MATERIALS AND METHOD

The present study was undertaken with a purpose to evaluate the effect of pranayama on circulo-respiratory function in college students. The methodology followed to conduct this scientific experiment has been presented in this chapter.

3.1 The Subjects

Seventy male students (n=70) were selected randomly from the J.S.P.M. College of Physical Education, Pusad, Dist. Yewatmal (Maharashtra, India) for this study. The subject’s age group was ranging from 18 to 21 years. The age was determined from the date of birth certificate available in the college record. The researcher made sure that the entire subjects were medically fit for going through the experimental requirements of this research project. This was done by scrutinizing the health examination record of the students maintained as a part of regular college procedure.

Criteria for Inclusion and Exclusion

- Only male students especially in the age group of 18 to 21 years were included, whereas the female students were excluded.

- Based on the medical examination, the subjects as ruled out by the medical practitioners were excluded from this study.

- The students who have in-depth knowledge and practice of yoga were also excluded.

- The students, who are regularly attending the College and committed to remain present in the entire experimental period of 8 weeks, were included.
3.2 Experimental Design

The selected seventy students were then again randomly assigned into two equal groups, viz., one experimental group (Group A; \(n_1 = 35\)) and one control group (Group B; \(n_2 = 35\)).

Group A received *pranayama* training while Group B was treated as control. The phase-wise design of the experiment has been planned as follows:

- 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 different standard physiological tests viz., PEFR, Vital Capacity and 12 min. run/walk test to record the pre test data.

**Treatment stimuli (phase – II)**

After the completion of pre test, all the subjects of experimental group were exposed to a two months (8 week) training on selected *pranayama* practices for one hour daily in the morning from 6.30 to 7.30 except Sunday and holidays.

- Group A – Specific *pranayama* training.
- Group B – Control.

For a total period of 8-week, the researcher himself organized daily the *pranayama* training programme.
Post test (phase III)

Lastly, when the treatment or training period of 8 week was completed, the posttest on the selected physiological variables was assessed (like pre-test) for all the subjects of both the groups.

The blue print of subjects’ distribution has been presented in Table 3.1.

### Table 3.1
Blue print of subjects’ distribution

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of Ss.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pranayama Group</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Control Group</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>70</strong></td>
</tr>
</tbody>
</table>

**Drop-Outs**

Some of the students were deliberately absent during the tenure of the experiment. However, their attendance was more than 80% and therefore their results have been incorporated in this study. Thus, there was no drop-outs in the experiment.

### 3.3 Variables Selected for the Study

#### 3.3.1 Dependent Variables and Tools Used

Before and after experiment, following variables on the subjects were assessed with the help of some reliable and standard tools:
### 3.3.2 Independent Variables

One independent variable viz., *pranayama* training had been included in this study.

#### Rationale of Pranayama training intervention

In recent years, there has been considerable Scientific research on yoga has been conducted. The focus of the scientific studies is mainly on the asanas and pranayama. The effect of different pranayamas on healthy (Subbalakshmi 2005) and diseased people (Cooper *et al.*, 2003; Dhungel 2008; Ravindra 2006) has been well studied and they are known to affect the cardiopulmonary activities and autonomic functions. The ancient science of yoga makes use of the voluntary regulation of breathing to make respiration rhythmic and to calm the mind. This practice is called ‘Pranayama’. It is an art of controlling the breath. It involves taking in breath, retaining it then exhaling it. Some studies have shown the various effects of Pranayama on young volunteers (Pal *et al.*, 2004). Therefore, in this study, an attempt has been made to observe the effect of selected pranayama on cardiovascular and respiratory functions in college students.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Tools Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Expiratory Flow Rate</td>
<td>Wrights Peak Flow Meter</td>
</tr>
<tr>
<td>Vital Capacity</td>
<td>Wet Spirometer</td>
</tr>
<tr>
<td>Cardiovascular Efficiency</td>
<td>12 min. Run/Walk test</td>
</tr>
</tbody>
</table>
3.3.2.1 Designing Pranayama Training Schedule

3.3.2.1 Designing Training Schedule

The training programme was designed on the basis of following:

- The practice of pranayama helps in the efficient functioning of different systems of the body. By inspiration, expiration and retention in pranayama there is a rise and fall of diaphragm and contraction and relaxation of the abdominal muscles which give accentuated and constant movement and massage to the bowels and the kidneys and help in removing congestion if there is any. The nerves and muscles of the bowels and the kidneys are toned up. The bowels and kidneys derive benefit not only during pranayama but even for the remaining part of the day. The function of elimination is carried on more effectively.

- Healthy respiration depends on strong respiratory muscles and good elasticity of the lungs. Through pranayama the chest is expanded to its fullest extent several times and putting the lungs on the utmost stretch. Thus these organs are better trained to perform their work efficiently during the remaining part of the day.

- The organs of digestion and absorption like the stomach, the pancreas and the liver, are all exercised in pranayama. This is done by gentle massage given to them by the diaphragm and the abdominal muscles. Congestion of liver is removed and unhealthy pancreas is corrected in their function. Gastric disorders are removed.

3.3.2.2 Training method for performing selected pranayama practices

Independent variable, representing pranayama practices for the experimental Group A, was constituted on the basis of the principles of
traditional yogic practices. Therefore, methods of performance were also taken care of on the basis of the followings:

- The very principles of *pranayama* as described in Patanjala yoga sutra (Karambelkar, 1989) were followed strictly. Thus, the subject performed the said practices steadily with comfort.

- Treatment period for the subject was eight weeks duration daily in the morning for one hour.

- The selected *pranayama* and kriya were taught as well as practiced in a hall, in the morning at 6.30 to 7.30 am. The experimental group was engaged and tackled by investigator and one experienced yoga instructor. The subjects were suitably dressed for the purpose.

- The control group was also engaged in some light jobs of no physical adaptation, while experimental groups were practicing scheduled practices as treatment stimulus. All other conditions were alike in terms of daily college routine.

- Subject, in general, were interested and adoptive to the programme. None of the subjects came to the notice of investigator having a long history of practicing the selected practices. Regularity in attendances was about more than 80% which is satisfactory.

### 3.3.2.3 Composition of Pranayama Training Interventions

Blue print of weekly schedule of *pranayama* training intervention has been presented below:
<table>
<thead>
<tr>
<th>Week</th>
<th>Repetition/Round</th>
<th>Training/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Week</td>
<td>15 Min.</td>
<td>Prayer, Introduction about Pranayama &amp; Yoga</td>
</tr>
<tr>
<td></td>
<td>25 min</td>
<td>Asana</td>
</tr>
<tr>
<td></td>
<td>15 Min.</td>
<td>Demonstration of Pranayama &amp; Practice</td>
</tr>
<tr>
<td></td>
<td>03 Min.(2 Rounds)</td>
<td>Anuloma-Viloma</td>
</tr>
<tr>
<td></td>
<td>02 Min. (2 Rounds)</td>
<td>OM Chanting</td>
</tr>
<tr>
<td>2nd Week</td>
<td>10 min.</td>
<td>Prayer, Introduction about Pranayama</td>
</tr>
<tr>
<td></td>
<td>20 Min.</td>
<td>Asanas &amp; Relaxation</td>
</tr>
<tr>
<td></td>
<td>25 Min.</td>
<td>Pranayama</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kapalbhati Kriya 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anuloma-Viloma  6 to 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ujjai  6 to 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bhashrika  6 to 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bhramari  10 to 15</td>
</tr>
<tr>
<td></td>
<td>05 Min.</td>
<td>OM Chanting</td>
</tr>
</tbody>
</table>

Sufficient time was given for relaxation after one pranayama practice.

| 3rd to 8th Week | 15 Min. | Prayer, Asanas & Relaxation |
|                 |         | Pranayama                   |
|                 |         | Kapalbhati Kriya 3 to 5     |
|                 |         | Anuloma-Viloma 8 to 10      |
|                 |         | Ujjai 8 to 10               |
|                 |         | Bhashrika 8 to 10           |
|                 |         | Bhramari 15 to 20           |
|                 | 05 Min. | OM Chanting                 |

Sufficient time was given for relaxation after two pranayama practices.
3.4 Facilities Utilized

Instrumentation

The investigator purchased the necessary instruments and raw material required for the data collection.

