Chapter III

METHODOLOGY

The present chapter discusses the overview of the methodology adopted in the study, selection of subjects, selection of variables, selection of morphological, physiological and biochemical markers, daily administration of training interventions on yoga and naturopathy, research design, allotment of training interventions and phases of experiment, administration of tests, instruments being used, procedures adopted in administering them and scoring them, collection of data, and statistical techniques for analyzing the data.

The present study was undertaken with a view to evaluate the training efficacy of yoga, naturopathy and combined yoga plus naturopathy treatment in controlling the morphological, physiological and biochemical markers of obesity among school girls. The methodology followed to conduct this scientific experiment has been presented below:

Procedure of the Study

Preparatory stage to conduct experiment

This study was conducted at Lonavla (Maharashtra State), where there were three secondary schools namely Our Lady Convent School, Don Bosco and D.C. High School. The distance between each of these schools was less than one kilometer. The researcher consulted the Heads of these schools and identified two hundred (n=200) obese girls, age ranged between 11 and 12 years from the selected schools situated in Lonavla, on the basis of body mass index.

The name of the girls who possess excessive body according to their age and height were enlisted and the purpose of this research project was discussed with their parents in the presence of the Principal of each school. The parents were convinced with the support given by the Principal and finally given consent about their daughters’ participation as subjects in this project. The project was conducted after school hours so that the class routine was not disturbed. The age group of the subjects was recorded from the date of birth as enlisted in the schools’ record.
It is important to note that while conducting the experiment the investigator wanted to take some photographs of the participating subjects as a proof, but amazingly the parents did not allow. Therefore, this report did not contain the photograph of the participating subjects while conducting the experiment.

**Pre - test**

The investigator conducted the pre test on the subjects with consent in writing form from the parents. Each subject was given individual code number that was case number and record card was prepared by the investigator so that they can be identified easily.

All the subjects were strictly instructed to arrive at each station made for testing the variables to collect data on the selected variables. Four professionally qualified and trained assistants controlled each station for pre-test data collection.

Demonstration of the test was given and questions asked by the subjects were explained and doubts, if any, were clarified.

Standard procedures were followed for testing the entire variables selected for. Then the group division was made into four groups namely, Group- I (Yoga training), Group- II (Naturopathy), Group -III (Yoga + Naturopathy) and Group- IV (Control) where each group represents 30 subjects.

**Daily Administration of Training Interventions**

Training programmes on Yoga and Naturopathy were scheduled separately. Although attendance of the subjects was taken regularly, the percentage of attendance of majority of the participants after completion of training was found more than 80%. In fact, some of the students were dropped out because of irregular attendance. However, in a regular class the students were demonstrated and explained while new movements / treatment are introduced. Any questions asked by the students have been clarified. They were also motivated properly to undergo training schedule.
Post – Test

Post-test was conducted like pre-test, where all the subjects were strictly instructed to arrive at each of the testing stations which were made for collecting data on the selected variables. Same procedures, as followed in pre-test, were performed for tests administration among all the subjects belonging to experimental and control groups.

The Experiment

Selection of Subjects

One hundred and twenty obese school girls were selected as samples for the experimental study. These subjects age ranged between 11 and 12 years. For this, a purposive sampling technique was used. Further, the sample subjects were randomly assigned into four equal groups, viz., three experimental groups (Group I: \( n_1 = 30 \)); Group II: \( n_2 = 30 \); Group III: \( n_3 = 30 \)) and one control group (Group IV: \( n_3 = 30 \)). All these subjects were residing within one kilometer range in Lonavla city, Maharashtra State. The researcher made sure from the parents as well as subjects that the entire subjects were ready to go through the experimental requirements.

Inclusion and Exclusion Criteria

- School girl students aged from 11 to 12 years were included.
- The subjects who agreed and sincerely attend the training program were included in the study.
- The subjects, who had any health complications or disease as examined and ruled out by the medical doctor, were excluded prior to the study.

Drop outs

It was important to note that one subject from group-II, two subjects from Group-III and four subjects from Group-IV were irregular in the experiment. Thus, total seven subjects were dropped out from the experiment.
SELECTION OF VARIABLES AND TOOLS USED AND CRITERION MEASURES

