Chapter III

METHODOLOGY

This chapter consist Selection of subjects, Selection of variables (dependent and independent), Experimental design, Orientation of the subjects, Pilot study and training schedule, practice methods, selection of test battery, Reliability of Instrument, Competency of Tester, Reliability of Data, Test administration and statistical techniques are in this chapter.

The purpose of this study was to find out the impact of the yogasana and pranayama in developing general motor ability with effect of selected hormones ACTH, Aldostirone and Vasopressine among the college women hockey players. The methods adopted for the present research has been discussed under the following headings.

SELECTION OF SUBJECTS

The purpose of the study was to find out the effect of yogic practice on selected hormones and bio-motor variables. For these purpose 32 women hockey players from Chittoor district hockey association team (16 players) and Cudapa district hockey association team (16 players). The age, height and weight of the subjects ranged from 17 to 19 years age, 160 to 170 centimeters and 45 to 55 kilograms respectively. The means were 18 years, 165 centimeters and 50 kilograms respectively. Cudapa team treated as a control group and Chittoor team treated as an experimental group. The subjects were not performing any type of yogasanas and pranayama rather than sports and games. Experimental group under went practice of yogasana and pranayama daily half hour in the
morning 6 days in a week up to 12 weeks additional practice, allowing with regular coaching.

**SELECTION OF VARIABLES**

Resorting from the review of literature and discussions with the experts and considering the feasibility criteria of the study and the relevance of the variables. yogasana and Pranayama were considered as Independent variables. The following dependent variable comes under selected hormones and bio-motor components.

**Hormones**

* ACTH (Adrenocorticotrophin hormone)
* Aldosterone
* Vasopressin

**Bio-Motor Variables**

* Speed
* Cardio respiratory endurance
* Muscular strength
* Flexibility

**Selection of Yogasanas and Prnayama for Training**

- Suryanamaskara
- Padmasana
- Patchimottanasana
- Sarvangasana
- Chakrasana
• Halasana
• Uttana Padasana
• Janu Sirshasana
• Shalabasana
• Anuloma Viloma Pranayama
• Kapalbathi Pranayama
• Savasana

The selected yogasanas and pranayama are practiced regularly for a period of twelve weeks. The experimental treatment of Yogasanas and pranayama are subjected to the experimental group.

Table: I

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>Experimental Design</th>
<th>Size of the Sample</th>
<th>Age Total Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Control Group</td>
<td>16</td>
<td>17 to 19 years</td>
</tr>
<tr>
<td>2.</td>
<td>Experimental Group</td>
<td>16</td>
<td>17 to 19 years</td>
</tr>
</tbody>
</table>

The experimental design used for this study was similar groups design involving thirty two subjects, who were divided into two equal groups of sixteen each. Control group did not undergo yogasana and pranayama. Experimental group subjected for experimental treatment of yogasana and pranayama training. Hormones test were conducted before participation of competition. One day after bio-motor variable were tested. All the subjects were tested pre and post on
selected hormones (ACTH, Aldosterone and Vasopressin), and bi0-motor variables (Speed, Cardio respiratory endurance, Muscular strength and Flexibility).

ORIENTATION TO THE SUBJECTS

The investigator clearly explained the selected variables in the study and the purpose of training schedule to the subjects. Before the commencement of the training programmes, a week was spent to teach the asanas postures for the experimental group. Four ‘half hour’ sessions were spent on alternate days to have harrow knowledge of practicing asanas and pranayama.

Pilot Study to Construct Schedule of Asanas and Pranayama

To construct the practice schedule of asanas, six teen trained women hockey players, (Experimental group) were selected from Chittoor district A.P. women hockey association and they underwent practice of asanas under the keen observation of the experts and the investigator. The asanas selected for this study under the practice schedule have been recommended to influence on pituitary and adrenal glands hormones secretions, physical fitness, pranic, mental balance and spiritual developments.