Man Power Facility

Two associates having background of research in physical education and sports were involved on temporary basis for data collection.

Prior to data collection, the testers’ reliability was determined (r=0.87, p<0.01) which was found statistically significant.

3.5 Description of Tests Measuring Dependent Variables

Detailed techniques to measure each of the dependent variables have been presented below:

- Peak Expiratory Flow Rate
- Vital Capacity
- Cardiovascular Efficiency

3.5.1 Peak Expiratory Flow Rate

Peak flow measurement is a procedure in which the maximum flow rate of expired air is measured. The measurement obtained is called the peak expiratory flow rate (PEFR). PEFR was measured with a peak expiratory flow rate meter, a portable, hand-held device.

Instructions:

Researcher explained the purpose of the test, technique to perform the test.
**Equipment:**

Peak Flow Meter, Disposable Mouth Piece

**Procedure:**

- Attach new disposable mouthpiece to the peak flow meter.
- Before each use, make sure the sliding pointer on the peak flow meter is reset to the 'zero' mark.
- Ask the subject to stand up & hold the peak flow in a horizontal position.
- Take care not to place the fingers over the scale.
- Ask the subject now to take a deep breath in & make a tight seal with their lips around the mouthpiece.
- Now ask the patient to blow out as hard & as fast as they can. Remember a “fast blast” is better than a “slow blow.”
- Note the number where the sliding pointer has stopped on the scale.
- Reset the pointer to 'zero'.
- Repeat this process three times.

**Scoring:**

The lungs function ability (i.e., peak expiratory flow rate) is measured in litre.

**Reliability and validity:**

The reliability coefficient has been reported as 0.92, whereas the construct validity as 0.87.
Assessment of Peak Expiratory Flow Rate
3.5.2 Vital Capacity

Wet Spirometer was used to record the vital capacity of the subjects. The wet spirometer can also measure the other respiratory volumes like tidal volume and expiratory/inspiratory reserve volumes. The wet spirometer is used upon the principle that the air exhaled from the lungs will cause a displacement of a closed chamber, which is partially submerged in water.

Procedure:

- The actual vital capacity, in milliliters, was measured by taking average of three readings.

- First, place a clean disposable mouthpiece into the spirometer.

- The subject was asked to stand erect and breathe deeply in and out for several seconds.

- In the next step the subject was asked to breathe in as deeply as possible, then the mouthpiece was placed in position, and the subject was asked to breathe out as hard as possible.

- Record the results for trial one. Repeat for 2 more trials and record as trials 2 and 3.

- Dispose of the mouthpiece.

- Computed the average of the 3 trials and recorded. This was the actual vital capacity.

3.5.3 Cardiovascular Efficiency

Twelve minute Run-walk test is also called as Cooper 12 minute Run-walk test, which was administered to measure cardiovascular efficiency of the
This test is developed by Dr. Kenneth Cooper hence; it is called as Cooper 12 min. run/walk test.

Cardiovascular tests may be given for any of several purposes within the institution. One purpose of this test is most common as a physical fitness test battery in classifying and rating students for assessing status and improvement. In this capacity the test is generally in the form of a distance run or endurance exercise rather than of physiological measurements. This test should not be considered as a substitute for a medical examination.

Cardiovascular tests may be utilized by the physical educator for the purpose of research. This test is treated as observational research in which measures are taken of status as for establishing norms, or test may be given before and after a training program in order to measure improvement.

**Test Administration:**

However, the purpose of this test was to measure the cardiovascular efficiency of college students of age group 18-21 years.

**Reliability:**

The reliability of this test is 0.94 was reported by Doolittle and Bigbee.

**Validity:**

The validity coefficient of this test was ranged from 0.64 to 0.90 as obtained when maximum oxygen intake was used as the criterion.

**Facilities, Equipment and Materials:**

To conduct 12 min run/walk test a 400 M. Standard track with eight lanes was used. The track was marked with starting line further for measuring the distance traveled line was marked after every 10 M distance from the starting line. This enables the tester to quickly determine the exact distance
covered in twelve minutes. A stop watch, whistle and distance markers are needed for the testing.

It is usually most efficient to assign each runner to spotter. The runner starts behind the starting line upon the starting signal. Run or Walk as many round as possible around the 400 M. track within twelve minutes. The spotter maintained a count of each lap or round and when the signal to stop is given, they immediately run to the spots at which their runner were at the instant the whistle or command to stop was given.

**Scoring:**

The score is recorded in distance and i.e., expressed in meter, which is determined by multiplying the number of complete laps or round plus the extra distance covered.

**Additional Pointers:**

a) The spotter should measure the correct laps.

b) For added protection the runner should also count the number of laps covered or given a token for every laps or round.

c) The tester should alert the spotter at least 30 seconds before the end of 12 minutes.

d) When the whistle sounded. The tester can then move to each spot and record the score.
Assessment of Cardiovascular Efficiency
3.6 Composition and Description of Independent Variables

Following Pranayama training schedule was followed during experiment for total eight weeks:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Pranayama</th>
<th>Sr. No.</th>
<th>Name of Asana</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kapalabhati Kriya</td>
<td>1.</td>
<td>Shavasana</td>
</tr>
<tr>
<td>2.</td>
<td>Anuloma Viloma Pranayama</td>
<td>2.</td>
<td>Padmasana</td>
</tr>
<tr>
<td>4.</td>
<td>Bhastrika Pranayama</td>
<td>4.</td>
<td>Sarvangasana</td>
</tr>
<tr>
<td>5.</td>
<td>Bhramari Pranayama</td>
<td>5.</td>
<td>Naukasana</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td>6.</td>
<td>Bhujangasana</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td>7.</td>
<td>Dhanurasana</td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td>8.</td>
<td>Chakrasana</td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td>9.</td>
<td>Pashchimatanasana</td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td>10.</td>
<td>Vrikshasana</td>
</tr>
</tbody>
</table>

(The duration of pranayama and OM Chanting was 45 min. and duration of Asanas was 15 min. for preparing a body for pranayama practice)

A) Techniques of Asana

1) Shavasana

It is a traditional relaxative posture. The posture is called shavasana as it resembles a dead body. In Sanskrit shava means a dead body, lying supine on the ground at full length, motionless like a dead body, is called Shavasana. Adopt a comfortable supine posture with the feet kept comfortably apart and the hands on the side with the fingers semi flexed. Once the final posture is assumed, there should not be any movement in the body. Close the eyes, start a little deeper abdominal breathing and attend to the flow of breath.
Starting Position:

- Lying on the back with hands extended along the body and the feet together.

