CHAPTER-III

METHODOLOGY

This chapter describes the selection of subjects, selection of variables, selection of tests, instruments reliability, competence of the tester, reliability of the data, orientation to the subjects, pilot study, training programme, collection of the data, administration of the tests, experimental design and statistical procedures.

3.1 SELECTION OF SUBJECTS

The purpose of the study was to find out the effect of the Yogasanas on Body composition and selected Anthropometric measurements of secondary school obese boys. To achieve this purpose of the study, eighty students studying in secondary schools of Vijiyapura, Devanahalli Taluk, Bangalore Rural District, Karnataka, India by using the BMI children percentile formula by considering purposive sampling technique as subjects. The age of the subjects were ranged between 14 to 16 years. The selected subjects were divided into two equal groups of forty subjects each. Group I underwent yogasana practices and for six days per week for twelve weeks. Group II acted as control that did not participate in any special training programme apart from their regular activities as per their curriculum. The subjects were free to withdraw their consent incase they felt any discomfort during the period of the training programme. But, there were no such drop outs in the study.
3.2 SELECTION OF VARIABLES

3.2.1 Independent Variables

Yoga is universally beneficial to all people of all ages. The study of yoga is fascinating to those with a philosophical mind and is defined as the silencing of the mind's activities which lead to complete realization of the intrinsic nature of the supreme being. It is a practical holistic philosophy designed to bring about profound state as well as an integral subject, which takes into consideration man as a whole. The aim of yoga is to devise ways and means of helping the better emotional and intellectual concentration. Hence, the yogasanas were selected as independent variables.

3.2.2 Dependent Variables

The following body composition and anthropometric measures were selected as dependent variables.

**Body Composition (four site skinfolds):**

1. Triceps
2. Abdomen
3. Suprailiac
4. Thigh
5. Body Fat %
Anthropometric Measures:

1. Height
2. Weight
3. Upper Arm Girth
4. Calf Girth

3.3 SELECTION OF TESTS

The present study was aimed to find out the effect of the Yogasanas on Body composition and selected Anthropometric measurements of secondary school obese boys namely triceps, abdomen, suprailiac, thigh, body fat percentage, height, weight, upper arm girth and calf girth. The investigator had analyzed various literatures, had consulted with the physical education professionals and selected the following test items, which were standardized and most suitable to serve the purposes of the study. The details of the test items were presented in Table-3.1.
Table-3.1
Selection of Tests

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Criterion Variables</th>
<th>Test Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Body Composition</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Triceps</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Abdomen</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Suprailiac</td>
<td>Skinfold measurements</td>
</tr>
<tr>
<td>4.</td>
<td>Thigh</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Body Fat %</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Anthropometric Measures:</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Height</td>
<td>Anthropometric measurements</td>
</tr>
<tr>
<td>2.</td>
<td>Weight</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Upper Arm Girth</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Calf Girth</td>
<td></td>
</tr>
</tbody>
</table>
3.4 INSTRUMENTS RELIABILITY

The required instruments measuring tape, weighing machine, vertical height stand and skinfold caliper were procured from the Department of Physical Education, Bangalore University, Bangalore, Karnataka India. All the instruments used for testing the dependent variables were in good condition and their calibrations were tested and found to be accurate enough to serve the purposes of the study. The qualified assistants were made use to measure the selected variables.

3.5 COMPETENCE OF THE TESTER

While testing the criterion variables, the researcher was assisted by Physical Education Teachers from the respective schools. The researcher and physical education teachers were learnt the procedures and methods to administer the test items and had a number of practice sessions to familiarize the test items.