Dependent Variables

Before and after the experiment, following tests for the subjects of experimental and control groups were administered with the help of some standard tests:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Tools</th>
<th>Criterion Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(nearest to)</td>
</tr>
<tr>
<td><strong>MORPHOLOGICAL VARIABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI – Body Mass Index</td>
<td>Weight/height in meter square</td>
<td>±1 Index</td>
</tr>
<tr>
<td>Fat%</td>
<td>Body fat monitor</td>
<td>0.05 %</td>
</tr>
<tr>
<td>Abdominal girth</td>
<td>Tape</td>
<td>0.05 cm.</td>
</tr>
<tr>
<td>Hip girth</td>
<td>Tape</td>
<td>0.05 cm.</td>
</tr>
<tr>
<td><strong>PHYSIOLOGICAL VARIABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>Sphygmomanometer</td>
<td>±1 mm.Hg.</td>
</tr>
<tr>
<td>Diastolic blood pressure</td>
<td>Sphygmomanometer</td>
<td>±1 mm.Hg.</td>
</tr>
<tr>
<td>Pulse rate</td>
<td>Stop watch</td>
<td>±1 beats/min.</td>
</tr>
<tr>
<td><strong>BIOCHEMICAL VARIABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholesterol</td>
<td>Statfax-2000 analyzer</td>
<td>0.05 mg/dL.</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>Statfax-2000 analyzer</td>
<td>0.05 mg/dL.</td>
</tr>
<tr>
<td>HDL</td>
<td>Statfax-2000 analyzer</td>
<td>0.05 mg/dL.</td>
</tr>
<tr>
<td>LDL</td>
<td>Friedwald’s Equation</td>
<td>0.05 mg/dL.</td>
</tr>
<tr>
<td>VLDL</td>
<td>Friedwald’s Equation</td>
<td>0.05 mg/dL.</td>
</tr>
<tr>
<td>Cardiovascular risk ratio</td>
<td>Calculation</td>
<td>±0.01 Index</td>
</tr>
<tr>
<td>Leptin</td>
<td>Eliza Reader</td>
<td>0.05 ng/mL.</td>
</tr>
</tbody>
</table>

The participants were found really encouraged and co-operative to conduct each of the above tests.
Research Design

This is a true experimental design with four parallel groups of obese school girls, who were treated with three specialized training interventions for a total duration of twelve weeks.

Allotment of Training Interventions and Phases of Experiment

Group I received specially designed yoga training, Group II received naturopathy treatment, Group III underwent yoga plus naturopathy treatment while Group IV was treated as control. The designs of the experiment have been planned in three phases:

- Phase – I: Pretest.
- Phase – II: Training or Treatment, and
- Phase – III: Post test.

Pre – Test (Phase – I)

All the subjects of experimental and control groups were exposed to the selected morphological, physiological and biochemical variables to record pre-test data.

Treatment Stimuli (Phase – II)

After the pre test was over, all the subjects of Group I, Group II and Group III underwent respective training while the Group IV was engaged in some recreational activities, library reading and day to day works during the period of experiment. All the training and treatment interventions were equated with one hour in the morning except Sunday and holidays for total period of twelve weeks.

Thus, four groups involved in this experiment were as follows:

- Group I – Yoga
- Group II – Naturopathy
- Group III – Yoga plus Naturopathy
- Group IV – Control
One yoga teacher and one Naturopathy (professionally qualified: Bachelor of Yoga and Naturopathy) were appointed to organize daily training program under the overall supervision of the investigator for a total period of twelve weeks.

**Post - Test (Phase III)**

Finally, when the treatment or training period of twelve weeks were over, all the subjects of experimental and control groups were assessed for the selected morphological, physiological and biochemical variables as it was described in pre test.

**Designing Independent Variable**

Yoga and naturopathy were included as an independent variable in this study.

**Designing Yoga Training Schedule**

The Yoga training schedule was designed on the basis of following:

- Yoga is a thoroughly practical system and practical aspects of yoga e.g., asanas, pranayamas, dhyana etc. have been taken care of.
- Yoga practices have been designed in such a way so that the it awakens the subjects’ true wisdom, joy and compassion.
- Yoga does not promise quick solution the problem rather it produce positive result if it done correctly.
- It was considered that it brings a state of homeostasis in our body.
- While designing the schedule, it was taken into consideration that yoga should be used both as a curative and preventive therapy. as well as a way for achieving mental peaces and for developing for concentration level.
- Regular practice of it help us to keep your body fit healthy and free from chronic diseases such as Blood pressure.
Composition of Yoga Training Interventions

On the basis of the reports of various investigations (Sharpe et. al., 2007; Ganguly, Bera and Gharote 2001; Bhogal, Oak, Gore, Kulkarni and Bera, 2005; Ganguly, Bera and Gharote 2003), the yoga training intervention has been composed for this study:

<table>
<thead>
<tr>
<th>I to IV Weeks</th>
<th>V to VIII Weeks</th>
<th>IX to XII Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shavasana</td>
<td>Shirasana</td>
<td>Shirshasana</td>
</tr>
<tr>
<td>Ardhahalasana</td>
<td>Viparitkarani</td>
<td>Halasana</td>
</tr>
<tr>
<td>Halasana</td>
<td>Sarvangasana</td>
<td>Sarvangasana</td>
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<tr>
<td>Ardhashalabhasana</td>
<td>Matsyasana</td>
<td>Matsyasana</td>
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<tr>
<td>Shalabhasana</td>
<td>Bhujangasana</td>
<td>Shalabhasana</td>
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<tr>
<td>Yoga Mudra</td>
<td>Dhanurasana</td>
<td>Dhanurasana</td>
</tr>
<tr>
<td>Vakrasana</td>
<td>Paschimottana</td>
<td>Paschimottana</td>
</tr>
<tr>
<td>Shirshasana</td>
<td>Vakrasana</td>
<td>Ardha-Matsyendra</td>
</tr>
<tr>
<td>Kapalbhati (5 rounds)</td>
<td>Kapalbhati (10 rds)</td>
<td>Kapalbhati (25-40 rounds)</td>
</tr>
<tr>
<td>Anulom Viloma (5 rounds)</td>
<td>Anulom Viloma (10 rounds)</td>
<td>Anulom Viloma</td>
</tr>
<tr>
<td>Bhramari (5 rounds)</td>
<td>Dhyana</td>
<td>Ujjayi</td>
</tr>
<tr>
<td>Omkar (5 rounds)</td>
<td>Omkar</td>
<td>Omkar</td>
</tr>
</tbody>
</table>

Note: Every Saturday in the morning session shuddi kriyas (jalneti, sutraneti and vaman) were practiced by the experimental group where a yoga component has been included.

