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 effects of varied packages of yogic practices on selected motor ability components, physiological, hematological and bio chemical variables among college men students. To achieve this purpose of the study, sixty college men students studying in Sir Theagaraya College, Chennai, SRM College of Arts and Science, Chennai and Patrician College, Chennai, Tamil Nadu, India were randomly selected as subjects. The age of the subjects were ranged between 18 to 24 years. The selected subjects were divided in to three equal groups of twenty subjects each. Group I underwent first packages of yogic practices and Group II underwent second packages of yogic practices for five days per week for twelve weeks. Group III 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 out in the study.

3.2. SELECTION OF VARIABLES

3.2.1. Independent Variables

Yoga is universally benefitting 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 first and second packages of yogic practices were selected as independent variables.

3.2.2. Dependent Variables

The following motor ability components, physiological, hematological and bio chemical variables namely flexibility, cardio
respiratory endurance, resting pulse rate, breath holding time, hemoglobin, red blood corpuscles, total cholesterol and blood sugar were selected as dependent variables.

3.3. SELECTION OF TESTS

The present study was aimed to find out the effects of varied packages of yogic practices on selected motor ability components, physiological, hematological and biochemical variables namely flexibility, cardio respiratory endurance, resting pulse rate, breath holding time, hemoglobin, red blood corpuscles, cholesterol and blood sugar. 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 I.
TABLE I
SELECTION OF TESTS

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Criterion Variables</th>
<th>Test Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Flexibility</td>
<td>Sit and Reach Test</td>
</tr>
<tr>
<td>2.</td>
<td>Cardio Respiratory Endurance</td>
<td>Cooper’s 12 min Run/Walk test</td>
</tr>
<tr>
<td>3.</td>
<td>Resting Pulse Rate</td>
<td>Radial Pulse</td>
</tr>
<tr>
<td>4.</td>
<td>Breath Holding Time</td>
<td>Holding the breathe for Time</td>
</tr>
<tr>
<td>5.</td>
<td>Hemoglobin</td>
<td>K.M. Samuel method of blood testing</td>
</tr>
<tr>
<td>7.</td>
<td>Total Cholesterol</td>
<td>Zak’s method of blood testing</td>
</tr>
<tr>
<td>8.</td>
<td>Blood Sugar</td>
<td>Asatoor and king method of blood testing</td>
</tr>
</tbody>
</table>

3.4. INSTRUMENTS RELIABILITY

The required instruments like sit and reach box, stop watch, measuring tape were procured from the Human Resource Laboratory in the Sir Theagaraya College, Chennai, Tamil Nadu, India. All the instruments used for testing the dependent variables were in good condition and purchased from the reputed and reliable companies. Their calibrations were tested and found to be accurate enough to serve the purposes of the study.
Qualified assistants were made use to find out the selected hematological and bio chemical variables namely hemoglobin, red blood corpuscles, cholesterol and blood sugar.

3.5. COMPETENCE OF THE TESTER

While testing the criterion variables, the researcher was assisted by Physical Directors, Sir Theagaraya College, Chennai, SRM College of Arts and Science, Chennai and Patrician College, Chennai. 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. Qualified assistants were made use from Appolo Diagnostic Centre, Chennai to measure the selected hematological and bio chemical variables namely hemoglobin, red blood corpuscles, cholesterol and blood sugar.

3.6. RELIABILITY OF THE DATA

The reliability of the data was established by test-retest method. Ten subjects were selected from the Sir Theagaraya College, Chennai, SRM College of Arts and Science, Chennai and Patrician College, Chennai, Tamil Nadu, 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 II.

### TABLE II

**INTRACLASS CO EFFICIENT OF CORRELATION VALUES ON SELECTED CRITERION VARIABLES**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Tests / Variables</th>
<th>'R' Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sit and Reach Test</td>
<td>0.90*</td>
</tr>
<tr>
<td>2.</td>
<td>Cooper’s 12 min Run/Walk test</td>
<td>0.94*</td>
</tr>
<tr>
<td>3.</td>
<td>Radial Pulse</td>
<td>0.92*</td>
</tr>
<tr>
<td>4.</td>
<td>Holding the breath for Time</td>
<td>0.93*</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 yogic exercises. It was useful to them while performing the yogic exercises 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 and Group II underwent first package of yogic practices and second package of yogic practices respectively for five days per week for twelve weeks of the training programme. In every day training session, the work out lasted approximately between 45 minutes and an hour, which included warming up and limbering down. Group III 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 groups underwent their respective training programmes under the supervision of the researcher. The subjects were carefully monitored and questioned about their health status through out the training programme. None of the subjects have reported any injury. The training schedules for the experimental groups were designed and are presented in appendix I & II respectively.
**PACKAGE - 1**

The package 1 is beginners level and can do easily. This package helps to bring the body in elastic mood. They not only improve the elasticity of the body but also its flexibility. It reduces the body stiffness. The spine or the back of the body is strengthened. They improve the breathing capacity of the lungs and improve the proper functioning of all the inner organs.