3.6 RELIABILITY OF THE DATA

The reliability of the data was established by test-retest method. Ten subjects were selected from secondary schools of Vijiyapura, Devanahalli Taluk, Bangalore Rural District, Karnataka, India and they were tested twice by the same tester under the similar conditions on each criterion variable. The intra class correlation was used to find out the reliability of the data with test-retest scores on each criterion variable separately and they were presented in Table-3.2.
Table-3.2

Intra-class Co Efficient of Correlation Values on Selected Criterion Variables

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Tests / Variables</th>
<th>‘r’ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Body Composition</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Triceps</td>
<td>0.88</td>
</tr>
<tr>
<td>2.</td>
<td>Abdomen</td>
<td>0.85</td>
</tr>
<tr>
<td>3.</td>
<td>Suprailiac</td>
<td>0.88</td>
</tr>
<tr>
<td>4.</td>
<td>Thigh</td>
<td>0.85</td>
</tr>
<tr>
<td>5.</td>
<td>Body Fat %</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td><strong>Anthropometric Measures:</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Height</td>
<td>0.82</td>
</tr>
<tr>
<td>2.</td>
<td>Weight</td>
<td>0.85</td>
</tr>
<tr>
<td>3.</td>
<td>Upper Arm Girth</td>
<td>0.88</td>
</tr>
<tr>
<td>4.</td>
<td>Calf Girth</td>
<td>0.86</td>
</tr>
</tbody>
</table>

* Significant at .05 level of confidence.

(The table value required for significance at .05 level of confidence was 0.767).
3.7 ORIENTATION TO THE SUBJECTS

For the collection of data, the investigator explained the purpose of training programme to the subjects and their part in the study. The investigator explained the procedures of test on selected criterion variables and gave instructions about the points and procedures to be followed by the subjects for measuring. Three sessions were spent to familiarize the subjects with the techniques used to execute the yogasanas. It was useful to them while performing the yogasanas correctly. The subjects were verbally motivated to attend the training session regularly. Further control group was specially instructed to avoid any special training programme till the end of the experimental period. The subjects of all the groups were motivated adequately to perform their maximum during the training and testing periods.

3.8 TRAINING PROGRAMME

During the training period, Group I underwent yogasanas for six days per week for twelve weeks of the training programme. In every day training session, the work out lasted approximately between 45 minutes in an hour, which included warming up and stretching exercises. Group II acted as control that did not participate in any special training programme or strenuous physical exercises apart from their regular activities as per the curriculum.

The experimental group underwent training programme under the supervision of the researcher. The subjects were carefully monitored and
questioned about their health status throughout the training programme. None of the subjects have reported any injury.

The experimental treatment was conducted on the basis of three phases:

Phase-I: Pretest
Phase-II: Experimental Treatment Programme
Phase-III: Post-test

PHASE-I: PRETEST

All the subjects of two groups were then exposed for pre-test. The test of all the selected variables was conducted by using reliable and valid tests that assessed the body composition and anthropometric measurements.

Experimental Treatment

The subjects were assigned to two equated groups. The experimental training programme on yogasanas were administrated to experimental groups and group II acted as the control group. The training programme consisted of different asanas with different proportions of yogasanas training to develop the body composition and anthropometric measurements changes. The training was imparted six days a week under the supervision of the research scholar. The selected body composition and anthropometric measurements were recorded at the beginning and after the completion of 12 weeks of an experimental period, (pre test and post test)
PHASE-II: EXPERIMENTAL TREATMENT PROGRAMME

The Experimental Treatment was conducted every day except Sunday. The intensity of the selected Experimental Treatment programme was for 60 minutes (one hour) per day in morning session from 6.00 to 7.00 A.M. The total duration of training was for 12 weeks period.

Content of yogasanas training programme

The content of yogasanas training programme consists of selected asanas. The yogasanas training programme was given to Group ‘A’ for six days in a week for a period of twelve weeks. The schedule of yogasanas programme is given below:

The training schedules for the experimental groups were designed and are presented as follows.
THE DESIGN OF TRAINING SCHEDULE FOR YOGASANAS