- Make a distance of about one to two feet between the feet, the toes pointing outside.

- Place both the hands on the ground at a comfortable distance from the body with fingers in a semi flex position.

- Keep the hand in a most convenient position.

- Close the eyes and gradually withdraw your body sense.

- Start with a moderately deep abdominal breathing.

- Attend to the flow of the breath without moving the body.

Important Point’s to Remember:

Do’s:

- Take a comfortable supine position which offers least resistance to the gravity.

- Keep the eyes close throughout the practice.

Don’ts:

- Once the final posture is assumed do not move the body.

Expected Learning Outcomes (Advantage)

- Remove physical and mental fatigue.

- Gives a sense of relaxation and feeling of freshness.
2) Padmasana

Padmasana is one of the meditative postures, and it resembles a lotus from a distance. In Sanskrit padma means “lotus” sometime it is also called kamalasana. Fold the right leg in the knee and place the right foot at the left groin in such a way that the right heel touches the lower part of the abdomen on the left. Similarly, fold the left leg in the knee and set the left foot at the right groin. Adjusting the heel to touch the lower part of the hands on the corresponding knees either covering them with the palms or the fingers may be formed in to Jnana-Mudra. Which is done by resting the wrists on the knees and joining the index fingers with their respective thumbs, while the rest of the fingers are spread out keep the eyes closed and sit erect.

Starting position:

- Sitting with the legs extended together.
- Fold the right leg in the knee and place it in the left groin in such a way that the right heel is touching the lower part of the abdomen.
- Fold the left leg in the knee and keep the heel in touch with the lower part of the abdomen.
- Place both the hands on the respective knee and sit erect by closing the eyes.
- Open the eyes and remove the hands from the knee and place them on the ground.
- Remove the left foot from the right thigh and extend it.
- Remove the right foot from the left thigh and extend it.
**Important Point to Remember:**

**Do’s:**

- Keep the heel in touch with the lower abdomen.
- Keep the knees in touch with the ground and if necessary press them down gently by hands.

**Don’ts:**

- Avoid bending at the back or at the loins.
- Avoid applying force while making a foot-lock

**Expected Learning outcomes (Advantage)**

- Improve better circulation in the legs
- Helps to improve faulty posture
- Helps to become more introspective
- Helps to remove mental and physical fatigue
- Is useful in higher practices like pranayama as and meditation
- Helps to improve better concentration

3) **Shalbhasana**

In Sanskrit, Shalbha means locust. In the full posture, the body resembles the shape of locust. It is further development of Ardha-salbhasana, lie prone with the hands by the side of the body and chin resting on the ground clench the fists and inhale a little. Raise both the legs together making an angle of about 45° and keep the knees straight. Maintain the posture for some time and lower the leg to their original position. Exhale and have normal breathing for some time.
Starting position:

- Lie prone on the ground with the hands by the side of the body and the feet together.

- Inhale a little and hold the breath. Clench the fists.

- Raise both the legs backward, keeping the weight on the fists and maintained the posture for some time.

- Lower the legs to the ground.

- Exhale.

Important Point to Remember:

Do’s:

- Raise the legs slowly without jerks.

- Take the support of the hand to rise the legs.

- In the beginning it will be profitable to keep the fists under the thighs to rise the legs high.

Don’ts:

- Avoid bending in the knees.

- Avoid keeping distance between the knees.

- Avoid bending at the elbows.

- Avoid maintaining the final position for a long time.

Expected Learning Outcomes:

- Strengthens the number region.
• Gives good exercise to the pelvic organs.
• Increases the tone of the abdominal muscles.
• Improve respiratory efficiency.

4) Sarvanga\(n\)asana

The posture is called Sarvang\(a\)sana, because it influences the whole body and its functions. Sarva means “Whole” and anga means ‘body’ in Sanskrit. It is a further development of Viparitakarani. After having taken the position of viparitakarani further rise the whole trunk with the support of the arms and the elbow till it stands erect on the ground.

The body stand vertically on the shoulders. Try to support the trunk from behind with the bracketed hands till the chin is well set in the jugular notch. This completes Sarvang\(a\)sana. Maintain the posture as long as possible without any discomfort.

Starting Position:

• Lie on the back with the hands extended along the body and the feet together.
• Raise both the legs slowly up to 30\(^\circ\) keeping the knees straight, and stop there for some time.
• Raise the leg further up to 60\(^\circ\) and stop there for some time.
• Rise the leg still further up to 90\(^\circ\) and stop their for some time.
• Raise the whole trunk and press it for the back with the hands till the chin is well set in the jugular notch.
• Release the supports of the hands from the back and brings the legs up to 90\(^\circ\)
• Lower the legs still up to 60° and stop there.
• Lower the legs still up to 30° and stop there.
• Brings both the legs slowly to the grounds.

*Important Points to Remember:*

*Do’s:*

• Move both the legs should be slow, stopping at different angles.
• Raise the legs till they stand vertically resting on the shoulders.
• Press the trunk with both the hands.

*Don’ts:*

• Avoid bending in the legs and loins.
• Avoid jerky action in assuming the final position or returning from it.

*Expected Learning Out-comes (Advantages)*

• Gives good exercise to the neck region.
• Helps better return of the venous blood.
• Helps in maintaining healthy thyroid function.
• Improve the health of the abdominal organs.

5) *Naukasana*

    This is an imitation of a boat from the supine position Nauka means ‘boat’ in Sanskrit. Hence it is named as Naukasana from the supine position when the legs are raised on one side and the trunk on the other to about 45° and the hands are fully stretched forward, this asana is completed. The posture is maintained for some time so long as it is comfortable. This can be repeated according to the capacity and the need.
**Starting Position:**

- Lie on the back with the hands extended along the body and the feet together.
- Raise both the legs together to about 45°
- Raise the trunk and the head to 45° approximately.
- Stretch the hands forward and maintain the position for a comfortable time.
- Bring the hands on the sides.
- Bring the trunk and the head to the ground.
- Bring the legs down and come back to the starting position.

**Important Points to Remember:**

**Do's:**
- Repeat the asana to get optimum exercise to the abdominal muscles.
- Stretch your hands fully.

**Don'ts:**
- Avoid bending at the knees and leaning back ward.

**Expected Learning Out-come:**

- Increases the tone and strength of the abdominal muscles.
- Helps better functioning of the abdominal Organs.

6) **Bhujangasana**

The posture is named Bhujangasana as the fully display of it resembles a hooded snake under irritation. Lie prone by placing the hands extended along the body, forehead resting on the ground in a relaxed manner. Place the palms on the ground by the side of the chest; slowly raise the forehead up, then the neck and then the chest. Try to give a full backward curve to the spine, so that
the pressure is felt at the abdomen. Maintain the posture comfortably for some time and come to the starting position slowly in the reverse order.

**Starting Position:**

- Lie prone with the forehead resting on the ground the arms extended along the body and the legs fully stretched.
- Place both the hands by the side of the chest bending them at the elbows which are raised.
- Slowly raise the head by bending the neck backward.
- Looking up raise the chest slowly from the ground giving a good bend to the spine.
- Further raise the upper part of the abdomen and maintain the posture.
- Bring down the upper part of the abdomen to the ground.
- Lower the chest to the ground. Bringing the forehead to the ground.
- Come to the starting position by extending the arms.

