leg stretching, forward and backward bending, hand rotation, neck rotation and angle rotation. Then free hand exercises are given. After that, do sit-ups, push-ups, pull-ups, squats and calf-raising. The details of callisthenic exercises, methods and procedure are explained below:
BEND AND REACH

Position

Stand in a wide, side-straddle with the palms facing each other and the arms overhead and straight.

Action

a) Bend at the knees and waist and slowly bring the arms down and reach between the legs as far as possible. Make sure the angle formed by the upper and lower leg is never less than 90 degrees.

b) Recover slowly to the start position.

c) Repeat action (a).

d) Repeat action (b). Use a slow cadence.
CROSS- COUNTRY SKIER

Position

Assume a position of attention.

![Cross-country skier image](image)

Fig.3.43. Cross-country skier

Action

a) Jump slightly into air, and move the left foot forward and the right foot backward, landing with both knees slightly bent. At the same time, move the right arm upward and forward to shoulder height and the left arm back as far as possible, always keep the arms straight and the palms facing each other.

b) Jump slightly into the air, and move the right foot forward and the left foot backward. At the same time, move the left arm upward and forward to shoulder height and the right arm back as far as possible.

c) Repeat action (a).

d) Repeat action (b). Use a moderate cadence.
FLUTTER KICK

Position

Lie on your back with the hands beneath the buttocks, the head raised, and knees slightly bent.

![Flutter kick diagram]

Fig.3.44. Flutter kick

Action

Ultimately raise and lower the legs, keeping the knees slightly bend and the feet elevated 6 to 18 inches above the floor. To do the flutter kick to cadence, do one repetition per count. Use a moderate cadence.
HIGH JUMPER

Position

Position the feet about shoulder width apart with the knees flexed. Bend forward at the waist, aligning the arms with the trunk and hips. Keep the arms, straight at all times during the exercise keep the palms facing each other with the head and eyes initially to the front.

![Fig.3.45. High Jumper](image)

Action

a) Take a slight jump into the air while swinging the arms forward and up to the shoulder level.
b) Take a slight jump while swinging the arms backward, returning to the start position.
c) Jump strongly upward while swinging the arms forward and up to the overhead position; at the same time, briefly look skyward. While descending, return the head and eyes to the front, and flex the knees.
d) Repeat action (b). Use a moderate cadence.
**KNEE BENDER**

**Position**

Stand with the feet shoulder width apart, hands on the hips, the thumps in the small of the back and the elbows back.

![Knee Bender Illustration](image)

*Fig.3.46. Knee bender*

**Action**

a) Bend at the knees, lean slightly forward at the waist with the head up, and click the hands along the outside of the legs until the extended fingers reach the top of the boots or the middle of the lower leg.

b) Recover to the start position.

c) Repeat action (a).

d) Repeat action (b). Use a moderate cadence.
LUNCHER

Position

Start the position of attention.

![Diagram of Lunger Position](image)

**Fig.3.47. Lunger**

Action

a) Lunge diagonally forward to the left by stepping in that direction with the left foot, placing the left knee over the left foot. At the same time, place the arms side-ward at shoulder level, the palms up, and the head and shoulders squarely to the front.

b) Bend slowly forward and downward over the left thigh and wrap the arms around the thigh, hands grasping the opposite arms above the elbows.

c) Recover slowly to the second position by releasing the arms, straightening the trunk, and extending the arms side-ward, palms up.

d) Resume the position of attention by dropping the arms and returning the left foot to the side of the right.

e) Repeat the exercise to the right side. Use a moderate cadence.
MULE KICK

Position

Stand with the feet shoulder width apart.

Fig. 3.48. Mule kick

Action

Jump up repeatedly while kicking the heels to the buttocks. To do the mule kick to cadence, do one repetition per count. Use a moderate cadence.

SIDE – STRADDLE HOP

Position

Assume the position of attention.

Action

a) Jump slightly into the air while moving the legs more than shoulder width apart. Swinging the arms over head, and clapping the palms together.

b) Jumping slightly into the air while swinging the arms side-ward and downward and returning to the position of attention.

c) Repeat action (a).

d) Repeat action (b). Use a moderate cadence.
Fig. 3.49. Side-straddle hop

Variations

1) Jump slightly into the air while moving the left leg forward and the right leg backward, swinging the arms over head, and clapping the palms together.

2) Repeat the jumping and arm movements of action (1). While moving the right leg forward and the left, left leg backward.

3) Repeat action (2). Use a moderate cadence.

**SKI – JUMP**

**Position**

Stand with the feet together, the hands placed behind the head with the fingers interface.
Fig. 3.50. Ski jump

**Action**

a) Keep the feet together, jump sideways to the left.

b) Keep the feet together jump sideways to the right.

c) Repeat action (a).

d) Repeat action (b). Use a moderate cadence.

**SQUAT BENDER**

**Position**

Stand with the feet shoulder-width apart, hands on hips, thumbs in the small of the back, and the elbows back.

Fig. 3.51. Squat bender
**Action**

a) Bending the knees, lower yourself to a half-squat position while maintaining balance on the balls of the feet. With the trunk inclined slightly forward, thrust the arms forward to shoulder level with elbows locked and the palms down.

b) Recover to the start position.

c) Keeping the knees slightly bent, bend forward at the waist, touching the ground in front of toes.

d) Recover to the start position. Use a moderate cadence.

**THE ENGINE**

**Position**

Stand with arms straight in front of the body. The arm should be parallel to the ground with arms facing downward.

![Fig.3.52. The engine](image)

**Action**

a) Bring the left knee downward to the left elbow.

b) Return to the start position.

c) Touch the right knee to the right elbow.

d) Recover to the start position; be sure to keep the arms parallel to the ground throughout the entire exercise. Use a moderate cadence.
7. COLLECTION OF DATA

Test items

The components and test items are (AAHPERD, 1980).