**PACKAGE - 2**

The next 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 develop 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.
3.9. YOGIC EXERCISES

3.9.1. Surya Namaskar (Salutation to the Sun)

1 - INHALATION

E - EXHALATION

E&K - EXHALE AND HOLD BREATH
Position 1:
Stand erect with the feet together. Place the palms together in front of the chest. Relax the whole body.

Breath: Normal.

Position 2:
Raise both arms above the head. Keep the arms separated by one shoulder’s width. Bend the head upper trunk backward.

Breath: Inhale while raising the arms.

Position 3:
Bend forward until the fingers or hands touch the ground on either side or in front of the feet. Try to touch the knees with forehead. Do not strain. Keep the legs straight.

Breath: Exhale as you bend forward. Try to contact the abdomen in the final position to expel the maximum amount of air.

Position 4:
Stretch the right leg back as far as possible. At the same time bend the left knee but keep the left foot in the same position. The arm should remain straight and in the same position. In the final position, the weight of the body should be support on the two hands, the left foot, the right knee and the toes of the right foot.
The head should be tilted backward, the back arched and the gaze directed upward.

**Breath** : Inhale while stretching the right leg backward.

**Position 5**

Straighten the left leg and place the left foot beside the right foot. Raise the buttocks in the air and lower the head so that it lies between the two arms; the body should form two side of a triangle. The legs and arms should be straight in the final position. Try to keep the heels in contact with the ground in this pose.

**Breath** : Exhale as you straighten the left leg and bend the trunk.

**Position 6**:

Lower body to the ground so that in the final position only the toes of both feet, the two knees, the chest, the hands and chin touch the ground. The hips and abdomen should raised slightly off the ground.

**Breath** : The breath should held outside. No respiration.

**Position 7**:

Raise the body from the waist by straightening the arms. Bend the head backward. The stage is same as the final position of bhujangasana.

**Breath** : Inhale while raising the body and arching the back.
Position 8:
This stage is a repeat of position 5. From the arch back position assume the mountain pose as described in position 5.

**Breath**: Exhale as you raise the buttocks.

Position 9:
This stage is same as position 4. Bend the left leg and bring the left foot forward so that it lies near the hands. Simultaneously lower the right knee so that it touches the floor.

**Breath**: Inhale while assuming this pose.

Position 10:
This stage is repeat of position 3. Place the right foot next to the left foot. Straighten both legs and try to bring the forehead as close to the knees as possible. Do not strain if you are unable to touch the knees but do not bend the legs.

**Breath**: Exhale while performing the movement.

Position 11:
This stage is a repeat of position 2. Straighten the whole body and raise the arms above the head. Keep the arms separated by one shoulder’s width. Bend the head and arms backward slightly.

**Breath**: Inhale as you straighten body.
Position 12:
This is the final pose and is the same as position 1. Bring the hands in front of the chest and place the palms together. Relax whole body.

**Breath:** Exhale as you assume the final pose. *(Swami Sathyananda Saraswati, 1993)*

3.9.2. Padmasana (the lotus pose)

Sit with the legs extended forward, fold one leg and place its foot on the top of the opposite thigh. The sole of the foot must be
upward and the heel should touch the pelvic bone. Fold the other leg and place its foot on top of the other thigh.

**Breath**: Normal breathing.

### 3.9.3. Vajrasana (the thunderbolt pose)

Stand on the knees with the feet stretched backward and big toes crossed. The knees should be together, heals 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.
3.9.4. Trikonasana (the triangle stretch pose)

Stand erect with the feet about 3 feet apart. Raise the arms sideways to form one straight line. Turn the body to the left while bending the knees slightly. Bring the left hand to the left foot, keeping the two arms in line with each other. Return to the standing position, keeping the arms in a straight line. Repeat to the opposite side. Practice 5 times.

**Breath**: Inhale while raising the arms. Exhale while bending. Inhale straightening to the vertical position.
3.9.5. 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

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.