YOGASANAS FROM 1 TO 4 WEEKS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Yogasanas</th>
<th>Repetitions</th>
<th>Duration in Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Warming Up and Stretching Exercises</td>
<td>-</td>
<td>15 minutes</td>
</tr>
<tr>
<td>2</td>
<td>Suryanamaskara</td>
<td>5 Rounds</td>
<td>18 minutes</td>
</tr>
<tr>
<td>3</td>
<td>Aradakati Chakrasana</td>
<td>Both Side – Two rounds</td>
<td>4 minutes</td>
</tr>
<tr>
<td>4</td>
<td>Parivrutha Trikonasana</td>
<td>Both Side – Two rounds</td>
<td>5 minutes</td>
</tr>
<tr>
<td>5</td>
<td>Padahastasana</td>
<td>Three Rounds</td>
<td>4 minutes</td>
</tr>
<tr>
<td>6</td>
<td>Vajrasana</td>
<td>-</td>
<td>3 minutes</td>
</tr>
<tr>
<td>7</td>
<td>Bujangasana</td>
<td>Two Rounds</td>
<td>3 minutes</td>
</tr>
<tr>
<td>8</td>
<td>Shavasana</td>
<td>-</td>
<td>8 minutes</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>60 minutes</strong></td>
</tr>
</tbody>
</table>
YOGASANAS FROM 5 TO 8 WEEKS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Yogasanas</th>
<th>Repetitions</th>
<th>Duration in Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Warming Up and Stretching Exercises</td>
<td>-</td>
<td>15 minutes</td>
</tr>
<tr>
<td>2</td>
<td>Suryanamaskara</td>
<td>4 Rounds</td>
<td>15 minutes</td>
</tr>
<tr>
<td>3</td>
<td>Aradakati Chakrasana</td>
<td>Both Sides – Two Rounds</td>
<td>3 minutes</td>
</tr>
<tr>
<td>4</td>
<td>Parivrutha Trikonasana</td>
<td>Both Sides –Two round</td>
<td>4 minutes</td>
</tr>
<tr>
<td>5</td>
<td>Veerabadrasana</td>
<td>Both sides - One Round</td>
<td>3 minutes</td>
</tr>
<tr>
<td>6</td>
<td>Padahasthasana</td>
<td>Two Rounds</td>
<td>3 minutes</td>
</tr>
<tr>
<td>7</td>
<td>Paschimottanasana</td>
<td>Two Rounds</td>
<td>3 minutes</td>
</tr>
<tr>
<td>8</td>
<td>Vajrasana</td>
<td>-</td>
<td>3 minutes</td>
</tr>
<tr>
<td>9</td>
<td>Bujangasana</td>
<td>Two Rounds</td>
<td>3 minutes</td>
</tr>
<tr>
<td>10</td>
<td>Shavasana</td>
<td>-</td>
<td>8 minutes</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>60 minutes</td>
</tr>
</tbody>
</table>
## YOGASANAS FROM 8 TO 12 WEEKS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Yogasanas</th>
<th>Repetitions</th>
<th>Duration in Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Warming Up and Stretching Exercises</td>
<td>-</td>
<td>15 minutes</td>
</tr>
<tr>
<td>2</td>
<td>Suryanamaskara</td>
<td>3 Rounds</td>
<td>12 minutes</td>
</tr>
<tr>
<td>3</td>
<td>Aradakati Chakrasana</td>
<td>Both Sides - One Round</td>
<td>2 minutes</td>
</tr>
<tr>
<td>4</td>
<td>Parivrutha Trikonasana</td>
<td>Both Sides – One Round</td>
<td>3 minutes</td>
</tr>
<tr>
<td>5</td>
<td>Veerabradrasana</td>
<td>Both sides – One Round</td>
<td>3 minutes</td>
</tr>
<tr>
<td>6</td>
<td>Padahasthasana</td>
<td>Two Rounds</td>
<td>2 minutes</td>
</tr>
<tr>
<td>7</td>
<td>Paschimottananasana</td>
<td>Two Rounds</td>
<td>2 minutes</td>
</tr>
<tr>
<td>8</td>
<td>Vakrasana</td>
<td>Both sides – One Round</td>
<td>3 minutes</td>
</tr>
<tr>
<td>9</td>
<td>Vajrasana</td>
<td>-</td>
<td>2 minutes</td>
</tr>
<tr>
<td>10</td>
<td>Ustrasana</td>
<td>Two rounds</td>
<td>3 minutes</td>
</tr>
<tr>
<td>11</td>
<td>Bujangasana</td>
<td>One Round</td>
<td>2 minutes</td>
</tr>
<tr>
<td>12</td>
<td>Dhanurasana</td>
<td>One Round</td>
<td>2 minutes</td>
</tr>
<tr>
<td>13</td>
<td>Navasana</td>
<td>Two Rounds</td>
<td>3 minutes</td>
</tr>
<tr>
<td>14</td>
<td>Shavasana</td>
<td>-</td>
<td>6 minutes</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>60 minutes</strong></td>
</tr>
</tbody>
</table>
The level is the combination of easy and advanced yoga and so it is called advance level. The yoga practices in this level help in the stretching of full body. It develops the external organs. It keeps the whole body in fine tune. They develop further the breathing capacity and flexibility by strengthening the body. Most of the yoga practices in this level are designed in such a way that they can be done in standing position.