Description of Training Interventions

YOGA PRACTICES

SHAVASANA

Introduction

In this asana the body remains completely relaxed on the floor. In Sanskrit “Sava” means “a dead body” and “asana” indicates “a stable and comfortable posture.” This is a traditional asana mentioned in the Hathapradipka (I –32) and the Gheranda Samita (II-19).
Stages and Preparation

- The starting position was resting on the back (supine decubitus) with the legs together. The hands remain by the side of body with the palms resting on the floor.

- Slowly, separated the legs up to 30 or 40 cm. and stop there. Relaxed the feet so that the toes remain pointing outwards.

- Opened the arms very slowly up to 30 cm. from the body and stop there. The hands were relaxed so that the palms are facing upwards.

- Then relaxed the head and the whole body. The eyes were closed and relax. To concentrate the subjects were asked to feel the heart, the touch of the air on the nostrils and the breathing movements.

- The subjects were asked to keep a natural deep breath throughout the practice and went further relaxed.

- The posture was maintained for some time and came back to the initial position slowly by reversing the steps.

ARDHAHALASANA

Introduction

It is a preparation for the complete plough posture (Halasana). In Sanskrit “ardha” means “half”.

Stages

Preparation – The starting position was resting on the back (supine dicubitus) with legs together. The arms remained by the side of the body with the hands on the floor.

- The subjects raised the right leg without bending at the knees up to 30 degrees, 60 degrees and 90 degrees and stopped there for a few seconds.

- Remained at 90 degrees and waited for some time.
• Came back slowly and rested for a while.

• Started with the other leg.

• The same movements were repeated with both legs together.

• The posture was maintained according to one’s capacity.

• The subjects relaxed in shavasana.

**HALASANA**

**Introduction**

It is a traditional posture in which the body imitates the shape of a plough. In Sanskrit “hala” means “plough” and “asana” indicates “a stable and comfortable posture”. This asana benefits all the body by increasing the spine flexibility. While practicing one should not force to reach the final position but maintain the comfortable point. Flexibility will increase day by day naturally.

**Stages**

Preparation – The starting position was resting on the back (supine dicubitus) with the legs together. The arms were kept by the side of the body with the hands on the floor.

• Raised both the legs without bending at the knees up to 30 degrees and stopped there for a few seconds.

• Raised the legs slowly up to 60 degrees and stopped again for a few seconds.

• Then the legs were raised up to 90 degrees and stopped for a few seconds.

• The subjects were asked to go further bringing the legs towards the head by lifting the buttocks from the floor till the toes of the feet touched the floor over the head. The subjects felt that the stretching at the lumbar sacral region and the toes kept further if possible till the stretching was felt at thoracic and cervical region.
• Then the hands were placed over the head.

• The chin was placed in the glottis as in the chin lock (Jalandhara Bandha).

• This posture was maintained according to one's capacity and came back to the initial position slowly by reversing the steps.

• The subjects were asked to relax in shavasana.

ARDHASHALABHASANA

The asana is a simple form of Shalabhasana originated by Swami Kuvalayanandaji. The main aim of the asana is to train the beginner to perform salabhasana or who are unable to perform shalabhasana.

Technique

• To lie down in prone position with the legs together and hand by the side of the body with the closed fist.

• The chin brought forward and placed it on the ground.

• Right leg was raised slowly without bending at the knees. It was asked not to tilt the pelvic and maintained it for a while.

• The subjects were asked slowly to return to the original position.

• It was asked to repeat the same movements with the other leg. This was one round of Ardha - Salabhasana.
SHALABHASANA

Posture

Shalabh means 'locust' as the position of the body in the asana appears to be like that of a locust. However the practice of Ardha Shalabhasana will be helpful to learn Shalabhasana.

Pre position

Same as in Ardha Salabhasana.

Procedure

- Some as in Ardha Salabhasana the only difference between these two asanas is that in the Salabhasana both the legs lifted simultaneously unlike one in Ardha Shalabhasana.

- Further because of high strain on legs the duration of this asana is less than Ardha Shalabhasana.
YOGA MUDRA
YOGA MUDRA

Introduction

In Sanskrit “Yoga” indicates “union” and here “Mudra” means “symbol” or “attitude”. Swami Kuvalayananda indicated it under the “four additional exercises.” The exercise is named Yoga Mudra as it is traditionally believed to be of help in the attempt for the awakening of intelligence and consciousness in man. This type of “nervous system training” was named “nerve culture” by Swami Kuvalayananda.

Stages

Preparation – This practice was done by sitting down with the legs folded by keeping the right foot on the left thigh and the left foot on the right thigh as in Padmasana.