**Important Points to Remember:**

**Do’s:**

- The trunk should be raised only up to navel region.
- Least pressure should be exerted on the hands.
- Raise the trunk slowly, as if one is lifting the vertebrae one by one like loop in a chain.
- Maintain the asana for a comfortable time
**Don’ts:**

- Avoid strengthening the elbows.
- Don’t allow the elbows to spread out.
- Avoid all jerky actions and strain.

**Expected Learning Outcomes (Advantage)**

- It gives flexibility to the spine.
- It improves the function of the organs situated in the abdominal cavity and the organs of respiration.

### 7) Dhanurasana

The posture is called Dhanurasana because it resembles a bow with the string joined to it. In Sanskrit, dhanu means a ‘bow’ here the trunk and the thighs represent the proper bow structure while the hands and the legs represent a string. Lie prone with the chin resting on the ground and hands placed along the body. Bend the legs in the knee joints, catch hold of the ankles. Raise both the ends i.e. the chest on one side and the thighs on the other, resting the whole body on the abdomen. Try to look up and maintain the position for some time. Slowly release the posture. This completes Dhanurasana.

**Starting Position:**

- Lie prone with the feet together and the hands extended along the body.
- Bend the legs in the knees.
- Hold the ankles firmly with the respective hands and keep the forehead on the ground.
- Inhale a little and raise the forehead.
- Raise the chest and the thighs by slowly punting the ankles upwards to assume the position like a bow.
- Release the posture by bringing the chest and the thighs back to the ground.
- Bring the head back to the ground and test on the chin.
- Release the hold at the ankles and place the hands on the sides.
- Unfold the legs and come to the starting position.

**Important Points to Remember:**

**Do’s:**
- Keep the knees a little apart so as to give a good bend at the back and the neck in the beginning.

**Don’ts:**
- Avoid jerks in raising the body.
- Avoid bending at the elbows with maintaining the final position.

**Expected Learning Outcomes:**
- The deep and superficial muscles of the back become stronger.
- Abdominal organs receive good exercise and their function improves.

8) Chakrasana

The posture is named as Chakrasana because it resembles the circular appearance of a wheel. In Sanskrit charka means ‘wheel’ Swami Kuvalayananda has included this asana in the yogic physical culture to give exercise in the lateral bending of the spine. Hence, it is a different variety of chakrasana, stand with the feet together and the hands in line with the body. Raise slowly one of the hands, say right, sideward and upward and keep the arm close to the ear.

Bend the trunk to the left side slowly, the right hand and the head following the bend. Keep the raised hand straight without any bend at the
elbow. Maintain the posture for some time in the final position before returning to the starting position. Repeat the same procedure using the other hand and bending the trunk to the right side.

- Standing with feet together.
- Raise the right hand from the side. Bring the hand close to the right ear and stand erect.
- Slide the left hand down along the left leg as far as possible allowing the right hand and the head to follow the bend.
- Release the posture by sliding the left hand back to the starting position.
- Bring the right hand down to the original position.
- Raise the left hand from the side. Bring the hand close to the left ear and stand erect.
- Slide the right hand down along the right leg as far as possible.
- Release the posture by sliding back the right hand to the original position.
- Bring the left hand down and come to the starting position.

**Important Points to Remember:**

**Do’s:**

- Raising of the hands and bending to the side should be done very slowly.
- Keep the raised hand close to the ear.
- Repeat the asana conveniently.
Don’ts:

- Avoid bending the body either to the front or to the back.
- Avoid any angle between the feet.

Expected Learning Outcomes:

- Develops lateral flexibility of the spine.
- Improves the respiratory functions.

9) Pashchimatanasana

Pashchimatana means ‘stretching’ the posterior region. In Sanskrit, poschima means ‘posterior’ and tana means ‘stretch’ in this posture almost all the posterior muscles of the body are stretched hence the name. Sit on the ground by extending the legs. Prepare hooks by bending the index fingers of both the hands and catch the corresponding big toes. If found difficult hold the ankles by the respective hands. Now slowly bend the trunk forward by relaxing the neck muscles. Touch the knees with the forehead. Maintain the position for some time, if possible. Release the posture and come to the starting position.

Starting Position:

- Sitting with the legs extended together.
- Bend the elbows, make hooks with the index fingers and bring them near the chest.
- Bend the body forward and catch hold of the toes with the hands of the fingers.
- Place the head between the arms.
- Keeping a little bend in the elbows and without bending the knees, try to touch the forehead to the knees, maintain the position for some time.
- Raise the head slowly from the knees and bring it between the arms.
• Raise the head from the arms.

• Leaving the hold of the toes and keeping the body erect bring the hooks of the fingers near the chest.

• Place the hands on the respective sides of the body and return to the starting position.

**Important Points to Remember:**

**Do’s:**

• Try to exhale while bending forward. This will help the bending comfortably.

• Try to relax while bending forward. Take away the mind from the body.

• Maintain the final position longer. This will gradually help in further progress.

**Don’ts:**

• Avoid jerks and strain while assuming and releasing the posture.

• Do not allow the knees to bend while touching the forehead to the knees.

**Expected Learning Outcomes:**

• Gives the spinal column a good posterior stretch.

• Helps to increase the flexibility of the spinal column.

• Helps to decongest the organs situated in the abdominal cavity and improves their blood circulation.

• Helps to correct postural deformities.

**10) Vrikshasana**

This is another balancing posture. In Sanskrit vriksha means ‘tree’ the final posture resembles a tree with the legs and the hands as its branches, stand erect, Bend the right leg at the knee. Place the sole of the right foot firmly at the
root of the left thigh. Fold the hands as in ‘Namaskara’ Balance one leg and after some practice try to close the eyes. Repeat the same with the other leg.

Starting Position:

- Stand with the feet together.
- Bend the right leg in the knee and place the right sole at the root of the left thigh.
- Fold both the hands on the chest in the Namaskara position.
- Place the right foot on the ground and bring the hands on the sides.
- Bend the left leg in the knee and place the left sole at the root of the right thigh.
- Fold the hands on the chest in the Namaskara position.
- Place the left foot on the ground and bring the hands on the sides.

Important Points to Remember:

Do’s:

- Taking the help of the hands place the foot at the root of the thigh pointing the toes down wards.
- Keep the knee of the folded leg projected side ways.

Don’ts:

- Avoid any angle between the feet.
- Avoid bending at the lines.

Expected Learning Outcomes:

- Improves balancing mechanism.
- Increases the strength of the muscles of the legs.
B) Techniques of Pranayama

1) Kapalabhati

Kapalabhati is classed as one of the six cleansing processes in yoga. Kapala, in Sanskrit, means ‘forehead’ and bhati means ‘to shine’ hence the name, it removes impurities from the passage of the nostrils and the sinuses by the forceful of the air. This is done in sitting position. Form a foot-lock by placing 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 abdominal strake at the navel region. Let the abdomen relax and simultaneously inhale. In the beginning practice 10=20 rounds of kapalabhati. The number of strake and the speed may be increased as one gets used to the practice.

Starting Position – Sitting with the legs extended together.