The exercises programme was imparted systematically from simple to complex manner; they were practiced as per the subject’s individual need.

3.9 **YOGASANAS**

The yogasanas selected for the training purpose are as follows:

3.9.1 **Warming Up and Stretching Exercises**

Simple Freehand Exercises

- On the spot jogging, Neck rotation, left to right, right to left and up and down
- Stand erect with the legs together take the hands above the head and bend the trunk backwards and inhalefully.
- Bend the body in front and touch the knee by the forehead, keep the palms on the floor.
- Keep the right leg back takes the left knee forward, lookup and inhale.
- Take the left leg also back, resting only on palms and toes, keep body straight from head to toes inclined to the ground at about 30° and exhale completely.

- Without moving the hands and toes come forward on the chest and rest the forehead. In this position of Asthanga Namaskar. Forehead, chest, hands, knee and legs all the eight parts will be touching the ground. The buttocks will be raised up stay in breath out condition.

- Inhale raise the head the trunk making the spine concave upwards without changing the position of the hands and feet keep the knee of the ground.

- Exhale raise the buttocks push the head down and have a compete arch with the heels touching the ground and palms on the floor.

- Inhale and bring the right leg in between the two hands and in the hale them. Arch the back concave upwards as in step three.

- Exhale and bring the left foot forward next to the right foot and touch the knee with fore head as in count two.

- Inhale and come up stand erect with hands along the body and relax.

3.9.2 Surya Namaskar (Salutation to the Sun)

Position:

Stand erect with legs together. Bring the palms together to namaskara mudra.
Step-1:

- Take the hands above the head while inhaling and bend the trunk backwards.

Step-2:

- Bend the body forward while exhaling. Touch the forehead to the knees.
- Keep the palms on the floor on either side of the feet.

Step-3:

- In this step breath in and kick the right leg back.
- Push the buttock forward and downward so that the left leg is perpendicular to the ground.
- Look up.
Step-4:

- In this step, exhale and take the left leg also back, resting only on palms and toes. Keep the body straight from head to toes inclined to the ground at about 30°.

- Take care to keep the neck in line with the back.

Step-5:

- While inhaling, bend the legs at the knees and rest them on the floor with buttocks resting on the heels without altering the position of the palms and toes.

- Exhale as you rest the forehead on the floor.

- Then relax in normal breathing.

Step-6:

- While exhaling without shifting the positions of hands and toes, glide the body forward and hold the breath (Bahya Kumbhaka) and rest the forehead, chest, hands, knees and toes on the ground. Raise the buttock off the ground.

- Note that eight points of the body are in contact with the ground-hence the name sastanga namaskara (Salutation with eight parts).
Step-7 :

- Inhale, raise the head and trunk making the spine concave upwards without lifting the position of the hands and feet.
- Arch the back as far as you can until the elbows are straight.
- Keep the knees off the ground.