3.9.7. *Halasana (the plough pose)*

Lie flat on the back with the arms straight and beside the body, palms facing downward. Keeping the legs straight, slowly raise them to the vertical position above the body. Only use the stomach muscles to raise the legs. Do not use the arms. Simultaneously bend the trunk upward, hips first. Slowly lower the legs over the head and touch the floor with the toes of both feet.
Keep the leg straight, bend the arms and place the hands on the back as in sarvangasana. Relax the body.

**Breath:** Retain the inside while assuming and returning from the pose. Breathe slowly and deeply in the final pose.

### 3.9.8. Matsyasana (the fish pose)

Sit in padmasana. Bend backward, supporting the body with the arms and elbows, until the crown of the head touches the ground. Hold the big toes and rest the elbows on the floor. Arch the back as much as possible. Remain in the final pose up to 5 minutes. Do not strain.

**Breath:** Breathe deeply and slowly in the final pose.
3.9.9. 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.
3.9.10. Shalabhasana (the locust pose)

Lie on the stomach with the hands under the thighs, palms facing downward. Stretch the legs and tense the arms. Raise the legs and abdomen as high as possible without bending the legs. Practice up 5 times.

**Breath:** Inhale deeply in the lying – down position. Retain the breath inside while raising the legs and abdomen. Exhale while returning to the starting position.

3.9.11. Uthana Padhasana (Raised Leg Pose)

Lie down. Keep the both legs together. Keep the legs straight and the hands by your sides, the palms facing the ground. Close the fingers. Both the feet should point outwards. Raise the two legs together above half foot (6 inches) from the ground without bending the legs and the knees. Practice 2 or 3 times.

**Breath:** Normal breathing.
3.9.12. Ardha Shalabhasana (the half locust pose)

Lie on the stomach with the hands under the thighs, palms downward. Keep both legs straight throughout the asana. Raise one leg as high as possible, keeping the other leg flat on the floor. Retain this position for sometime and then lower the leg to the floor. Allow the respiration to return to normal. Repeat the same movement with the other leg.

**Breath:** Inhale in the prone position. Retain the breath inside while lifting the leg and in the final pose. Exhale while returning to the starting position. Breathe normally in the prone position.
3.9.13. Pawan Muktasana (wind releasing posture)

Lie down on the back. Keeping legs together, hug tightly the drawn up knees against the chest, so that the plane are placed on elbows. Raise the head and touch the chin with the knees. Keep the breath normal and toes stretching out side. Place the head on the ground when the neck gets tired.

**Breath:** Normal Breathing *(Vivekananda Kendra, 1972)*

3.9.14. 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.

**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.
3.9.15. *Maha Mudrasana*

Kneel on the floor. Keep the knees together and spread the feet. Rest the buttocks on the body of the feet. Keep the toes pointing back and touching the floor. Keep the back straight and the both legs should be flat. Holds the left hand by the right hand at the backside slowly bend forward. The forward should touch the floor. The chest and the stomach should lie on the thighs.

**Breath:** Normal breathing.

3.9.16. *Ardha Matsyendrasana (Half Spinal Twist Pose)*

Sit with the legs straight in front of the body. Place the right foot flat on the floor outside the left knee. Bend the left leg to the right and place the left heel against the right buttock. Place the left arm outside the right leg, and with the left hand hold the right foot or ankle. The right knee should be as near as possible to the left armpit. Turn the body to the right, placing the right arm behind
the back. Twist the back and then the neck as far as possible without strain. Remain in the final pose for a short time and then slowly return to the starting position. Change the legs and repeat to the other side.

**Breath** : Exhale while twisting the trunk. Breathe as deeply as possible without strain in the final pose. Inhale while returning to the starting position.

**3.9.17. Vipareeta Karani Mudra (the inverted attitude)**

The method is the same as for sarvangasana, expect the chin is not pressed against the chest in the final pose. The trunk is held at a 45 degree angle to the ground instead of at a right angle.
**Breath:** Retain inside which assuming and returning from this asana. Practise normal breathing when the body is steady in the raised position.

**3.9.18. 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.
3.9.19. Savangasana (the shoulderstand pose)

Lie flat on the back with the feet together, the arms by the sides and palms flat on the ground. Using the arms as levers raise the legs and back to a vertical position. Bend the elbows and use the arms as props to steady the back by pressing it with the palms. The trunk and legs should extend straight up, forming a right angle with the neck, the chest pressing the chin.

Breath: Retain inside which assuming and returning from this asana. Practice normal breathing when the body is steady in the position.