- Place the right foot on the left thigh.
- Similarly, place the left foot on the right thigh.
- Place the hands on the respective knees.
- Raise the chest a little and sit erect.
- Exhale suddenly and forcibly given an inward stroke at the navel region.
- Relax the abdomen completely and inhale.
- Repeat the forceful exhalation and inhalations a number of times comfortably.
- Lower the chest.
- Release the hands from the knees.
- Remove the left foot from the right thigh and extend it.
- Remove the right foot from the left thigh and come to the starting position.
Important Points to Remember:

**Do’s:**

- Sit erect while doing Kapalbhati.
- Soon after exhalation relax the abdomen fully and inhale, soon after inhalation, do forceful exhalation.

**Don’ts:**

- Avoid all contortions on the face.
- Avoid the chest movement.
- Avoid doing Kapalbhati with loaded stomach

**Expected Learning Outcomes:**

- Keeps the respiratory passage clean.
- Helps to promote blood circulation in the whole body.
- Helps to increase the efficiency of the respiratory system.

**Physical Benefits:**

- Kapalbhati cleanses the nasal passages, lungs and entire respiratory system.
- It strengthens and increases the capacity of the lungs and the inter costal muscles.
- Bronchial congestion is removed as is spasm of the bronchial tubes; consequently, asthma is relieved and cured over a period of time.
- As the lungs are cleansed, excess carbon dioxide is eliminated. This permits the red blood cells to suck in more oxygen, increasing the richness of the blood.
• This blood is purified and towed. The body gets an increased supply of oxygen to all cells.

• The abdominal contractions of Kapalbhati massage the liver, spleen pancreas, stomach and heart, thus invigorating them. Abdominal muscles are strength Enid, digestion is improved.

**Mental / Psychic Benefits:**

• Kapalbhati refreshes and invigorates the mind.

• It brings an increase in alertness as a result of the increase of oxygen to the brain.

• It creates a feeling of exhilaration.

• Kapalbhati activates panic energy.

2) Anuloma-Viloma

It is classed as a type of *pranayama*. In *pranayama* controlled breathing is insisted upon, when the breath is unsteady, the mind is unsteady, but when the breath is still, the mind is also still. In Sanskrit, anuloma means towards and loma or viloma means ‘reverse’ It is also called toma-viloma, one inhales through the left nostril, holds the breath and exhales it through the right nostril and again inhaling through the right nostril and holding the breath, exhales through the left nostril. This completes one round of the Anuloma-Viloma.

Maintain a time ratio of 1:3 between the inhalation and the exhalation i.e. if inhalation is for five second then exhalation should be for 10 seconds. While doing this practice keep a control over the abdomen. One may start with five rounds and slowly go on increasing the rounds up to ten or even more.

**Starting Position** – Sitting in Padmasana or in other comfortable posture.

• Keep the body erect and place the hands on the respective knees.
- Raise the right hand and place the right thumb on the right nostril and close it. Inhale slowly through the left nostril.

- Close the left nostril by using only the ring and the little fingers and exhale slowly through the right nostril in a ratio of 1:2 between the inhalation and the exhalation.

- Again inhale through the right nostril.

- Now exhale through the left nostril.

- Repeat the stages 2 to 5 at least five times.

- Place the right hand on the right knee.

- Stop the practice and release the posture.

**Important Points to Remember:**

**Do's:**

- Slowly inhale the air without bulging the abdomen.

- Exhale the air by pressing the abdomen in.

- Keep ratio of 5:10 between the inhalation and the exhalation.

**Don’ts:**

- Avoid producing any sound from the nose.

- Avoid pressing head on the nostrils.

- Avoid retaining breath in the beginning.

**Physical Benefits:**

- Anuloma Viloma cleanses and strengthens the lungs and entire respiratory system.

- It harmonizes the entire system.
During retention there is the highest rate of gaseous exchange in the lungs. Because of the increase in the pressure, more Oxygen goes from the lungs into the blood and more Co2 pass from the blood in to the lungs for elimination during exhalation.

As exhalation is twice the time of inhalation, state air and waste products are drained from the lungs.

The anabolic and catabolic processes of the body are brought into equilibrium.

**Mental Benefits:**

- Anuloma Viloma helps to calm the mind making it lucid and steady.
- Practice of Anuloma Viloma purifies the nadis. It should be mastered and practiced on a regular basis before going on to more advanced pranayamas.
- Prana, the vital energy, is stored and controlled.
- It makes the body light and the eyes shine.
- The psychic system is balanced.

3) **Bhastrika Pranayama (The Bellows Pranayama)**

**Contra-indications:** Persons having any serious trouble in the lungs abdomen and throat should avoid this pranayama.

**First Variety**

**Technique:**

**Starting Position:** Sit in Padmasana. Catch the knees firmly with the respective palms i.e. apply Drona Mudra Apply Moola Bandha
Action: The technique of Bhastrika can be roughly divided into two parts.

First Part: Retaining the Moola Bandha, expand the chest and fix it as in Kapalabhati. In the state of expanded chest and contracted lower abdomen, give a stroke at the middle portion of the abdomen i.e. The portion of the abdomen in between the ribs (epigastric region) and breathe out quickly and, immediately actively protrude the epigastric region to the original position and at the same time breathe-in quickly. In the same way perform quick cycles of breathing-in and breathing-out, one after mother, without stopping in between. This breathing will be active and with a frictional sound. Breathing will be shallow and rhythmic. Perform these cycles with increasing speed. Perform these breathing-in and breathing-out cycles till you feel short of breath and can not maintain the speed, finally do Rechaka fully and then complete the Pooraka slowly. From here, the second part of Bhastrika commences.

Second Part: After finishing the complete Rechaka, do the Pooraka through the right nostril somewhat slowly i.e. in about 8-10 seconds. At that time, keep the nasal passage free. After completing the Pooraka, start the Kumbhaka. Then by applying the Jalandhara Bandha, close the air-passage in the throat: Draw in the navel region (i.e.Uddiyana Peetha) and keep it in the same contracted position. Maintain an easy Kumbhaka as per capacity. After this, start the Rechaka. First release the jalandhara Bandha and take the head up. Close the right nostril with the right thumb and perform the Rechaka slowly through the left nostril. Prolong the Rechaka as much as you can with case and comfort.

Eyes: Keep the eyes closed throughout.

Attention: In the first part, let the attention be on the movements of the abdomen while in the second part of Pooraka, Kumbhaka and Rechaka, let the attention be on the lower abdomen.

Practice: In the first part, give 20 quick strokes, complete the easy Kumbhaka of the second part. Perform 3 Rounds in this manner.
While performing Bhastrika along with Kapalabhati and Ujjayi pranayama, three Rounds of Bhastrika are enough. However, if only Bhastrika Pranayama is to be done, perform 18 to 36 Rounds according to the above.

Probable Mistakes and their Correction:

- Do not lean backward during the Pooraka and lean forward during the Rechaka. Keep the body erect.

- Do not move the torso during the performance of the first part of the pranayama.

- Avoid unnecessary contractions or movements of the facial muscles or the lower portion of the nose during the bellow-like breathing in the first part of the Pranayama

- Do not exceed your capacity during Kumbhaka so that you are not starved for air and the subsequent operations are not upset.

- Do not bring the shoulders forward or bend them while applying Jalandhara Bandha during Kumbhaka.

Notes:

- Practice the Bhastrika Pranayama after mastering the techniques of Kapalbhati and Anuloma-Viloma.