Training Schedule

The Training schedule time between at 6-00 A.M to 6-30 A.M. Suryanamaskar 6-00 to 6-15, specific yogasanas 6-15 to 6-23, specific pranayama 6-23 to 6-27 and 6-27to 6-30 Savasana given to the Experimental Group only. Schedule of practice indicated in table: II
### Table: II

**Schedule the time Table**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>No. of Weeks</th>
<th>6.00 A.M. to 6.15 A.M. (15 mts)</th>
<th>6.15 to 6.23 (8 mts) Yogasanas</th>
<th>6.23 to 6.27 (4 mts) Pranayama</th>
<th>6.27 A.M. to 6.30 A.M. (3 mts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>First 3</td>
<td>Suryanamaskar</td>
<td>Artha Padmasana, Patchimottanasana, Sarvangasana,</td>
<td>Anuloma Viloma Pranayama, Kapalbath,</td>
<td>Savasana</td>
</tr>
<tr>
<td>2.</td>
<td>Next 3</td>
<td>,,</td>
<td>Chakrasana, Halasana,</td>
<td>Anuloma Viloma Pranayama, Kapalbath,</td>
<td>Savasana</td>
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<tr>
<td>3.</td>
<td>Next 3</td>
<td>,,</td>
<td>Uttana Padasana, Janu Sirhashana,</td>
<td>Anuloma Viloma Pranayama, Kapalbath,</td>
<td>Savasana</td>
</tr>
<tr>
<td>4.</td>
<td>Last 3</td>
<td>,,</td>
<td>Vrikshasana, Shalabasana,</td>
<td>Anuloma Viloma Pranayama, Kapalbath,</td>
<td>Savasana</td>
</tr>
</tbody>
</table>

**Note:**
1. Suryanamaskar practice start with 3 rounds and each round can be performed 4 minutes.
2. Specific asanas selected for this study, can be performed 3 minutes each asana.
3. Pranayams can be performed up to 4 minutes. Each one 2 minutes
4. Finally Savasana can be performed up to 5 minutes.

**Practice Methods of Asanas and pranayama**

While giving training on asana practice, researcher followed the systematic process of asana. Otherwise the experimental group will not show any significant improvement. Researcher has kept in mind some important points, to be followed by the students.
a) Keep the body clean and fresh (over from natural calls more important, empty stomach, mouthwash, and takes both).

b) Practicing time morning 6.00 A.M to 6.30 A.M.

c) Practicing place should be peaceful and pleasant.

e) Every asana position should depend on breathings (Inhale & Exhale) Inhalation and Exhalation rhythms depend on position of asana. This system never change because, the experts of yoga discovered this process, proved by scientific benefits of human body.

f) Duration of the asana position and breathing actions must be kept in mind.

g) After completion of asana, the body comes limbering down with the specific savasana.

Surya Namaskar (The Sun Salutation)

This asana is more important and covered with some special asanas. In this total body movement cumulate and become active, includes 12 different positions, they are:
Surya Namaskar

1. PRANAMASANA.
2. ASTAUTTHANASANA.
3. PADAHASTASANA.
4. ASHWA SANCHALANASANA.
5. PARVATASANA.
6. ASHTANGA ASHARA.
7. BHUJANGASANA.
8. PARVATASANA.
9. ASHWA SANCHALANASANA.
10. PADAHAHTASANA.
11. HASTAUTTHANASANA.
12. PRANAMASANA.
1. **PRANAMASAN**: Maintain the position as shown in figure from standing position with normal breathing and hands joined together near chest, feet together and keep the toes apart.

2. **HASTA UTTHANASANA**: While inhaling slowly raise the arms upward and bend backward, stretching arms above the head.

3. **PADAHASTASANA**: (Standing forward Bend) Exhale and bend forward from the waist till palms touches the ground in line with the toes. Don’t bend knees while performing. At first you may find it difficult to attain the ideal position but try to bend as much as possible without bending the knees.

4. **ASHWA SANCHALANASANA**: Inhale and take the left leg back with left toe on the floor, press the waist downward and raise the neck, stretch the chest forward and push shoulders backwards. Keep the right leg and both the hands in the same position. Keep the right leg folded.

5. **PARVATASANA (mountain pose)**: Exhale and slowly bend the neck downwards and press the chin in the throat, push the body backwards and touch the heels on the ground, raise the waist upwards, do not move the palms on the floor.