- The subjects were asked to clasp both hands at the back on the lumbar area.
- Bent forward slowly and tried to repose flat upon heals touching the floor with the forehead. The subjects felt that heels were given a mild pressure to the abdomen.
- Normal breathing was done during the practice and were asked not to overdo it.
- Maintained the posture for some time and came back slowly to the initial position by reversing the steps.
- It was asked the subjects to concentrate on the inner sensation and relaxed for a while.
- Repeated this movement conveniently. It was asked to alternate the position of the feet in the foot lock.
AKRASANA

Posture

In the asana the subject is asked to twist the spine to the right and left side from its erect position alternatively.

Pre position

The subjects were in long sitting position keeping the spine straight.

Procedure

- The subjects were asked to bend the left leg at the knees and placed the heel near the thigh. Kept the sole of the left foot flat on the floor and the thigh and the knees touched to the chest.

- Placed the left hand in front of the right hand in such a way that the fingers of both the palms faced each other and the palms remained flat on the floor.

- The subjects turned their neck and the trunk to the right side, by twisting the spine and looked back above the shoulder. This posture was continued smoothly and normal breathing was done.

SHIRSHASANA

Technique

For practice of shirshasana use extra padding, so the subjects were asked to perform this asana on soft bed over yoga mate. As the asana is difficult one the subject were asked to perform the asana in the two stages.
Stage 1 (For Beginners)

- The subjects spread a mat into a corner, kneel down in front of it and placed interlocked fingers in the corner close to the walls.

- The subjects kept their head into the hollow of the palms, raised off the knees and took a step or two towards the corner.

- Lift one leg and placed it in the corner against the wall. If the subject was little unsure, ask other subject to held the leg and kept it in the corner. Then kicked the other leg up. The subject stayed there for about 15 seconds and tried to remain relaxed.

- To come out of the headstand, the subject was asked to lower one leg at a time. Again, if the subject was unsure, ask other subject to held one of the legs while lowering the other leg.

Start off in the headstand for about 15 seconds. Increase the time by 15 seconds every week until the subject is doing three minutes.

Stage 2 (The Standard Headstand)

- The subject was asked to kneel down on the mat. Interlock the fingers of the hands and place them and the forearms on the extra padding on the yoga mat. Keep the elbows fairly close together.

- Place the back of the head into the hollow of the palms (not on the palms or fingers). Rise up off the knees and took a step or two towards the head.

- The subject was asked to inhale, and slowly raise the legs until they are vertical. The back was kept straight and tries to relax. The subject was asked to breathe slowly and deeply from the abdomen.

- Concentrate on the brain or the pineal gland between the eyebrows.
• To come down, the subject bent the knees and lower one leg and then the other leg. As for the beginners' stage, start off in the headstand for about 15 seconds and increased the time by 15 seconds every week, until the subjects are doing three minutes.

VIPARITKARANI

Introduction

In this “mudra” the body remains inverted, standing upside down. In Sanskrit “viparita” means “inverted” and “karani” means “action”. This posture is also known as “topsy turvy posture”. This is a traditional asana mentioned in the Hathapradipika (iii 76-81) and the Gheradasamhita (iii 30-32) under the mudras. It can be also included under the balancing postures. The benefits of it are very similar to Sarvangasana but this posture is easier.

Stages

The starting position was resting on the back (supine dicubitus) with the legs together extended forward. The hands remain by the side of the body with the palms resting on the floor.

• Both the legs were together up to 30 degrees and stopped there for a few seconds.

• Further it was raised both legs very slowly up to 60 degrees and stopped for few seconds.

• Then the legs were raised the legs up to 90 degrees and stopped for few seconds once more.

• The subjects further brought the legs towards the head by lifting the buttocks from the floor.

• The subjects were kept the elbows on the floor and gave support to the back with the palms on the lumbar area.

• Legs were straightened the legs up comfortably to concentrate and gazed some point (as the toes for example) or closed the eyes.
• The posture was maintained according to one's capacity and came back to the initial position slowly by reversing the steps and relaxed.

SARVANGASANA

Introduction

In Sanskrit “Sarva” means “whole”, “anga” means “limb” and “asana” indicates “a stable and comfortable posture”. It is thought that this posture does influence positively the Thyroid gland. It is sometimes determined as a further development of Vipritkarni. It is occasionally included under the balancing postures. Swami Kuvalayananda considered it as a “Yogic Physical Culture” position in his book on asanas.

Stages

Preparation – The starting position was resting on the back (supine decubitus) with the legs together. The arms were kept by the side of the body with the palms resting on the floor.

• The subjects raised both legs without bending at the knees up to 30 degrees and stopped there for a few seconds.

• Then raised both legs slowly up to 60 degrees and stopped again for a few seconds.

• Then raised the legs up to 90 degrees and stopped for a few seconds once more.

• The subjects brought the legs towards the head by lifting the buttocks from the floor. The elbows were kept on the floor and gave support to the upper back with the palms.

• The subjects straightened their body up comfortably. Situate the chin on the glottis (Jalandhara Bandha).

• The posture was maintained according to one's capacity and came back to the initial position slowly by reversing the steps.

• Then relaxed in shavasana posture and concentrated on the inner sensation.
MATSYASANA

Introduction

It is a traditional meditative posture mentioned in the Gheranda Samhita (II 21). If this asana is properly done the student can float on the water. In Sanskrit “Matsya” means “fish” and “asana” indicates “a stable and comfortable posture”. This Asana can be practiced as the complementary of Sarvangasana.