- If there is a desire and capacity, one can perform Easy Shoonya Kumbhaka also. Performing this is optional.

- It is all right to do the Rechaka through both the nostrils.

- There are many methods of performing Bhastrika Pranayama, short descriptions of some of these are given below for the information of eager sadhakas.
• In all these, the Rechaka (Breathing out) and the Pooraka (Breathing in) in the first part are speedy, shallow and performed only by strokes given to the middle and upper abdomen.

• In some traditions during the stroke in the first part, sound is produced by closing the throat partially.

Second Variety

Partially close the throat while giving strokes in the first part. Produce sound during Rechaka and Pooraka. In the second part, do the Pooraka through the right nostril and the Rechaka through the left nostril. The remaining part of the technique is as given above.

Third Variety

In the first part, do the Pooraka and the Rachaka through the right nostril while giving odd numbered strokes i.e. 1,3,5,7 and so on. Keep the nasal passage free and during even numbered strokes i.e. 2,4,6,8 etc. do the Rechaka and Pooraka through the left nostril.

In the second part, leave the nasal passage free. During the odd numbered Rounds i.e. 1,3,5,7 etc. do the Pooraka through the right nostril, followed by Kumbhaka and finally do the Rechaka through the left nostril. For the even numbered Rounds i.e. 2,4,6,8 etc. do the Pooraka by the left nostril, followed by the Kumbhaka and finally do the Rechaka through the right nostril.

Fourth Variety

In the first part, quickly do the pooraka through the right nostril and the Rechaka through the left nostril with strokes till one feels short of breath and cannot maintain the speed.

Then in the second part, do the Pooraka through the right nostril, followed by the Abhyantara Kumbhaka and then finally do the Rechaka
through the left nostril. Thus complete on Round. Follow this procedure for odd numbered Rounds i.e. 1,3,5,7 etc.

In the same way for the even-numbered Rounds i.e. 2,4,6,8 etc. perform Bhastrika as follows:

In the first part quickly do the Pooraka with the left nostril and the Rechaka through the right nostril with strokes at the abdomen till one feels short of breath and cannot maintain the speed.

In the second part do Pooraka through the left nostril. Then maintain Kumbhaka as per text i.e. with Tribandhas and finally do the Rechaka through the right nostril.

Notes:

- Perform Bhastrika, keeping in mind the notes given under Kapalbhati and Ujjayi.

- Different methods of performing Bhastrika are prevalent in different traditions. One can practice any method which suits him/her.

- Perform Kumbhaka in Bhastrika within one’s capacity and which gives a happy feeling.

- The Pooraka and the Rechaka in the first part of Bhastrika are not slow as in other Pranayamas but fast and quick because they are the result of strokes. In the same way one should not forget that the Pooraka also in the second part is more speedy and reactionary compared to the Pooraka in other Pranayamas.

- Some traditions (e.g., Gheranda Samhita) suggest 20 strokes in the first part of Bhastrika.
Benefits:

- The benefit of Bhastrika Pranayama gives all the benefits of other pranayamas and Kapalbhati, with some differences.

- Both abdominal breathing and chest breathing are taken care of.

- Asthma, breathing problems, gasping for breath, inefficient breathing etc. are mitigated to a great extent.

- The Practice of Ujjayi, Kapalbhati, Anuloma-Viloma and Bhastrika are complementary to each other.

- Bhastrika Pranayama can be practiced in any season. Its practice keeps a balance between the Tridoshas i.e. Vata (air Principle) Pitta (bile) and Kapha (phlegm) in the body.

- Digestion function is activated and made more functional.

- Promotes spiritual progress.

- Emotional life gets balanced to some extent.

- Helps the mind to become peaceful and single-pointed i.e. concentration capacity is increased.

4) Bhramari Pranayama

The solemn sound of the ocean, the sounds made by the glow-worms on a dark night, the jingling of the ghungaroos, the serene sounds of church bells coming from a long distance at dawn, the whistle blown in a dense forest, the soft bubbling sound of a stream in an isolated place, the cracking sound generated in a bamboo jungle when the wind blows, the enchanting sounds of cymbals and mridanga coming from far away at night, the grinding sound coming out from the manual grind-stone on a quiet morning. (With traditional
songs), in the village, the tinkling sound produced by the bells around the necks of the bullocks while they tread slowly, the melodious sound coming out of a stringed instrument like a tambora at the crack of dawn with a pleasing devotional song, the high-pitch singing of the cuckoos from a mango grove at midday etc. are wonderful, magical sounds which bring a rare, unique and ecstatic pleasure human mind and ears. Many minute sweet and melodious vibration and resonance in the sounds have a soothing effect on the nerves and the mind. Many a times, such happiness could be like the pleasure one gets during Savikalpa Samadhi complete merging of the mind in the subject). Because of these capabilities of sound, it is called “Nada Brahma” Nada Brahma can bring about Gana Samadhi to both the singer and the listener. That is why supreme importance is given to sound in spiritual science. In Shambhavi Mudra, Shanmukh Mudra Ujjayi Pranayama, Bhamari Pranayama etc. use is made of these very sound vibrations for increasing the serenity of the mind and preparing it for merger with the subject. This is called “Laya Yoga” In Hatha Yoga, this is called “Nadanusandhana” It is practiced to arrest the fickleness and modulations of the mind. In this practice it is said that the sadhaka gets progress by practicing the initial stage, the ‘Ghata’ stage, the order. It is said that in these stages many sounds (Produced without friction) are also experienced by the sadhaka. From this one can gauge what a high place is given to vibrations and sound in Hatha Yoga.

While practicing Pooraka and Rechaka in Bhamari Pranayama, low but reverberating and pleasant humming sounds are produced similar to those made by the male bee and the female bee respectively. It is said that, with this vibrational sound, the body, mind and the chitta (cognitive affective and conative functions of man) become pleasant and the entire personality is filled with ecstasy. It is not surprising, therefore, that this Pranayama has proved to be the master key to the release of tensions in this modern tensionful world.
Contra-indications: if there is a swelling or pain in the throat/nose or if the nose is choked, or if there is an extra growth of a bone or muscle in the nose, this Pranayama should be avoided.

Leading and Preparatory Practices: Practice Bhramari Rechaka and Bhramari Pooraka separately for a few days. Only after getting a good practice of both separately, one can combine these leading practices and produce a humming sound both in the Pooraka and in the Rechaka.

However, the ideal proportions of time between Pooraka and Rechaka should be practiced only after getting a good command over Pooraka and Rechaka.

Technique:

Starting Position: Sit in any of the sitting postures. Apply Moola Bandha.

Action:

Pooraka: Bring the soft palate and the throat near to each other and start performing Pooraka. A humming sound resembling Um as in “numb” is produced. In the beginning this sound is irregular, harsh and rough. However, with practice, this sound becomes clear, vibratory sweet and humming. The sound would then be like that coming out of a stringed instrument i.e. sweet and attractive and humming, like that made by the male bee. Complete the Pooraka in the predetermined time such that Rechaka : Pooraka ratio is 2:1.