3.9.20. 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.

3.9.21. **Gomugasana (Cow’s Face Pose)**

Sit on the floor with the legs stretched straight in front. Place the palms on the floor and raise the seat. Bend the left knee back and sit on the left foot. Remove the hands from the floor, raise the right leg and place the right thigh over the left one. Raise the buttocks and with the help of the hands bring the ankles and the back of the heels together till they touch each other. Rest the ankle, keeping the toes pointing back. Raise the left arm over the head; bend it at the elbow and place the left palm below the nape of the neck between the shoulders. Lower the right arm, bend it at the elbow and raise the right forearm up behind the back until the right hand is level with and between the shoulder-blades. Clasp the
hand behind the back between the shoulders. Keep the neck and head erect and look straight ahead.

**Breath**: Normal breathing

### 3.9.22. *Supta Vajrasana (Supine Pelvic Pose)*

Sit in virasana. Exhale, recline the trunk back and rest the elbows one by one on the floor. Relive the pressure on the elbows one after the other by extending the arms. At first the crown of the head on the floor. Gradually rest the back of the head and then the back on the floor. Take the arms over the head and stretch them out straight. Hold this pose as long as you can while breathing deeply. The hands may be stretched over the head or placed beside the thighs. When they are stretched over the head, do not raise the shoulder blade from the floor.

**Breath**: Normal breathing

### 3.9.23. *Baddha Padmasana (Locked Lotus Pose)*

Sit in padmasana, exhale, swing the left arm back from the shoulders and bring the hand near the right hip. Catch the left big toe, hold he position and inhale. Similarly, with the exhalation, swing the right arm back from the shoulder, bring it near the left hip and catch the right big toe. If the toes are difficult to catch, stretch the shoulders back, so that the shoulder blades are brought
near each other. A little practice in swinging the arms back with an exhalation. Will enable one to catch the big toe. If the right foot is placed first over the left thigh and then the left foot over the right thigh, catch the left big toe first and then the right big toe. If, on the other hand, the left foot is placed over the right thigh first and then the right thigh, catch the right big toe first and then the left big toe. Catch first the big toe of the foot, which is upper most. Throw the head as far back as possible.

**Breath:** Take a few deep breaths.

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**3.9.24. Kurmasana (Tortoise Pose)**

Sit with your legs apart. Place your knees up by keeping the feet flat on the floor. Bend forward and bring your arms and shoulders under your knees, hands pointing back towards the hips, palms facing down. Slowly stretch your legs out, pulling your torso forward. You can also exhale and bend forward by walking your hands along the floor until both legs and spine reach their maximum stretch.

**Breath:** Inhale and exhale breathing normally as you hold.
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.

**3.10. COLLECTION OF THE DATA**

The data on flexibility, cardio respiratory endurance, resting pulse rate, breath holding time were collected by using the standardized test items such as sit and reach test, cooper’s 12 min
run/walk test, radial pulse and holding the breath for time respectively. The following hematological and bio chemical variables namely hemoglobin and red blood corpuscles were assessed by using K.M. Samuel method of blood testing, total cholesterol was measured by using Zak’s method of blood testing and blood sugar was assessed through Asatoor and king method of blood testing respectively. 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

3.11.1. Sit and Reach Test

Purpose

To measure the flexibility of the subjects.

Equipment

The equipment for this test consist of a platform, scale, two gymnasium (Stall bar) benches and a piece of rubber moulding about 4 feet square. The scale is drawn on a piece of plywood 24 by 8 inches. The centre line is marked 0, inches lines or side are marked 1, 2, 3 and so on to 12 and those on the other side −1, −2, −3 and so on up to −12.
The support for the scale is in the form up and elongated sign made of 11 inch – wide boards resting on their edges. These are referred to as the cross-board and stem board, food prints are outlines on the surface of the cross-board. One on either side of the upper edges of the support in such a way that when the subject is selected on the floor with the feet against the foot prints, the zero-line condides with the near surface of the cross board and the minus workings towards the subject.

Two benches are placed side by side their sides, about 12 inches apart, with their legs against a wall. The scale is placed between the benches with the cross-board placed against them.

The rubber mouldity is spread on the floor in front of and partially under the side.

**Procedure**

In taking the test, the subjects sites on the rubber matting with shoes removed, legs separated enough to stable the stem board. The feet are placed on the foot prints and pressed firmly against the cross board. The arms are extended forward with the hands placed palms down on the upper surface of the scale in this position, the subject bobs forward four time and holds the position of maximum reach on the fourth count. The knees must remain straight. If the hands reach
unevenly, the hand reaching the shorter distance determines the score.