Stages

Preparation—the starting position was resting on the back (supine dicubitus) with legs together. The arms remain relaxed and kept by the side of the body.

- In first step, the subjects sat in padmasana posture and then lean the body backward with the weight resting on the elbows.

- By adopting a back bending position, the top of the head was placed on the floor and the chest open.

- The subjects made a hook with the forefingers and held the opposite toes if possible.

- This posture was maintained according to one’s capacity and came back to the initial position slowly by reversing the steps.

- First the subjects returned to padmasana posture and then released the legs. After this the subjects relaxed in shavasana posture.
PASCHIMOTTANASANA

ARDHMATHYENDRASANA
BHUJANGASANA

Introduction

It is a traditional posture mentioned in the Gheranda Samhita (II 42) in which the body imitates the shape of a cobra. In Sanskrit “bujanga” means “cobra” and “asana” indicates “a stable and comfortable posture”. In the final position this asana resembles a hooded cobra standing straight. The snake is also a symbolic representation of the energy. A good complementary posture of Bhujangasana can be Halasana.

Stages

Preparation – The subjects were lying on prone position and rested on the chest (prone) with legs and toes together. The arms were remained by the side of the body with the hands relaxed and the chin on the floor.

- The subjects bent their arms and kept by the side of the chest with the palms resting on the floor near to the shoulders.
- The chin was brought up, head and chest from the floor.
- The subjects slowly raised their vertebra one by one so that the pressure on the spine moved step by step down to the pelvic bone.
- The posture was maintained comfortably for some time (approximately 15 to 20 seconds according to ones capacity). The subjects were asked to keep attention on the back muscles.
- The subjects came back to the initial position slowly by reversing the steps.
- Then the subjects relaxed in Makrasana posture.
DHANURASANA

Introduction

It is a posture in which the body is supposed to imitate the shape and stand of a bow. This traditional asana is mentioned in the Gheranda Samhita (II 18) and Hathapradipika (I 25) in Sanskrit “Dhanus” means “bow” and “asana” indicates “a stable and comfortable posture”. Dhanurasana can be considered as a combination of Bhujangasana and Shalabhasana.

Stages

Preparation – The subjects were lying on prone position and rested on the chest (prone) with the chin on the floor. The legs were together and arms were kept by the side of the body.

- The subjects slowly bent the knees, brought their heels nearer to the back and held both ankles with their respective hands.
- The subjects pulled their ankles from the back and raised the chest and legs till the body remained on the abdomen, the spine got stretched backward.
- The subjects were asked to maintain a normal breathe during the practice. After some time the subjects relaxed in the posture.
- This posture was maintained for one minute and came back to the initial position by reversing the steps and relaxed in shavasana.

PASCHIMOTTANASANA

Introduction

This posture is called Paschimottanasana because it generates in almost all the body a gentle but wide back stretching. It is a traditional asana mentioned in the Hathapradipika as “Paschimatan” (I 28-29) and in the Gheranda Samhita as “Paschimottana” (II 26). The Siva Samhita describes a difficult variation of it as “Ugrasana” in (III 111-112). In Sanskrit
“Paschima” indicates “back”, the root “tan” means, “to stretch” and “asana” indicates “a stable and comfortable posture”. Swami Kuvalayananda included it under the “Yogic physical culture positions”.

**Stages**

Preparation - This practice was done by long sitting position on the floor with a straight back and the legs were extended together. The arms were relaxed and kept by the sides of the body with the hands on the floor.

- The subjects were asked to lift the arms slowly and bent forward to clasp the toes or ankles.
- The subjects were asked to bend further with a gentle stretch to place the head nearer to the knees and elbows were kept on the floor if possible. Bent forward from the pelvic area. It was instructed the subjects not force the spine at the thoracic vertebra.
- The posture was maintained for some time while breathing and relaxed.
- The subjects came back slowly to the initial position by reversing the steps one by one.
- After coming back to normal position the subjects were asked to relax in shavasana posture.

**ARDHAMATSYENDRASANA**

**Introduction**

It is a traditional asana mentioned in the Hathpradipika (I 27) and the Gheranda Samhita (II 22 – 23) “Matsyendra” comes from a famous Yogi (Hathayogi) Matsyendranath who was one of the yoga pioneers, and “asana” indicates “a stable and comfortable posture”. Because the complete Matsyendrasana is quite a difficult posture it is not popular and the half one is usually practiced.
Stages

Preparation – The starting position was sitting with the legs extended together. The arms relaxed by the side of the body and the palms were kept on the floor.

- Slowly bent the right leg horizontally and place the right feet on the waist line over the left groin.

- Bent the left leg vertically and place it on the right side of the right knee with the sole on the floor.

- If possible held the right foot (from the back) with the left hand. Then pulled the left shoulder back towards the left.

KAPALBHATI

It is classified as one of the six processes in Yoga. “Kapala” in Sanskrit means forehead and “bhati” means to shine hence the name. It removes impurities from the passages of the nostrils and the sinuses by the forceful current of the air. This is done in sitting position by a foot lock, placing of the right foot on the left thigh and left foot on the right thigh. Place the hands on the knees. Sit erect. Exhale suddenly and forcibly giving an inward stroke at the naval region. Let the abdomen relax and simultaneously inhale. In the beginning practice 10 – 20 rounds of Kapalabhati. The number of strokes and the speed may be increased as one gets used to the practice.