Step-8 :

- While exhaling, raise the buttocks, push the head down until the heels touch the ground without shifting the position of hands and feet.

Step-9 :

- Same as step 5.
Step-10 :

- Inhale and bring the right leg in between the two hands. Arch the back concave upwards as in step 3 until the right leg is perpendicular to ground.

Step-11 :

- Exhale and bring the left foot forward next to the right foot and reach down with your upper body to touch the forehead to the knees as in step-2.

Step-12 :

- While inhaling, come up to sthiti.

- This completes one round of Surya Namaskar.
**Benefits:**

The dynamic series known as Surya Namaskara (Salutation to the Sun) is the best way to burn the calories and reduce weight. Surya Namaskara is full Yoga by itself. It tones up the whole body & has a unique influence on the endocrine, circulatory, respiratory, digestive and nervous system, helping to correct metabolic imbalances that cause and perpetuate obesity.

- Surya Namaskar is extremely beneficial for the digestive system as it stretches the abdominal muscles making them well toned. In addition to that, it also helps to loose weight by reducing excessive fat accumulated in the body.

- Surya Namaskar stimulates blood circulation in the body.

- Moreover, surya namaskar helps to loose extra calories that increase the weight and keeps to fit and fine.

- Regular practice of Sun Salutation keeps you face and skin glowing and radiant and also enhances vitality and strength in the body and muscles.

- Surya namaskar has great significance in providing great flexibility to the muscles that keeps the active and fit.
3.9.3 Ardha-Katichakrasana

The subjects stood with the legs together, and kept their hands sideward straight in standing position. The subjects raised their right hand forward and kept it straight near their right ear. The subjects were bent their body to left side slowly as much as possible for thirty seconds in the final position. The subjects were released their final position to starting position reverse order slowly. The subjects were performed on the left side and maintained for thirty seconds in the final position.

Benefits:

Ardha Kati Chakrasana reduces fat in waist region, stimulates sides of the body. Thus it is beneficial in weight loss.
3.9.4 Parivrtta Trikonasana

**Position : Tadasana**

While inhaling spread the legs apart by about a meter by moving the right leg away from the left. Simultaneously raise. While exhaling, the right hand is taken down to the ground on the outside of the left foot, while the left arm is raised up to the vertical position. Turn the face up to look at the raised hand. Maintain at the final posture for 1 minute with normal breathing. Return to sthiti and repeat the same to the left side also.

**Benefits :**

Gives rotational movements to the spine. Improves strengthens the thigh muscles and Stretches the calf muscles, hamstrings, and hip musculature. The practice this *asana* regularly the waist will become slim and reduce weight.
3.9.5 **Virabhadrasana (Warrior Pose)**

Stand erect with the feet together, the heels and big toes touching each other. Raise the both arms above the head, stretch up and join the palms. Take a deep inhalation and with the jump the legs apart sideways 4 to 4 ½ feet. Exhale, turn to the right. Simultaneously turn the right foot 90 degrees to the right and the left foot slightly to the right. Flex the right knee till the right thigh is parallel to the floor and the right shin perpendicular to the floor, forming a right angle between the right thigh and the right calf. The bend knee should be extend beyond the ankle, but should be in line with the heel. Stretch out the left leg and tighten at the knee. The face, chest and right knee should face the same way as the right foot, as illustrated. Throw the head up, stretch the spine from the coccyx and gaze at the joined palms.

**Breath**: Normal breathing.

**Benefits**:

The practice this *asana* regularly the waist will become slim and reduce weight.
3.9.6  Pada Hastasana (The Forward Bending Pose)

Stand with the trunk erect and the hands beside the body. Slowly bend the head forward, then the upper trunk and the lower trunk. The body should bend forward as though there are no muscles in the back. Place the fingers underneath the toes or touch the ground with the palms to the fingertips. If this is not possible then bring the fingertips as near to the ground as possible. Try to bring the forehead to the knees. Maintain this pose up to 1 minute then slowly return to the starting position.