**Scoring**

The score is recorded to the nearest half inch.

### 3.11.2. Cooper’s 12 Minutes Run/Walk Test

**Purpose**

To assess the cardiovascular endurance of the subjects.

**Equipments**

400 meters track, stopwatch, whistle, score sheets and pencils.

**Procedure**

For this test, a 400 meters track was prepared with marking at every tenth meter. The investigator and the tests served as the lap scores. The subjects were asked to stand on the starting area drawn at the finish line of the 400 meters track and they were given instructions to cover as much distance as possible by running/walking. They were instructed to continue the run/walk till the final whistle. The race was started with a whistle and at the end of the nine minute again. The whistle was blown. The number of minutes left was announced to the subjects every minute. At the twelfth minute a whistle was blown and the subjects stopped
instantly and stood on the spot. The distance covered by each in twelve minutes was recorded to the nearest tenth meter.

**Scoring**

The distance covered by each subjects were recorded with the help of the lap scores.

### 3.11.3. Resting Pulse Rate

**Purpose**

The objective was to record the resting heart beats of each subject per minute.

**Equipment**

Heart rate monitor (or) bio monitor was used to measure the resting heart rate.

**Procedure**

The resting heart rate of the subjects was monitored through the heart rate using the method of finger plythermography with the help of an opto-electronic transducer on finger.

Resting heart rate of each subject was recorded in the morning time between 6.00 A.M to 6.30 A.M. fifteen minutes before taking the heart rate, the subject was asked to sit and rest herself
comfortably on chair. The investigator fixed on opto sensor unit to the thumb of the subjects using velcrostraps. It was fixed in such a way that the light on the opto sensor unit was the distal end of the fingertip and the L.D.R was near to the fingertip. The velcrostrap on the L.D.R side was fastened firmly while, the strap on the lamp side was loosely fastened.

The PCG/pulse ON-OFF switch of the bio monitor was kept in the pulse position. Then the heart rate monitor was switched on by pressing the pulse push button switch. After about 30 seconds, the put L.E.D indicator flashed and beeps occurred rhythmically with respect to the subjects pulse. The heart rate per minute was indicated by the three digital meters.

Scoring

After a minute, the digital meter showed the subjects heart rate.

3.11.4. Breath Holding Time

Purpose

The objective was to measure the ability of the subjects to hold the breath for longer time.
Equipments

A stopwatch with calibration of 1/10 seconds, a score sheet and a pencil were used to administer the test.

Procedure

The subject stood at care and inhaled deeply after which she held her breath for a length of time possible to her. The index finger of the respondent served as an indicator for the investigator to know the start and end of the recording time. The thumb and center finger were used to hold the nose to avoid letting the air through nostrils. The subjects were requested not to let the air out by opening the mouth while recording the breath holding time.

Scoring

The time of holding the breath till the subject let the air out was clocked by using the stopwatch to the nearest one tenth of a second of breath holding.
3.11.5. Collection of Blood Sample

Objective

Collection of blood sample by venous puncture.

Equipment

A 20ml disposable syringe with needle, blood container with anticoagulant. Tourniquet, cotton and methylated spirit were used for collecting blood sample for each subject.

Procedure

The subject sat on arm chair. Examination of the superficial veins of the left forearm was made to select the vein for venous puncture. The skin was cleaned with spirit and allowed to dry. A tourniquet was tied around the upper arm. The subject was asked to flex and extend the wrist joint to make the veins more prominent.

Thumb of the left hand was placed on the lower part of the cleaned area and gentle traction was given to fix the vein. As the vein was punctured, blood flowed in the syringe. A sterile cotton wool was placed on the puncture and pressed gently.
Estimation of Hemoglobin Content


Drabkin’s solution

Sodium bicarbonate 1.0g  
Potassium cyanide 0.2g  
Potassium ferricyanide 0.2g  
Distilled watered to make 1000 ml.

Chemicals were dissolved in distilled water and made up to 1000ml. when prepare, the solution is slightly pink, but gradually turns grey.

Standard solution

The standard solution was prepared from blood of known hemoglobin content diluted 1:250 with drakbin’s solution.

Procedure

0.02ml of blood sample was expelled into 5ml. of drabkin’s solution and rinsed out the pipette several times with the mixture. The tube was stoppered with rubber bung and inverting the tube several times mixed the solution. Then the solution was allowed to stand at room temperature for 10 minutes. Then by
using yellow green filter (liford 625) the solution was matched against standard solution in calorimeter and the readings were recorded.