Stages

Starting position

The subjects were sitting with the legs extended together, placed the right foot on the left thigh and similarly placed the left foot on the right thigh. The subjects placed their hands on the respective knees.

- Raised the chest a little and sit erect.
• The subjects were asked to exhale suddenly giving an inward stroke at the naval region.

• Relax the abdomen completely and inhale.

• The subjects were asked to repeat the forceful exhalation and inhalation a number of times comfortably.

• Then the subjects were asked to lower their chest and release the hands from the knees.

• Removed the left foot from the right thigh and extend it.

• Removed the right foot from the left thigh and came back to starting position.

ANULOM-VILOM

The pranayama is called as Nadishodhak by Swatmarama According to him practicing of this pranayam for continually three month will parfie the nades. However the pranayam is mostly known as Aulom – Vilom.

Pre Position

• The subject is asked to sit in padamasan or in any comfortable sitting position

• The subject is asked to place right hand near the nose, to put the thumb on the right nostril keeping ring finger near the left nostril.

Procedure :

• The subject is asked to take a prolomg inhale through the left nostril closing the right nostril with the thumb.

• Then the subject is asked to exhale through the right nostril closing the left nostril with the ring fingers and removing the thumb.
• Then the subject is asked to inhale prolong through the same nostril

• Then the subject is asked to exhale through the left nostril by removing the ring fingers from the left nostril and closing the right nostril.

NOTE :

Time for exhalation should be double that of inhalation.

BHARAMARI PRANAYAMA

Introduction

As the name indicate this pranayam is named after an insect Bhramar and the sound which it produce that means in this pranryam the subject is asked to create the sound of 'humming bee'

Pre position

• The subject is asked to sit in padamasana or in any comfortable sitting position.

• The subject is asked to close both the ear with the both thumb of both and hand and the finger on closed eyes and face.

Procedure

After taking the position the subject is asked to take prolong inhale then lock it on throat and produce the sound like 'humming bee'. However these possible after continued practice. The sound produce will be with constant pace without any ups and down and cleared and pleasing to ears.
ANULOM - VILOM

BHRAMARI PRANAYAMA
**UJJAYI**

This is one type's meditations on sound. The asana tives a feeling of presence of diving power means step to perform this prenoyst are is of done correction.

- The is asked sit in medective or dhygone positive with spine and head erect
- Close thier eyes and take a long
  - It makes the respiratory apparatus more strong. It activates thyroid region by increased awareness.

**Technique**

- The subjects sat comfortably in a meditative posture.
- Took a breath (thoracic) through both nostrils with partial closure of the glottis, in a controlled way.
- Retained in breath and then exhaled through the left nostril again with partial closure of the glottis, slowly and rhythmically. (Pratap, 1987: 88-89)

**OMKAR**

This is one type meditation Om sound. The asana gives a feeling of presence of diving power, Bramhan, if done correctly. The Step to perform pranayama are

- The is asked to sit in any meditative or dhyana posture with spine and head erect.
- Close thier eyes and take a long breath.
- Then start to chanting OM mentally without any breaking for at least for 10 minutes
Designing Naturopathy treatment Schedule

The naturopathy treatment was designed on the basis of following:

- Naturopathy tends to cure all kinds of ailments through natural resources in altering dietary habit. These modifications in diet and treatment through natural resources help to provide relief from the symptoms of obesity and lead a better lifestyle.

- It helps to lose weight in achieve and ideal body shape gradually

- Naturopathy helps to achieve the person, its normal body shape without any side effects and without any use up medicine.

COMPOSITION OF NATUROPATHY TREATMENT

Based on research report (Garrow and Egede, 2006; Ben et. al., 2009) and as per suggestion of experts available in the National Institute of Naturopathy, Pune (India), following naturopathy training schedule have been formulated:

- Cold hip bath
- Warm water enema
- Fasting on liquid food for 3-4 days.
- Under water massage
- Steam and sauna bath
- Warm water immersion
- Life style modification
NATUROPATHY TREATMENT

COLD HIP BATH

It is a type of hydrotherapy treatment. The patient is asked to sit in tube in such a way that his body up to navel from below is immersed in water. Hip bath is given in hot, cold, neutral and other temperature.

Procedure

- For cold hip bath, maintain the water temperature at 10 to 18 C for a period of 10-15 minutes, sometimes up to half an hour.
- If the patient feels cold then immediately hot foot immersion bath is advised along with cold hip bath.

WARM WATER ENEMA

Equipment for Enema

The equipment for enema consists of an enameled container for water, a plastic tube about 5 feet in length, a tap for regulating the flow of water, and a catheter, or nozzle.

Method of Enema

- Lie down on a hard bed; the foot of the bed must be four inches higher than the head. Of course, you can take enema while lying on the floor, but in that case your buttocks should be higher than the rest of your body in order to facilitate the introduction of the liquid through the rectum.
SAUNA AND STEAM BATH

Saunas and steam baths are similar in effect; the decision to take one rather than the other will be guided by personal preference. In a sauna the heat acts more quickly to eliminate toxins through the skin, though some consider the moist air of a steam bath to have a more satisfying effect on the respiratory system. Saunas are deeply relaxing and are a great way to melt away stress. It improve mental outlook. Children can start to take saunas at two or three years of age.