**Breath:** Exhale as you bend forward. Breathe slowly and deeply in the final pose. Inhale as you return to the starting point.

**Benefits of Padahastasana**

It strengthens the back and thigh muscles. Improves the flexibility of the spine. Helpful for removing extra fat from abdomen region.
3.9.7 Paschimottanasana (The Back Stretching Pose)

Sit on the floor with the legs straight in the front of the body, the lower arms on the thighs. Relax the whole body, especially the back muscles. Slowly bend the body forward. Try to grasp the big toes with the fingers and the thumbs. If this is impossible then hold the heels, the ankles or the legs as near to the feet as possible. Again, consciously relax the back and leg muscles. Keeping the legs straight and without utilizing the back muscles, only using the arms, pull the trunk a little lower toward the legs. This should be a process without any sudden movement or excessive strain anywhere in the body. If possible, without strain, touch the knees with the forehead. Remain in the final pose for a comfortable length of time, trying to further relax the whole body, and then slowly return to the starting position.

Benefits:

Reduces fatigue, Activates the abdominal muscle, Strengthens the thighs and knees and Stretches the hips, hamstrings, and calves
3.9.8 Vakrasana:

The posture is called Vakrasana because in doing so, the spine is twisted. Vakra in Sanskrit means ‘twisted’. It is a simplified form of Ardha-Matsyendrasana and has been introduced by Swami Kuvalayananda as preparatory posture for vakrasana. The subjects were sat with the legs extended together, and kept their hands sideward. The subjects folded right leg in the knee and placed their foot by the side of the right knee. Placed their left hand at the back and kept the body in erect position. The subjects were kept their left arm over the right knee and placed their palm on the ground. The subjects gave good twist to the trunk to the right and turned the head over the right shoulder. This was the final position and maintained for thirty seconds. The subjects were turned their head to the front, brought their left hand to left hand side, extended their right leg and came to starting position. The subjects performed the same practice to the left hand side.

Benefits:

The elasticity of the spine increases as it gets twisted in its erect position. Along with the spine the belly and other internal organs also get twisted and reduce the fat content in waist.
3.9.9 Vajrasana (The Thunderbolt Pose)

Stand on the knees with the feet stretched backward and big toes crossed. The knees should be together, heels apart. Lower the buttocks on to the insides of the feet, the heels at the sides of the hips. Place the hands on the knees, palms downward. Practice vajrasana as much as possible, especially straight after meals for at least 5 minutes to enhance digestive function.

**Breath**: Normal breathing.

**Benefits**:

It stretches thighs, knees, ankles, hips and reduces the fat content
3.9.10 Ustrasana

Sit on the knees as in Vajrasnna. Slowly stand on the knees. While inhaling raise the hands over the head. Exhaling, arch the spine and neck backwards. Fully push the pelvis forward and hold the ankles. Return to the starting position while inhaling. Improves the respiratory and reproductive organs functions. Relieves stiffness in the back and shoulders.

Benefits

Reduces fat in thighs, Stretches and strengthens the shoulders and back and Strengthens thighs and arms
3.9.11 Bhujangasana (The Cobra Pose)

Lie on the stomach with the legs straight and the feet extended. Place the palms flat on the floor under the shoulders. Rest the forehead on the ground and relax the body. Slowly raise the head and shoulders off the ground, bending the head as far back as it will go. Try to raise the shoulders without using the arms, only utilizing the back muscles. Now bring the arms into action and slowly bend the back as much as possible without strain until the arms are straight. Keep the navel as near to the ground as possible. Hold as long as comfortable. Practice upto 5 times.

**Breath:** Inhale while raising the body from the ground. Breathe normally in the final pose. If the final pose is held for a short time, retain the breath inside.