Kumbhaka: The time taken for the Rechaka is twice that taken by the Pooraka. Therefore, the same air which is inside the lungs has to be released over a longer period at a slower rate and lesser volume. Therefore, the quality of the vibrational sound production in Rechaka is different. The pitch loudness, volume (of sound) and vibrations as also the timbre are less and, therefore this sound is mind-winning, more delicate, subtle and ringing, resembling the humming sound of a female bee.
Release the Jalandhara Bandha. Bring the inner part of the throat to the soft palate. Contract the chest slowly. Produce a mixed sound resembling in Omkara with the (nasal sound). Imitate the sound like that of a female bec. Let this sound reverberate and continue till the completion of the Rechaka (Fig.12.8) After completing the Rechaka as above, continue the chain of Pooraka-Kumbhaka-Rechaka a number of times as per your desire.

Gaze and Attention : Keep the eyes closed and let the attention be on the exhilarating humming sound that is produced in Pooraka and Rechaka.

Practice : Health culturists may perform 10 to 30 Rounds one after another in a day, beginning with 5 Rounds and adding 5 Rounds each week.

After completing the desired number of Rounds, release the Moola Bandha and relax.

Probable Mistakes and their Correction : Leaning backward or forward during the Pooraka and Rechaka respectively should be avoided.

Notes:

- In the beginning practice only Rechaka. The practice of simple Pooraka (i.e. without sound) and Rechaka with sound, increases one’s confidence, and the actor of producing sound during the Rechaka is made easy.

- In the beginning, while bringing out the sound during the Pooraka there is irritation of the throat and coughing is produced. At such times, stop the practice.

- First practice the art of producing the sound like that of a bec. In the beginning produce this sound only during the Rechaka. Afterwards, produce the sound during the Pooraka only. Practice sound production in Rechaka and in Pooraka Separately. Then practice only Pooraka and
Rechaka, both with sound. Later, after these are mastered, practice Pooraka, Kumbhaka and Rechaka in the required rations.

- The joy of performing Bhramari at midnight when there is all-round peace everywhere is indescribable.

- In Gheranda Samhita it is said that if Bhramari Pooraka, Kumbhaka and Rechaka are practiced at midnight in a calm and quiet place, plugging the ears with fingers, a variety of sounds are experienced and the mind merges in them.

**Benefits:**

- The ringing and melodious vibrating and sweet sound in Bhramari elevates and enchants the body and mind. Hence, Bhramari is called “Mood-elevating Pranayama.

- Mental stresses and strains are removed and, as a result, the whole body is relaxed. This is a golden key for sound sleep.

- All the systems of the body become activated.

- Mind becomes single pointed. Minor functional defects of the mind are kept at bay.

- This Pranayama is the best way to get rest, peace of mind and mental stability.

5) **Ujjayi Pranayama**

There is a tendency among common people to avoid even some beneficial things if there are strict and numerous difficulties and restrictions. The common people, while playing cards, prefer rummy to bridge, and prefer carom to the intellectual game of chess. This is the nature of man from times
immemorial and it will continue for ever. This is the same reason why many persons, fearing Yamas and Niyamas in Yoga, keep themselves away from them. In Hatha Yoga there is a very beneficial Pranayama practice which even such persons would like and its name is “Ujjayi Pranayama”

This Pranayama, when compared to the other types of Pranayamas, has less restrictions and more benefits. The first advantage of this is i.e. Ujjayi Pranayama can be practiced while walking, sitting or standing.

Such a concession is given for this Pranayama. Secondly, it is said that in this Pranayama, Kumbhaka can be maintained according to one’s capacity. This means that it is not a must to keep the traditional restrictions of ratio between Kumbhaka and Pooraka / Rechaka while practicing this Pranayama. Because of these concessions, common sadhakas feel relieved. Even with these concessions, the benefits accruing from this Pranayama are not less. The particular benefits derived from this Pranayama are such as to attract no only the spiritual sadhakas but also the commoners.

This Pranayama can be practiced while walking even without the application of any Bandhas. Due to these advantages, even persons leading fast life-styles in big cities like Mumbai (Bombay), Chennai (Madras), New York, London, Paris etc. can practice this Pranayama, if they so wish. One can take advantage of this Pranayama practice while going to the station, while waiting for the bus at the bus at the bus stop or even while traveling in the bus or train. Such a practice, however, is not ideal. From the point of view of the maxim something is better than nothing, it has some importance. Therefore, due its extra ordinary characteristics, this Pranayama is a boon to the common urban Yoga sadhakas leading busy city life-styles.

The word “Ujjayi” is derived by prefixing the word “Jai” with “Ud” “Ud” means with force or speed and “Jai” denotes success. From this “Ujjayi” would mean “Sound Proclaiming Victory”
While practicing Ujjayi, a sweet, melodious whistling sound is produced from the throat. It is possible that this Pranayama was given the name Ujjayi taking the sound as denoting the proclamation of victory (Jaijaikar). If one sees from another point of view “Ud’’ means ‘Great’ and “Jai’’ means success. The one who practices it gets great success- this meaning can also be taken of the word “Ujjayi”.

**Contra-indications** : Persons having throat infections, acute disorders particularly of the lungs or blockage of then nose should avoid this Pranayama.

**Caution:**

- The sound comes through the throat. It should not be nasal. If the heaviness in the head, giddiness etc. occur, it is better to stop the practice of the Pranayama.

- Faulty or excessive Pooraka can have ill-effects on the lungs.

**Technique :**

**Starting Position** : Sit in Padmasana (If this is not possible, sit in Sukhasana or Swastikasana). Let the palms be in Padma Mudra. Let the gaze be on the tip of the nose (Nasagra Drishti) or normal aply Moola Bandha.

**Actions** : Pooraka, Abhyantara Kumbhaka and Rechaka are the three important phases of Ujjayi Pranayama. (Note: if Bahya Kumbhaka is done it is the fourth phase of the Pranayama. It is all right if common people omit this part.)

The actions in each phase are independently described below:

(First determine the length, speed and time required for Rechaka and adjust the time for Pooraka accordingly). Breathe out completely and be ready for Pooraka.

**Pooraka** : Pooraka means controlled and complete breathing-in. while doing Pooraka, air is taken in through both the nostrils.
Constrict the throat (i.e. partially close the glottis) leaving some small space for the air to enter. First raise the shoulders. Afterwards, contract the muscles between the ribs so that the chest will be expanded and the ribs will be raised. At the same time contract the diaphragm such that the dome-like muscles will comes down and the lower part of the chest will expand more. As the void enlarges more and more, the outside air will go on entering. While doing so, due to the partial constriction of the throat, the air will enter with friction and a whistling-like but sweet and self-experienced clear sound will emerge. Keep your mind on this sound. Ensure that this sound is of the same volume, uniform but minute and clear, from the beginning to the end. If the expansion of the chest is done slowly and mythically, the Pooraka also becomes mythmic. Keep your attention on the whistling sound produced during the Pooraka.

**Abhyantara Kumbhaka**

**Caution:**

- This is the most beneficial and at the same time, most effective part in the Pranayama. Caution should be exercised during this phase.

- The forceful application of Kumbhaka can possibly damage the air sacs in the lungs.

First constrict the throat fully and tie the tongue up the palate i.e. apply Jivha Bandha (See note below) Let the chin touch the chest. Fix the chin firmly in the depression in the upper part of the chest i.e. apply Jalandhara Bandha. Let the gaze be between eyebrows (Bhrumadhya Drishti) and keep your attention on this area. At the same time, take the navel region (i.e. Uddiyama Peetha) inward i.e. apply Uddiyana Bandha. This is the Uddiyana Bandha in the Abhyantara Kumbhaka.