Warning: It should be person under the guidance of supervision only

DESCRIPTION OF TESTS MEASURING DEPENDENT VARIABLES

MORPHOLOGICAL VARIABLES

BODY MASS INDEX (BMI)

Equipments used

Weighing machine was used to measure body weight in Kilograms and stadiometer for measuring body height in Meters.

Method of Measurement

Body weight was measured on a weighing machine in Kilograms, where the subjects wear a light dress without shoes. The subjects were directed to stand straight on the weighing machine and instructed to look front. Further body height was measured on a stadiometer which was normally kept nearby a wall. The subjects stood straight keeping equal weight on both legs and looked forward. A flat plate slides on the vertical scale was pressed on the head and then the subject was instructed to come out. The flat plate indicates a marker on the scale which was a score of the subject’s height.
Scoring

Body weight was recorded in Kilograms, whereas height was measured in Meters.
Thus, \(\text{BMI} = \text{body wt.} / \text{height}^2\).

**BODY FAT %**

Omron Body Fat Monitor (model HBF-362) was used to measure the body fat. in percentage.

Procedure

After setting the data, such as height, weight and age body fat mass was measured by simply holding the grip electrodes and pushing the start button. The measured results were displayed approximately seven seconds after the start screen was displayed.

**Body fat Measurement**

OMRON BODY FAT MONITOR

Fig. 1
Recommendation for taking a measurement

If the palms of hands were dry or the temperature of palms or the grip of the electrodes were extremely cool, stable measurement is impossible, which may lead to display error indication or inaccurate results.

ABDOMINAL GIRTH

Equipment Used

Flexible metal tape and pen for marking the skin.

Procedure

The waist measurement was taken at the narrowest waist level. Measure abdominal circumference at the level of the umbilicus (belly-button). When recording the tape was not too tight or too loose, was lying flat on the skin, and was horizontal.

HIP GIRTH

Equipment Required

Flexible metal tape measure and pen suitable for marking the skin.

Procedure

The hip girth measured, at the level of the greatest protrusion of the gluteal (buttock) muscles. When recording, the tape was not too tight or too loose, was lying flat and was horizontal. It was better that the subject stood on a box to take the measurement easier.
PHYSIOLOGICAL VARIABLES

BLOOD PRESSURE

Proper care was taken before blood pressure measurement as physical exertion and anxiety can cause rise in blood pressure substantially. Therefore subject was asked to lie down for ten minutes prior to blood pressure measurement. The sphygmomanometer was placed on a bench in such a position that the subject was unable to see the readings. Blood pressure was recorded after the subject has rested quietly for ten minutes, and this measure should precede all other measures. This process was done automatically with the digital blood pressure monitor.

Scoring

Blood pressure was recorded in the units of millimeters of mercury (mm Hg). Normal blood pressure is approximately 120 systolic and 80 diastolic, for both men and women.

BLOOD PRESSURE MONITOR

Fig. 2
PULSE RATE

The digital blood pressure monitor was having facility to record pulse rate which was used to record blood pressure. Scoring was recorded in number of beats / minutes.

BIOCHEMICAL VARIABLES

CHOLESTEROL

*(Kit Used: Accucare, Method: Enzymatic, Equipment Used: Statfax-2000 USA)*

Test Procedure

Pipette into test tubes:

<table>
<thead>
<tr>
<th></th>
<th>Blank</th>
<th>Standard</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>-</td>
<td>-</td>
<td>10 µl</td>
</tr>
<tr>
<td>Standard</td>
<td>-</td>
<td>10 µl</td>
<td>-</td>
</tr>
<tr>
<td>Reagent</td>
<td>1000µl</td>
<td>1000µl</td>
<td>1000µl</td>
</tr>
</tbody>
</table>

Mixed, incubated for 5 minutes, at 37°C and measured absorbance of sample and standard against reagent blank at 505 nm.

Linearity

The method is linear up to a concentration of 1000 mg/dl.

TRIGLYCERIDE

*(Kit used: Accucare, Method: GPO/POD Enzymatic, Equipment used: Statfax-2000 USA)*

Test Procedure

All the reagents of assay were brought to room temperature. Working assay table is as follows:
<table>
<thead>
<tr>
<th></th>
<th>Blank</th>
<th>Standard</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>-</td>
<td>-</td>
<td>10 µl</td>
</tr>
<tr>
<td>Standard</td>
<td>-</td>
<td>10 µl</td>
<td>-</td>
</tr>
<tr>
<td>Enzyme Reagent</td>
<td>1000µl</td>
<td>1000µl</td>
<td>1000µl</td>
</tr>
</tbody>
</table>

Mixed well and incubated for 10 minutes at 37°C. Measured the absorbance of standard and sample against the reagent blank at 546 nm.

**Linearity**

The method is linear up to a triglyceride concentration of 1000 mg/dl.