**Benefits:**

Reduces the abdominal fat, Strengthens the spinal muscles, stretches muscles in the shoulders, chest and abdominal and relieves fatigue.
3.9.12 Dhanurasana (The Bow Pose)

Lie flat on the stomach and inhale fully. Bend the knees and hold the ankles with the hands. Tense the leg muscles and arch the back. Simultaneously raise the head, chest and thighs as high as possible. Keep the arms straight. Hold for as long as is comfortable. Practice up to 5 times.

**Breath:** The breath may be retained inside in the final pose or slow, deep breathing may be practiced.

**Benefits:**

It reduces tummy fat.
3.9.13 Navasana (The Boat Pose)

From a seated position bent the knees and tilt the upper body back. Straighten the legs. Point the heels, toes or ball points of the toes. Apply a little pressure inward so the legs stay together and lengthen the inner legs. Raise the chest up and allow weight to fall upon the sacrum. Or balance on the very end of the tailbone. (The Coccyx) Lengthen the torso. Keep space around the front of the neck. Push through the top of the head to balance the energy that moves through the toes.

**Breath** : Normal Breathing

**Breath** : Breathe normally in the sitting position. Exhale slowly while bending forward. Inhale while holding the body motionless. Exhale as you pull the trunk further forward with the arms. Breathe slowly and deeply in the final pose. Inhale while returning to the starting position. If the final pose is not held for a long time the breath may be retained outside.

**Benefits**

Massages the internal abdominal organs and rejuvenates the body and reduces belly fat and Increases lower back strength.
3.9.14 Savasana (The Corpse Pose)

Lie flat on the back with arms beside and in line with the body, palms facing upward. Move the feet slightly apart to a comfortable position and close the eyes. Relax the whole body. Do not move any part even if discomfort occurs. Let the breath become rhythmic and natural. Become aware of the inhalation and exhalation. Count the number of respirations: I in, I out, and so on, Continue to count for a few minutes. If the mind starts to wander bring it back to the counting. If you can keep the mind on the breath for a few minutes, the mind and body will relax.

**Breath**: Normal Breathing.

**Benefits**:

A decrease in muscle tension, a decrease in fatigue, decrease in heart rate and the rate of respiration and decrease in blood pressure.
PHASE-III: POST-TEST

The post-test in the all selected variables were conducted on the subjects of all the groups after completion of experimental treatment period of 12 weeks. The procedure of post-test was same like the pre-test.

3.10 COLLECTION OF THE DATA

The data on body composition and anthropometric measurements were measured accordingly. The pre test and post test data were collected two days before two days after the last training session respectively. In both the cases, the data were collected in two consecutive days.
3.11 ADMINISTRATION OF THE TESTS

A. BODY COMPOSITION (Skinfold Measurements)

Purpose: To measure the body fat of the subject

Equipment: Lange’s skinfold caliper.

Description:

Skinfold measurement method is probably the most widely used of all and it is based on the fact that about one half of the total adipose tissue is kept in specialized cells within the subcutaneous areas beneath the skin. The fold involving two layers of skin and subcutaneous strictures can be held between the thumb and index finger while the skinfold calipers are being applied. The right side of the body is used to determine the percentage. It is recorded in millimeter.

1. Triceps Skinfold

   It was taken over the triceps muscle at a point half way between the tip of the shoulder acromian process and process of the elbow. The spot was located with the forearm flexed to 90°. However during test the arm was allowed to hang freely.

2. Abdominal Skinfold

   The abdominal skinfold site is one of the common locations used for the assessment of body fat using skinfold calipers. A mark is made 5 cm adjacent to the umbilicus (belly-button), to the right side. See notes below about alternate
sites. The vertical pinch is made at the marked site, and the calipers placed just below the pinch. Be careful not to place the caliper or fingers inside the navel.

3. **Suprailiac Skin fold**

The suprailiac skinfold site is one of the common locations used for the assessment of body fat using skinfold calipers. It has previously been known as the Suprailiac site. The intersection of a line joining the spinale (front part of iliac crest) and the anterior (front) part of the axilla (armpit), and a horizontal line at the level of the iliac crest. The pinch is directed medially (towards the centerline) and downward, following the natural fold of the skin (at an approximate angle of 45 degrees).