6. **ASHTANGA NAMASKARA**: While exhaling bend both the hands at elbows and touch forehead on the ground, touch the knees on the ground, keep both the elbow close to the chest. The forehand, chest, both the palms, both the toes, both knees should touch the ground and rest of the body not touching the floor. Since only eight parts rests on the ground, it is called “Ashtanga” position.
7. **BHUJANGASANA (cobra pose):** Inhale and straighten the elbows, stretch the shoulders upwards, press the waist downwards but don’t bend the arms. Keep the knees and toes on the floor. Push the neck backwards and look upwards.

8. **PARVATASANA (mountain pose):** Exhale and slowly bend the neck downwards and press the chin at the throat, push the body backwards and touch the heels on the ground, raise the waist upwards, do not move the palms on the floor.

9. **ASHWA SANCHALANASANA (equestrian pose):** While Inhaling slowly keep the palms flat on the floor, bend the left leg and bring the left foot forward and keep in between the hands. Simultaneously, lower the right knee so that it touches the floor and push the pelvis forward. Tilt the head backward, arch the back and gaze at the eyebrow center.

10. **PADAHASTASANA (hand to foot pose):** Exhale and bring the right leg forward as in position 3 and place it in between both the palms.

11. **HASTA UTTHANASANA (raised arms pose):** While Inhaling slowly raise the arms upward and bend backward, stretching arms above the head.

12. **PRANAMASANA (prayer pose):** Hands joined together near the chest, feet together and toes touching each other during Exhale. Completing one round, like that there may be three repetitions depending up on researcher.
Ardha Padmasana

• Sit with the legs straight in front of the body.
• Bend one leg and place the sole of the foot on the inside of the opposite thigh.
• Bend the other leg and place the foot on top of the opposite thigh.
• Without straining, try to place the upper heel as near as possible to the abdomen. Adjust the position so that it is comfortable.
• Place the hands on the knees in either chin or jnna mudra.
• Keep the back, neck and head upright and straight. Close the eyes and relax the whole body.
**Paschimottanasana (back stretching pose)**

* Sit on the floor with the legs outstretched, feet together and hands on the knees. This is the starting position.
* Relax the whole body.
* Bring the both hand upward and bend forward from the hips. Try to grasp the big toes with the fingers and thumbs. If this is impossible, hold the heels, ankles or any part of the legs that can be reached comfortably.
* Move slowly without forcing or jerking.
* Hold the position for a few seconds. Relax the back and leg muscles allowing them to gently stretch.
* Keeping the legs straight and utilizing the arm muscles, not the back muscles, begin to bend the elbows and gently bring the trunk down towards the legs, maintaining a firm grip on the toes, feet or legs.
* Try to touch the knees with the forehead. Do not strain.
* This is the final position.
* Hold the position for as long as comfortable and relax.
* Slowly return to the starting position. This is the one round.
Breathing

* Inhale in the starting position.
* Exhale slowly while bending forward.
* Inhale in the static position.
* Exhale while bringing the trunk further towards the legs with the arms.
* Breathe slowly and deeply in the final position or retain the breath out if holding for a short duration.
* Inhale while returning to the starting position.

Sarvangasana (shoulder stand pose)

* Lie flat on the back on the carpet.
* Keep the legs stretched out, tightened at the knees. Place the hands by the side of the legs, palms facing down.
* Take a few deep breaths. Inhale slowly and at the same time raise both legs together and bring them at a right angle to the body as shown in figure above. Remain in this position and inhale, keeping the legs steady.
* Exhale again raise the legs further up by lifting the hips and back from the floor. Turn the palms if the hands upward, bend the elbows and place the hands behind the ribcage, slightly away from the spine, to support the back.
* The elbows should be about shoulder width apart.
* Gently push the chest forward so that it presses firmly against the chin.
* In the final position, the legs are vertical, together and in a straight line with the trunk. The body is supported by the shoulders, nape of the neck and back or the head. The arms provide stability, the chest rests against the chin and the feet are relaxed.