1. Cardio respiratory function.
   A. One mile run.

2. Body composition (Leaniness/Fatness).
   A. The sum of triceps and sub scapular skin folds.

3. Abdominal and low back- Hamstring Musculoskelton function.
   A. Modified timed sit-ups..
   B. Sit and reach

The Administration of Tests

The administration of the tests and the methods of collecting the data are detailed below.

7.1 Cardio Respiratory Function

One mile run

Objective

The objective of the distance run was to measure maximal functional capacity and endurance of the cardio respiratory function.

Description

Students were instructed to run one mile distance in the fastest possible pace. The students began to race on the signal “ready start” or blow of a whistle, simultaneously stopwatch also start to function. As they cross the finish line, elapsed time was recorded. Walking was permitted, but the objective was to cover the distance in the shortest possible time. The run was scored in minutes and seconds. One mile run was administered on 200 or 400 meters tack, and other flat measured area (Safrit, 1986).
Scoring

One mile run time is recorded in minutes and seconds.

7.2 Body Composition (Sum of Skin fold Fat)

Objective

The aim of this test is to evaluate the level of body fat in school children in the selected schools. Skin fold caliper is used to measure the body fatness.

Description

Two skin fold fat sites (triceps and sub-scapular) were used in this particular test battery to measure body fatness because they are easily measured and are highly connected to total body fat (Safrit, 1986).

The sub-coetaneous adipose tissue can be lifted with the fingers to form a skin-fold. A skin-fold caliper was used to obtain the skin-fold, measuring the thickness of a double layer of sub-coetaneous fat and skin at the designated site. Triceps skin fold was measured over the triceps muscles of the right arm half way between elbow and the acromion process of the scapula with the skin-fold parallel to the longitudinal access of the upper arm. The sub scapular site (right side of the body) is 1 cm (½ inch) below the inferior angle of the scapular in line with the natural cleavage lines of the skin (Safrit, 1986).
Fig. 3.53. Measuring body fatness by Skin fold caliper

**Testing Procedure**

1. Firmly grasp the skin fold caliper between the thump and the forefinger and lift up.

2. Place the contact surfaces of caliper 1 cm (½ inch) above or below the finger.

3. Slowly release the grip on the calipers enabling them to exert their full tension on the skin-fold.

4. Read skin-fold to nearest 0.5 millimeter after needle stops. (1 to 2 seconds after releasing grip on caliper) (Safrit, 1986).

Lange skin-fold caliper is used to measure the body composition. Characteristics of this skin-fold caliper include accurate calibration capacity and a constant pressure of 10 gm/mm² through out the range of skin-fold thickness.
Scoring

The skin-fold measurement is registered on the dial of the caliper. Each measurement is taken three consecutive times with recorded score being the median (middle) of the three scores. For example, if the three readings were 18, 15 and 16 mm, the score recorded is 16 mm (Safrit, 1986).

7.3 Sit and Reach Test (Safrit 1986)

The purpose of the test Sit and Reach was to evaluate the flexibility (extensibility) of the low-back and posterior thighs.

Fig. 3.54. Sit and reach test

Description of the test

Reach forward as far as possible from a seated position. Subjects are directed to sit down at the test apparatus with their knees fully extended
and the feet shoulder width apart, place your feet flat against the box. The arms are extended forward with hands placed on top of each other to perform the test. The student reaches directly forward, palms down, along with the measuring scale four times and hold the position of the maximum reach on the fourth trail. The position of the maximum reach must be held for two second. The test apparatus consists of a specially constructed box with a measuring scale were 23 cm is at the level of the feet.

**Scoring**

The score is the most distant point reached on the fourth trial measured to the nearest centimeter. The test administrator should remain close to the scale and note the most distant line touched by the finger tips of both hands. If the hands reach unevenly, the test should be re-administered. The tester should place one hand on the subject’s knee to ensure that the knee remain extended.

**Test Area:**

Any plane area with sufficient floor space may be used.

### 7.4 Modified Sit-ups

**Test Objective:**

The purpose of the test sit-ups is to evaluate abdominal muscular strength endurance.

**Description:**

This is maximum number of sit-ups in 60 seconds done correctly. To assume the standing position, the student lies on his back with knees flexed, feet on floor, with heals between 12 to 18 inches from the buttocks. The arms are crossed on the chest with hands on the opposite shoulders. The feet are held by a partner to keep them in touch with the testing surface. The student, by tightening his abdominal muscles, curls to the sitting position. Arm contact with the chest must be maintained. The chin should remain tucked on the chest. The sit-up is completed when the
elbows touch the thighs. To complete the sit-up the student returns to the
down position until the mid-back makes contact with the testing surface.

Fig.3.55. Sit-ups-1

Fig.3.56. Sit-ups-2
Scoring:

The timer gives the signal “ready go” and the sit-up performance is started. Performance is stopped on the word “Stop”. The number of sit-ups performed in 60 seconds (1 minute) shall be the score. Rest between the sit-ups is allowed, and the student should be aware of this before initiating the test. However, the objective is to perform as many correctly executed sit-ups as possible in 60 seconds period (Safrit, 1986).

Equipments:

Mats are recommended for safety and comfort. Casio electronic manually operated stopwatch was used.
8. STATISTICAL TECHNIQUES

To find out the effect of various physical training, i.e. yoga, aerobics and calisthenics on health related physical fitness was evaluated on the basis of scores obtained were analyzed with the statistical tools mean, standard deviation, ‘t’ Test, Scheffe’s test and ANACOVA was used.