4. **Thigh Skinfold**

The anterior thigh skinfold site (also called the front thigh or mid thigh) is one of the common locations used for the assessment of body fat using skinfold calipers. Less commonly the posterior thigh site is used, and another site on the leg is the patella or knee cap site (details below). The mid-point of the anterior (front) surface of the thigh, midway between patella (knee cap) and inguinal fold (crease at top of thigh). A vertical pinch is taken. This measurement is normally taken with the subject sitting and the knee bent at right angles. If there is difficulty in lifting a fold of skin, it may be easier with the leg extended, or with the thigh supported from below by the subject.
Determining the body fat percentage, equation developed Jackson and Pollock (1978) for predicting body density from skinfold measurements and adapted by YMCA (Golding, Myers, and Sinning 1989) was used.

\[
\% \text{ Body Fat} = (0.29288 \times \text{sum of skinfolds}) - (0.0005 \times \text{square of the sum of skinfolds}) + (0.15845 \times \text{age}) - 5.76377, \text{ where the skinfold sites (measured in mm) are triceps, abdominal, thigh and suprailiac}
\]
B. ANTHROPOMETRIC VARIABLES

1. Standing Height

Purpose:

To measure the standing height of the subject.

Equipment:

Standing Scale.

Procedure:

The height of the subject was measured with subject standing erect without shoes against a stand marked scale. The subjects were instructed to keep the heels together body touching the stand with heels, buttocks and back, head erect without tilt and to take and hold a full breath and standing erect while height measurement was taken. A stiff hard board was held horizontally on his head, slightly pressing the head and touching the scale marked on the stand, at right angle. The subject was asked to step out by lowering the head and reading indicated by the lower end of the stand was taken.

Scoring:

Height was recorded correctly to the nearest half of a centimeter. ¹

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2. **Body Weight**

**Purpose:**

To measure the weight of the subject.

**Equipment:**

Calibrated weighting machine

**Procedure:**

The weight of the subject was taken with a lever tight laboratory anthropometric weighing machine. The subject wearing shorts and vest only stood at the centre of the machine and the weight was recorded from the indicator needle of the dial.

**Scoring:**

The weight was read and recorded correct nearest to a half of a kilogram.²

3. **Upper Arm Girth/Circumferences:**

**Purpose:**

To measure the upper arm girth of the subject.

**Procedure:**

The measurement of upper arm girth was taken with a steel tape; it was measured at the thickest part above the elbow joint. This level was marked on

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² Carter *Loc.Cit.*
the skin first then tape was placed around the arm, so that it was in light contact with the skin all around. The arm was hung down loosely at the side relaxed.

**Scoring**

Upper arm girth was measured and recorded in the nearest half centimeter.

4. **Calf Girth/Circumferences**

Purpose: To measure the horizontal circumferences of calf of the subject.

Equipment: Measuring tape.

Description:

The subject stood erect with his feet placed slightly apart. The measuring tape was kept horizontally on the lower leg at the level of the great bulge (prominence) of calf muscle. The measurement was taken without pressing the skin surface to the nearest half of a centimeter with no air space underneath.
3.12 EXPERIMENTAL DESIGN AND STATISTICAL PROCEDURES

The pre and post test random group design was used as experimental design in which eighty obese boys subjects were divided into two groups. Each group consists of forty subjects. Group I underwent yagasan for six days per week for twelve weeks of training period. And Group II acted as control who did not participated in any special training programme apart from their regular curricular activities. The data were collected for all the groups on selected criterion variables by using the standardized test items. The data were collected from the two groups two days prior to and two days after the training programme on selected dependent variables as pre and post tests. They were statistically analyzed by using the ‘t’ test to determine the differences. The 0.05 level of confidence was fixed as the level of significance to test the ‘F’ ratio obtained by the analysis of covariance, which was considered as an appropriate.