**Breathing**

* Inhale in the starting position.
* Retain the breath inside while assuming the final pose.
* Practice slowly, deep abdominal breathing in the final pose when the body is steady posture.
* Retain the breath inside while lowering the body to the floor.

![Chakrasana (wheel pose)](image)
Starting position:

* Lie on the back with the knees bent and the heels touching the buttocks.
* The feet and knees should be about 30 cm apart.
* Place the palms on the floor beside the head with the fingers pointing towards the shoulders.
* Next slowly raise the body and arch the back, allowing the crown of the head to support the weight of the upper body. Move the hands in further towards the body for more support if necessary.
* Straighten the arms and legs as much as possible and lift the head and trunk from the floor.
* Try to arch the back as high as possible in the final position.

Breathing:

* Inhale in the starting position.
* Retain the breath inside while raising the body.
* Retain the breath inside or breathe normally in the final position.
* Exhale while lowering the body.

Halasana (plough pose)
* Lie flat on the back with the legs and feet together. Place the arms beside the body with the palms facing down.
* Relax the whole body.
* Raise both legs to the vertical position, keeping them straight and together, using only the abdominal muscles.
* Press down on the arms and lift the buttocks, rolling the back away from the floor. Lower the legs over the head.
* Try to touch the toes to the floor behind the head.
* Do not force the toes to touch the floor.
* Turn the palms up, bend the elbows and place the hands behind the ribcage to support the back as in sarvangasana.
* Relax and hold the final pose for as long as is comfortable.
* Return to the starting position by lowering the arms with the palms facing down, then slowly the back and buttocks to the floor.

**Breathing**

* Inhale while in the lying position.
* Retain the breath inside while assuming the final pose.
* Breathe slowly and deeply in the final pose.
* Retain the breath inside while returning to the starting position.
**UttanaPadasana (raised leg pose)**

* Stand in tadasana and slowly raise the both hand upward. Inhale and raise the right leg as high as is comfortable, keeping it straight and the foot relaxed.
* The left leg should remain straight and in contact with the floor.
* Hold the posture for 3 to 5 seconds, counting mentally and retaining the breath.
* Exhale and slowly lower the leg to the floor.

**Breathing**

* Inhale while raising the leg(s).
* Hold the posture and the breath. Exhale while lowering the leg(s).
Janu Sirsasana (head to knee pose)

* Sit with the legs outstretched and the feet together.
* Bend the left leg, placing the heel of the foot against the perineum and the sole of the foot against the inside of the right thigh. Keep the left knee on the floor.
* Place the hands on top of the right knee, keeping the spine straight and the back muscles relaxed. This is the starting position.
* Slowly bend forward, sliding the hands down the right leg, and grasp the right foot.
* If possible, hold the big toe with the index finger, middle finger and thumb of the left hand and the outside edge of the foot with the right hand. Try to touch the knee with the forehead.
* This is the final position. Keep the back relaxed and do not strain.

Breathing

* Inhale in the starting position.
* Exhale while bending forward.
* Retain the breath outside in holding the final position for a short time. Breathe normally if holding the pose for longer.

* Inhale while returning to the starting position.

Salabhasana

* Lie flat on the stomach with the legs and feet together and the soles of the feet uppermost.

* The arms may be placed either under the body or by the side, with the palms downward or the hands clenched.

* Stretch the chin slightly forward and rest it on the floor throughout the practice.

* Close the eyes and relax the body. This is the starting position.

* Slowly raise the legs as high as possible, keeping them straight and together.

* The elevation of the legs is produced by applying pressure with the arms against the floor and contracting the lower back muscles.
* Hold the final position for as long as is comfortable without strain.
* Slowly lower the legs to the floor.

**Breathing**

* Inhale deeply in the starting position.
* Retain the breath inside while raising the legs and holding the position.
  Exhale while lowering the legs.
* Beginners may find it helpful to inhale while raising the legs.

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**Anulom-Vilom Pranayama**

Just like Anuloma Viloma is about alternate nostril breathing. In this case, the inhalation and exhalation is done with one nostril blocked and the other partially open. Some variations of the yoga are granular anuloma.
This type of pranayama is particularly useful in cleansing the nasal passages and creating calmness within.