**STATFAX 2000 BIOCHEMISTRY ANALYSER USED FOR ANALYSIS OF BIOCHEMICAL VARIABLES**

Fig. 3
HIGH DENSITY LIPOPROTEIN (HDL)

*(Kit used: Agappe, Method: Precipitation, Equipment used: Statfax-2000 USA)*

Test Procedure

Precipitation

<table>
<thead>
<tr>
<th>Sample</th>
<th>300 µl</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDL reagent</td>
<td>300 µl</td>
</tr>
</tbody>
</table>

*Mixed well, allowed to stand for 10 min. at room temperature, mixed again and centrifuged for 10 min. at 4000 rpm. After centrifugation, separated the clear supernatant from the precipitate within 1 hour and determined the HDL Cholesterol concentration using the cholesterol reagent.*

HDL Cholesterol determination

<table>
<thead>
<tr>
<th></th>
<th>Blank</th>
<th>Standard</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol reagent</td>
<td>1000 µl</td>
<td>1000 µl</td>
<td>1000 µl</td>
</tr>
<tr>
<td>Standard (HDL)</td>
<td>-</td>
<td>50 µl</td>
<td>-</td>
</tr>
<tr>
<td>HDL Supernatant</td>
<td>-</td>
<td>-</td>
<td>50 µl</td>
</tr>
</tbody>
</table>

*Mixed well and incubate for 5 minutes at 37°C. Measured the absorbance of the standard and sample against the reagent blank.*

LOW DENSITY LIPOPROTEIN (LDL)

The Friedewald’s equation was used to calculate VLDL (very low density lipoprotein) and LDL (Low Density Lipoprotein) cholesterol levels in a lipoprotein estimation test. In this method, total cholesterol, triglycerides and HDL cholesterol were directly estimated using reagents.

\[
\text{LDL} = \text{Total cholesterol} - (\text{HDL} + \text{VLDL})
\]

VERY LOW DENSITY LIPOPROTEIN (VLDL)

The very low density lipoprotein was assessed from the levels of triglyceride

\[
\text{VLDL} = \text{Triglyceride}/5
\]
LEPTIN

(Kit used: Millipore, USA, and Method: Elisa, Equipment used: BIO-RAD 680 plate reader, BIO-RAD Pw-40 washer)

Test Procedure

- Pre-warmed all reagents to room temperature immediately before setting up the assay.
- Diluted the concentrated Wash Buffer 10 fold by adding the entire contents of both bottles of buffer to 900 mL de-ionized or glass distilled water.
- Removed required number of strips from the Microtiter Assay Plate. Unused strips were resealed in the foil pouch with the desiccant provided and stored at 2-8°C.
- Assembled all strips in an empty plate holder and add 300 µL of diluted Wash Buffer to each well. Incubate at room temperature for five minutes. Decant wash buffer and remove the residual amount from all wells by inverting the plate and tapping it smartly onto absorbent towels several times. It was taken care that the let wells dry before proceeding to the next step.
- Added 75 µL Assay Buffer into all wells.
- Added in duplicate 25 µL Assay Buffer to blank wells.
- Added in duplicate 25 µL Human Leptin Standards in order of ascending concentration to the appropriate wells. Added in duplicate 25 µL QC1 and 25 µL QC2 to the appropriate wells. Added sequentially 25 µL of samples in duplicate to the remaining wells. For best results all additions were completed within one hour.
- Covered the plate with plate sealer and incubate at room temperature for two hours on an orbital microtiter plate shaker was set to rotate at moderate speed, about 400 to 500 rpm.
- Removed plate sealer and decant solutions from the plate. Taped as before to remove residual solutions in the wells.

- Wash wells three times with diluted Wash Buffer, 300 µL per well per wash. Decant and tap after each wash to remove residual buffer.

- Add 100 µL Detection Antibody to each well. Covered the plate with sealer and incubate at room temperature for 30 minutes on the microtiter plate shaker.

- Removed sealer and decant solution from the plate. Taped as before to remove residual solutions in the wells.

- Added 100 µL Enzyme Solution to each well. Covered plate with sealer and incubate with moderately shacked at room temperature for 30 minutes on the microtiter plate shaker.

- Removed the sealer, decant solution from the plate, and taped plate to remove the residual fluid.

- Wash wells five times with diluted Wash Buffer, 300 µL per well per wash. Decant and taped firmly after each wash to remove residual buffer.

- Added 100 µL of Substrate Solution to each well, covered the plate with sealer and shaked on the plate shaker for ~five minutes. Blue color was formed in wells of Leptin standards with intensity proportional to increasing concentrations of Leptin.

- Removed sealer and add 100 µL of Stop Solution and shacked the plate by hand to ensure complete mixing of solution in all wells. The blue color was turned to yellow after acidification. Read absorbance at 450nm and 590nm in a plate reader within five minutes and it was ensured that there were no air bubbles in any well. Then it was recorded the difference in absorbance units.
Blood Analysis
BIO-RAD ELISA PLATE READER USED FOR ANALYSIS OF LEPTIN

Fig. 4

BIO-RAD PW 40 WASHER

Fig. 5
Statistical procedure

Descriptive statistics have been applied to process the data prior to employing inferential statistics. Since there were four equated groups (namely yoga, naturopathy, yoga plus naturopathy and control) participated in different training interventions for a particular duration of time, where the nature of the variables were different (that is: morphological, physiological and biochemical attributes to obesity), the data were analyzed by employing “ANCOVA” (Analysis of Covariance) followed by Scheffe’s post-hoc test.
REFERENCES