**Estimation of RBC**

Blood was drawn from the sample of oxalate blood exactly to the 0.5 mark into the RBC Pipette. Then immediately diluting fluid (formal citrate solution of hayem’s solution) was drawn up to the mark of 101. The pipette was then rotated carefully. The dilution was 1200. sahli method K.M. Samuel (1989).

Hemocytometer and the cover slip were cleaned thoroughly. Cover slip was placed in position over the ruled area, using gentle pressure. By holding the pipette horizontally the suspension was mixed thoroughly by rotating the pipette for one minute. Then the fluid in the stem of the pipette was expelled and by holding the pipette for one minute. Then the fluid in the stem of the pipette was expelled with the fluid by highly touching the tip against the edge of the cover slip. Care was taken to ensure that the suspension did not flow into the moats on either side not should any air bubble from under cover slip. Two to three minutes were allowed for the RBCs to settle.
Then the RBCs were counted in 80 small squares. Cells touching the lower and right hand lines were not counted but cells touching the upper and left hand lines were counted. (K.M Samuel, 1989)

\[
\text{Total RBC/CMM} = \frac{\text{No. of cells counted} \times \text{Dilution factor (200)} \times \text{Depth (4000)}}{\text{Area counted (80)}},
\]

### 3.11.6. Estimation of the Total Cholesterol

**Method**

For the estimation of Cholesterol, the procedure prescribed by zak’s was followed. Zak’s (1959)

**Aim**

The purpose of this test was to measure the level of cholesterol in the blood in Mg%.

**Equipment**

Calorimeter, centrifuge, test tubes, cotton 20 ml. dry sterilized syringe with needle, 5 ml pipette, 0.1 ml pipette and beaker were used for this test.
Procedure

0.1 ml. of Serum was added to 10 ml of ferric chloride acetic acid reagent in a glass stopper tube mixed well and allowed to stand for fifteen minutes for proteins to flocculate. Centrifuged and 5 ml of clear supernatant fluid was transferred into a glass stopper centrifuge tube

3.11.6. Estimation of Blood Sugar

Method

For estimation of blood sugar the procedure prescribed by asatoor and king as followed. (Asatoor and King, 1980)

Aim

The purpose of this test was to measure the level of sugar in the blood in mg%.

Equipment

A calorimeter, centrifuge, test tubes, cotton, 20ml. dry-sterilized syringe with needle, 5ml. pipette, 0.1ml. pipette, folins tube and breaker were used for this test.
Reagents

The reagents used for determining the level of sugar in the blood were isotonic sodium sulphate, copper sulphate solution, sodium tungstate, 10% alkaline tart rate solution, phosphomolybolic acid and standard glucose solution.

Procedure

10ml. of blood was added to 3.8ml. of isotonic sulphate and 100ml. of sodium sulphate. The contents were mixed. One ml. of the supernatant and one ml alkaline tart rate solution were added and plunged tightly with cotton wool. The tube was heated in boiling water bath for 10 minutes and then cooled 0.3ml. of phosphomolybolic acid reagent was added to each tube to 3ml. of distilled water mixed well and read after five minutes. At the same time one ml. of working standard was put in the same way and blank using one ml. of isotonic sodium sulphate, copper sulphate solution.

Scoring

Reading were taken in a photoelectron calculated using standard graph
3.12. EXPERIMENTAL DESIGN AND STATISTICAL PROCEDURES

The pre and post test random group design was used as experimental design in which sixty men subjects were divided into three groups. Each group consists of twenty subjects. Group I underwent first package of yogic practices and Group II underwent second package of yogic practices for five days per week for twelve weeks of training period. And Group III acted as control who did not participate any special training programme apart from their regular curricular activities. The data were collected for all the groups on selected criterion variables such as flexibility, cardio respiratory endurance, resting pulse rate, breath holding time, hemoglobin, red blood corpuscles, cholesterol and blood sugar by using the standardized test items. The data were collected from the three groups two days prior to and two days after the training programme on selected dependent variables as pre and post tests. They were statistically analysed by using the analysis of covariance (ANCOVA) to determine the differences, if any, among the groups on selected dependent variables separately. Whenever the obtained ‘F’ ratio for adjusted post test was found to be significant, the Scheffe’S test was applied as a post hoc test to find out the paired mean differences, if any. The .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.