**Procedure**

Hold your right nasal with thumb, breath in form left. Now open right nasal and close left nasal, with middle and right finger and breathe out from right nasal. Now close right nasal and open left and breath out and in from left nasal, and do so at least 10 minuets.

**Viloma Paused Inhalation**

* Lie down in a comfortable position and try to relax. Breath deeply, but normally.
* Now inhale for 2 to 3 seconds and pause. Hold your breath for two seconds and then restart inhalation. Pause inhalation again after 2 to seconds. Inhale again. Repeat this process until the lungs feel full of air
* Exhale now, slowly, till you feel empty of air

**Viloma Paused Exhalation**

The paused exhalation is the exact opposite of the inhalation process. In this case, you inhale deeply and normally without interruption, but exhale with regular pauses.
Kapalabathi Pranayama

The process or kriya of Kapalabhati (Kapala = skull, bhati = light, lustre) is a milder form of Bhastrika Pranayama. In Kapalabhati, the inhalation is slow but the exhalation is vigorous. There is a split second of retention after each exhalation. Do a few cycles of Kapalabhati instead of Bhastrika if the latter breathing proves too strenuous. Lie down in Savasanas after finishing Kapalabhati effects:

Both Bhastrika and Kapalabhati activate and invigorate the liver, spleen, pancreas and abdominal muscles. Thus digestion is improved the sinuses are drained, the eyes feel cool and one has a general sense of exhilaration.

To perform the kapalabhati pranayama technique, sit in a comfortable position crossing your legs. Perform two to three deep inhales and exhales.
Now inhale deeply and exhale forcefully drawing all the air out. Your belly should be drawn in, as you exhale.

When you inhale, let it happen passively without you making any effort to inhale as the belly goes back to normal position.

Exhale forcefully again and continue doing this for about 20 to 30 times as possible.

**Savasana**

* Lie flat on the back with the arms about 15 cm away from the body, palms facing upward. A thin pillow or folded cloth may be placed behind the head to prevent discomfort. Let the fingers curl up slightly.

* Move the feet slightly apart to a comfortable position and close the eyes.

* The head and spine should be in a straight line. Make sure the head does not fall to one side or the other. Relax the whole body and stop all physical movement.

* Become aware of the natural breath and allow it to become rhythmic and relaxed.
The purpose of the study was to assess the impact of yogasana and Pranayama Training on selected hormones secretion and (ACTH, Aldosterone and vasopressine) and bio-motor ability variables (Speed, Cardio respiratory endurance, Muscular strength and Flexibility). The investigator searched various literatures and also consulted with physical education professionals to use most suitable tests for the purpose of the study.

### Table III

**Test Items for the Selected Hormone**

<table>
<thead>
<tr>
<th>S.No:</th>
<th>Hormones</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ACTH (Adrenocorticotrophin hormone)</td>
<td>Blood Test (RIA) Radioimmunoassay</td>
</tr>
<tr>
<td>2.</td>
<td>Aldosterone</td>
<td>Blood Test (RIA) Radioimmunoassay</td>
</tr>
<tr>
<td>3.</td>
<td>Vasopressin</td>
<td>Blood Test (RIA) Radioimmunoassay</td>
</tr>
</tbody>
</table>

### Table IV

**Test Items for the Selected Bio-Motor Variables**

<table>
<thead>
<tr>
<th>Sl. No:</th>
<th>Bio Motor Variables</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Speed</td>
<td>50 meters Run</td>
</tr>
<tr>
<td>2.</td>
<td>Cardio respiratory Endurance</td>
<td>Harward Step Test</td>
</tr>
<tr>
<td>3.</td>
<td>Muscular Strength</td>
<td>Sit-up Test</td>
</tr>
<tr>
<td>4.</td>
<td>Flexibility</td>
<td>Sit and Reach Test</td>
</tr>
</tbody>
</table>
RELIABILITY OF DATA

The reliability of data was ensured by establishing the reliability of instruments, competency of tester, reliability of the test and retests process and subject reliability.