Maintain the Tribandha (i.e. Moola Bandha, Jalandhara Bandha and Uddiyana Bandha) comfortably. With case and according to your capacity.
Afterwards, first release the Jalandhara Bandha. Straighten the face release the Bhrumadhya Drishti and closing the right nostril, start the Rechaka through the left nostril.

**Rechaka**

Caution: If the Rechaka is prolonged or intermittent or if control on it suddenly lost, this can possibly strain the heart.

Rechaka should be for double the time taken for the Pooraka, continuous and slow. Before starting the Rechaka, constrict the throat partially so that the outgoing air produces a rhythmic, whistling-like frictional sound. For performing the Rechaka, slowly relax the contraction of the muscles of the chest, one after the other. Relax the abdomen and lower portion of the chest so that the diaphragm and muscles between the lower ribs are slowly relaxed. Afterwards, relax the upper portion of the chest. Finally, bring the shoulders down. Then, contract the abdominal muscles to the maximum to complete the Rechaka.

After completing the Rechaka, wait for a moment and start the second Round of Pooraka, Kumbhaka and Rechaka. Maintain the Moola Bandha from the beginning to the end.

**Practice**: For health culturists, practice of 20 to 60 Rounds, one after another in a day are enough, beginning with 5 Round and adding 5 Rounds each week, each Round consisting of Pooraka, Pooma Kumbhaka and Rechaka.

**However**, spiritual aspirants should practice Rounds of Pooraka, Pooma Kumbhaka Rechaka and Shoonya Kumbhaka as per need.

At the end of the practice release Moola Bandha and relax.
Pooraka

- In Pooraka, the control of the breathing-in process is done by the movements of the chest. The expansion of the chest must be mythmic, continuous and complete. First raise the shoulders. Next, expand the upper chest. Finally expand the lower ribs and upper portion of the abdomen.

- Do not bend the spine backwards.

- The chest will expand on all sides i.e. up and down, left and right sides, and back and front sides. However, one should not exceed one’s capacity limit during the expansion of the chest.

- After completing the Pooraka, if the time taken for it is less, do not indulge in filling the time by awkward jerky actions to increase the duration of the Pooraka for the required period.

- Pooraka should be done continuously and rhythmically. There should not be any intermittent break. If the Pooraka is interrupted now and then, the continuity of the sound produced is lost.

- The control over Pooraka should be with minimum effort up to the end.

- As Pooraka is active, it is easier to control.

- The Sound produced must be guttural and not nasal.

- If one feels heaviness in the head and vertigo-like sensations, the Pranayama practice should be stopped.

- Wrong and excessive Pooraka may damage the lungs.
Kumbhaka

Perform Kumbhaka according to capacity. The pressures created in the chest, abdomen and lungs should be pleasurable. If the pleasure in Kumbhaka is lost, do not try to prolong the Kumbhaka by force.

Rechaka

- Is rhythmic and takes double the time taken for the Pooraka. Therefore, first determine the length speed and time required for the Rechaka and adjust the Pooraka accordingly.

- The Rechaka, being reactionary and passive, is difficult to control. While performing it one should be more cautious.

- Stop for a moment after the Rechaka before starting the next Pooraka.

Benefits:

- Ujjayi Pranayama is like an obstacle race. Just as life in normal times becomes happier when we have developed the habit of facing difficulties, the same thing happens after practicing Ujjayi. Due to the partial constriction of the throat, the lobes of the lungs are required to be expanded to the maximum extent for completing the Pooraka, and the chest and abdomen are required to be contracted to the maximum extent for completing the Rechaka. For these actions, the unutilized capacity of the lungs has to be brought into action. If this is done regularly, then in normal life the breathing becomes easy and light, and the lungs capacity increases just as in the saying “One who dances well can walk easily.” Ease can be seen in the walking of a regular dancer.

- As the efficiency of the entire respiratory system increases, the provision of blood to the brain and the oxygen to the blood becomes abundant. However, this happens because of the discipline and regulation in
breathing due to the practice of Ujjayi and not while practicing the Pranayama.

- The capacity of the brain to tolerate Co2 tension increases (This happens in all Pranayamas). In this state, the conscious control on the brain goes on increasing to the maximum extent.

- All the organs situated in the abdominal cavity get pleasantly massaged. Digestion, excretion and blood circulation processes are activated and normalized.

- The heart gets rest. It also gets pleasantly massaged. The working capacity of the heart also increases.

- Due to the abundant supply of blood, the functioning of the nerves is maximized.

- Because of Nadanusandhana, mental tensions are reduced, the nervous system is smoothened and the mind becomes calm and stable. The body becomes refreshed.

- The benefits of Bandhas and Mudras are also obtained.
GLIMPSES OF TRAINING INTERVENTION
3.7 Procedure of the Study

3.7.1 Pre Test

Although prior permission from the Principal of the College was taken well in advance, the pre test was conducted after receiving the consent in writing from all the subjects prior to this programme.

Each subject was given individual code number i.e. Case number and record card prepared by the investigator so that they can be identified easily.

Demonstration of the test and question asked by the students were clarified and explained. They were also motivated properly. Uniform for the testing of the subject was tracksuit.

Standard procedures were followed for testing all the selected variables.

3.7.2 Daily Administration of Training Intervention

During the experiment, attendance of the subjects was taken regularly and the percentage of attendance after completion of training was found satisfactory. Any question asked by the students has been clarified and they were found contented with the teacher / trainer. They were also motivated properly.

Treatment or training period for the subjects was eight weeks. The duration of training / day was 60 minutes in the morning session, 6 days a week (except Sundays and holidays) for a total period of 8 weeks for the experimental group.
Pranayama practices were taught and practiced in the hall of J.S.P.M. College of Physical Education, Pusad, Dist. Yewatmal, morning at 6.30 am to 7.30 am. The experimental group was engaged and tackled by qualified Yoga teacher under the supervision of present investigator. The subjects were suitably dressed for the purpose.

Instructional part was totally looked after by the qualified teachers and investigator ‘himself’.

Adaptation of the Training Schedule

As the subjects were between age group of 18 to 21 years, a seven-day practice period for adaptation of most of the scheduled practices for the selected groups was good enough. However, some of the selected yoga practices required more gradual and longer duration (7 – 10 days) for adaptation. Regular attendance in the training session was taken.

Administration of Tests

The Principal of the College, teachers as well as subjects were assembled and oriented to the objectives and requirements of the project. The schedule of testing programs was notified to the subjects and testing stations were established to gather the data related to the project.
3.7.3 Post-Test

Post-test was conducted same like pre test. All the subjects were strictly instructed to arrive each station made, like pre-test, for collecting data on the selected variables. Same procedures, as followed in pre test, were performed for tests administration among the subject belonging to both the experimental and control group.

3.8 Statistical Analysis

Primarily, descriptive statistics have been applied to process the data prior to employing inferential statistics. Since there are three variables along with two testing programmes (i.e., pre-test and post-test) conducted for two different groups (yoga and control), the inferential statistics applied was $2 \times 2 \times 3$ Factorial ANOVA. Further, Scheffe’s post hoc test was employed to record comparative effects of yoga on peak expiratory flow rate, vital capacity and cardiovascular efficiency in college students.