RELIABILITY OF INSTRUMENT

For assessment of selected Hormones following instruments are used

• RIA kits for measuring Blood serum ACTH, Aldosterone and Vasopressin hormone from Bio medicals.

For assessment of Bio motor variable following instruments are used

• Stop watch used to take time for 50 mts. dash.
• 18 inches height stool (or) step was used to test for Harward step test.
• Flexo measure Box was used to test flexibility.

COMPETENCY OF TESTER

The operations of the stop watches, measuring tape, step counting and pulls recovery, sit-up counts, observation scale on Flexomeasure case by qualified person who was well versed in measurements.

The Biological variables were tested with RIA kits from Biomedical by the qualified person.
TEST ADMINISTRATION

Blood Test  RIA (Radioimmunoassay)

Purpose

The purpose of the test was to measure the level of hormones secretion (ACTH, Aldostirone and Vasopressin) in the endocrine system.

Equipment:

Biomedical clinical RIA kit.

Sources of Testing

Biomedical clinical laboratory.

- Blood is typically drawn from a vein, usually from the inside of the elbow or the back of the hand. The site is cleaned with germ-killing medicine (antiseptic). The health care provider wraps an elastic band around the upper arm to apply pressure to the area and make the vein swell with blood.
- Next, the health care provider gently inserts a needle into the vein. The blood collects into an airtight vial or tube attached to the needle. The elastic band is removed from your arm. Once the blood has been collected, the needle is removed, and the puncture site is covered to stop any bleeding.
- Careful standardization of the patient preparation and sampling conditions is recommended during the rest, five minutes before participation and immediate after the competition.
- Draw blood from from the subjects into a chilled tube, containing EDTA or Heparin.
- Centrifuge at 4º C to separate the plasma.
- Freeze the sample in plastic tubes at - 20º C until assayed.
• Adherence to the basic rules of radiation safety should provide adequate protection.
• Single dose blood collections for 4 ml. in each collection are enough to test ACTH, Aldostirone and Vasopressin hormone secretion.
• Blood samples were collected from the subjects just before the participation.

Precautions
• Do not eat, drink, smoke or apply cosmetics where radioactive materials are used.
• Do not pipette radioactive solutions by mouth.
• Avoid direct contact with all radioactive materials by using protective articles such as lab and disposable gloves.
• All radiological work should be done in a designated area.
• Radioactive materials should be stored in original containers in a designated area.
• Laboratory equipment and glassware, which are subject to contamination, should be segregated to prevent cross-contamination of different radioisotopes.
• Any radioactive spills should be taken care of immediately in accordance with established procedures.
• All radioactive materials must be disposed of in accordance with the prevailing regulations and guidelines of the agencies jurisdiction over the laboratory.
ACTH (Adrino Cortico Tropic Hormone)

Blood Sample Collection

ACTH levels can be measured by radioimmunoassay (RIA). RIA can be used indifferently for the assessment of the ACTH response.

Normal Results

Normal values: 9 - 52 pg/mL or 1.90 – 11.4 p mol/L

Note: pg/mL = picograms / per milliliter
P mol/L = per minute mol / per Letter

Aldosterone

Serum aldosterone was measured with RIA kits from Biomedicals.

Normal Results

Aldosterone

Lying down: 2 to 16 ng/dL or 55.48 to 443.84 p mol
Standing up: 5 to 41 ng/dL or 138.7 to 1137.34 p mol

Note: ng/dL = nanograms per deciliter
{ng/dl × 27.74(conversion value)} = p mol / L
**Vasopressin**

The Bio-Source Vasopressin-RIA kit contains reagents and instruction for the quantitative measurement of vasopressin in plasma or urine. After solid phase extraction (SPE) or ethanol extraction the plasma vasopressin concentrations are measured by radioimmunoassay (RIA). Urine vasopressin concentrations can be measured directly.

This kit contains (half-life: 60 days.) emitting ionizing X (28keV) and Y (35.5keV) radiations.

**Normal Results**

<table>
<thead>
<tr>
<th>Vasopressin</th>
<th>Low Value: 1.9 Pmol/L to 15 Pmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Upper Value: 30 Pmol/L to 60 Pmol/L</td>
</tr>
</tbody>
</table>

*Note: Pmol/L (perminute mole/ per Letters)*
50 metres Run

Purpose

To assess the speed, average stride length and average stride frequency.

Equipment

Tape, starting clapper, stop watches and video cassette recorder.

Marketing

Two lines (starting and finish) were drawn 50 metres apart in 200 metres track straight. On both sides of the finish line, 12 coloured lines (six at each side) were drawn 20 centimeters apart to determine whether the last stride should be counted on not. If the last stride covered less number of lines outside the finish line than inside, the stride was counted, and if it covered more number of lines outside the finish line than inside, it was not counted.
Procedure

Standing start method was adopted. The subject stood behind the starting line with the command ready ‘clap’ ran through the 50 metres. The elapsed time from starting signal to the runner crossing the finish line was measured by a digital timer. Since the timer was operated by hand, the time was rounded to the next largest one tenth of a second. Each subject was given two trails with sufficient rest in between and the best of the one trails was recorded.

Scoring

Score was recorded in seconds to the nearest one tenth of a second.
Harvard Step Test

**Purpose**

The purpose of the test was to measure the cardio respiratory endurance.

**Equipment**

Stop watch, 17 inches stadium stairs height used for this purpose.

**Description**

The condition is 30 steps per minute. The body should be erect when the subject steps on to the bench. The subject continues to exercise at the prescribed condition that for five minutes, unless in feels that she must stop before that because of exhaustion. As soon as he stops exercising, he sits down and remains seated and quiet throughout the pulse count. The pulse rate taken at the radial
artery at the wrist, in such a manner that palpitation was clearly felt by the finger tips. The measurement of palpitation was counted ½ minutes.

**Scoring**

Pulse rate for ½ minutes (30 seconds) recorded; sum of pulse count in recovery are taken, 1 to ½ min., 2 to 2½, 3 to 3½ minutes after exercise.

The three resting pulse count is taken and physical efficiency index is calculated aging the formula.

\[
P.E.I. = \frac{\text{Duration of exercise in seconds} \times 100}{2 \times \text{sum of pulse count in recovery}}
\]
Bent Knee Sit-up

Purpose

The purpose of this test was to measure abdominal, hip strength and endurance.

Equipments

Clean floor, stop watch and score sheet.

Description

The subject lies on the back with knees bent, feet on the floor mat and heels between ten to twelve inches from the buttocks. The finger are clasped behind the neck and the elbows placed flat on the floor. These flats are held in place by a partner. The abdominal muscles are tightened, head and elbows brought forward and the elbows touched to the knees. The subjects return to the
initial position and repeat this exercise. the number of correctly completed sit-ups in 60 seconds was recorded.

**Rules**

Only one trial was allowed if the subjects did not perform fairly. No resting was permitted between sit-ups. No sit-ups was counted if the subjects failed to do it according to the above description.

**Scoring:** Number of correctly executed sit-up in 60 seconds was recorded.

*Sit and Reach Test*

**Purpose**

To measure the horizontal forward mobility of hip region and elasticity of the hamstring, gluteus and gastronomies group muscle.

**Equipments**

Flex measure case with scale and centimeter tape.
**Procedures**

The investigator has directed the subjects to take long sitting position. Hands were kept by the side of his body heels were placed 10 cm. apart. The equipment was placed that the 40 cm. mark of the scale with a lime on the floor.

The subjects were asked to sit erect then slowly raise both the hands till they come to vertical position and palms facing each other, they were asked to reach forward to the yard stick (scale) and maximum possible measurement was taken one quarter of the centimeter.

**Scoring**

The best among the three trials were her test score.

**STATISTICAL TECHNIQUES**

The data were collected from control group and experimental group prior and after experimentation training on selected hormones (ACTH, Aldosterone, and Vasopressin) and selected bio-motor variables (Speed, Cardio respiratory endurance, Muscular strength and flexibility) were statistically examined for significant difference by dependent ‘t’ test. No attempt was made to equate the groups in any manner, to test the adjusted post means for significant differences between two groups, the analysis of covariance (ANCOVA) statistical method was applicable.