Yoga Teacher Training

The Physiology of Breathing and Teaching Pranayama and Bandhas

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Physiology of Breathing and Teaching Pranayama

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Physiology of Breathing and Teaching Pranayama

Introduction

Breath is life. We can live for days without food or water, but deprive us of breath and we die in minutes. In view of this, it is surprising how little attention we pay to the importance of breathing correctly.

Why is breathing important in yoga? The body depends on breathing for the intake of oxygen and the exhalation of waste matter in the form of carbon dioxide. But is breath only chemical? Not so, say the great yogis. They equate breath with both life and energy. In fact, in India, the word “prana” is used for all three. Breath acts as a strong stimulus to the natural energy flow. Proper breathing can help immensely make you more energetic.

Breathing patterns also reflect our emotional states. When we are emotionally upset, the breath becomes erratic, jerky and rapid. But this connection also works in the other direction, whereas the breath can affect our emotional state, and we can use this influence to our benefit. In yoga, deliberate, deep, harmonious breathing is used to help overcome harmful emotional states.

Experts say that few people in Western, industrialized societies know how to breathe correctly. We are taught to suck in our guts and puff out our chests, which causes the muscles to tense and respiration rate to increase. Tensing the belly during breathing also prevents the diaphragm from moving freely. As a result, many of us become shallow "chest breathers," who primarily use the middle and upper portions of the lungs, using as little as 20% of our lung capacity. Babies breathe from the belly, but with age, many people shift from this healthy abdominal breathing to shallow chest breathing. We also often breathe through the mouth rather than the nose, especially during a stressful situation. Breathing through the mouth permits inhaling and exhaling large volumes of air quickly, which can lead to hyperventilation, diminished energy, and a weakening of health and well-being.

There are many reasons for poor breathing habits, including:

- Poor posture. Diaphragmatic breathing is nearly impossible when a person habitually stoops forward
- Mental tension and the ensuing stomach tension. When the stomach is always kept tense, diaphragmatic breathing is impossible.
- Clothing. Wearing tight belts or constraining clothing makes it difficult to breathe properly.

Can you think of any other reasons for poor breathing habits?

Stop right now and notice your natural breath. Describe your own way of breathing.

Diaphragmatic Breathing

Many people in our society do not breathe in an optimal way. To breathe properly, one should begin with the diaphragm – that membrane that separates the lungs from the visceral cavity. When we breathe naturally, the diaphragm moves down as we inhale. The downward movement of the diaphragm pushes the abdomen out slightly. If your abdomen does not expand as you inhale, you are not breathing diaphragmatically. There are breathing exercises in yoga in which we do not use diaphragmatic breathing, but when someone is breathing naturally during normal activity, diaphragmatic breathing is preferred.

Slow, smooth, abdominal breathing (otherwise known as diaphragmatic breathing) is a powerful anti-stress technique. Studies have shown that simply learning how to breathe correctly can have remarkable effects throughout your body. When you bring air down into the lower portion of the lungs, where the oxygen exchange is most efficient, heart rate slows, blood pressure decreases, muscles relax, anxiety eases and the mind calms. A natural stress release is created as you breathe diaphragmatically. Your heartbeat will naturally slow down as your diaphragm stimulates the vagus nerve. Your overall circulation will also improve.

You can see the process of natural breathing most clearly in the breathing of a baby, whose belly will rise and fall with each breath. Babies seem to breathe with their whole bodies, as if every part expands and contracts with the movement of breath. Encourage your students to observe their own diaphragmatic breathing by lying on their back and noticing the natural rise and fall of the belly with the breath.

<u>Benefits of Diaphragmatic Breathing</u>

- Energy efficient
- Enhances gas exchange in your lungs
- Calming/relaxing, activates the relaxation response
- Strengthens your diaphragm
- Increases lung capacity
- Enhances flexibility of ribs and spine
- Provides a gentle internal massage to abdominal organs, enhancing function of stomach, intestines and lymph system
- Slow, regular breathing (done at least 10 minutes a day) can lower blood pressure

<u>How to Breathe Diaphragmatically</u>

Keep your abdomen relaxed, so your diaphragm can move freely and do your best to:

- Breathe in and out through your nose, keeping your mouth gently closed
- Inhale air into the bottom part of your lungs
- Allow your breath to gently expand your belly, but don't push your belly out
- Take slow, smooth and even breaths

- Keep your breath fluid between inhalations and exhalations (no pauses between the two)

Place your hands on your belly. As you breathe in, notice how your fingertips will slightly separate. Your fingertips will go back together when you breathe back out.

Be mindful of your shoulders. If you feel any tightness or tension, allow them to relax and soften as you exhale.

Try focusing your attention on the sensation of breathing itself. Know when you are breathing in and when you are breathing out, following the trail of your breath with your mind. When you mind begins to drift to other thoughts or concerns, gently bring your attention back to your breath. If your mind continues to wander, try counting slowly to 4 or 5 as you inhale and counting slowly as you exhale. This allows your mind to take a break from its usual activities of analyzing, reasoning and judging. And will allow it to come back more refreshed for those activities when the time is right.

The natural breath wants to flow full, however, if mental or emotional traumas or stresses are introduced, we may learn different breathing habits that restrict natural flow. For instance, when we are threatened or upset our whole body tightens as we enter a state commonly referred to as the “fight or flight” response. In such a state, we are reduced to our basic survival instincts – the abdomen tightens, restricting diaphragmatic breathing, and quick shallow chest breathing results. This state might be healthy for a person who is being chased by a wild animal, but chronic exposure to circumstances that elicit the fight or flight response can cause a person to form long-term restricted breathing habits.

Breathing Practices in Yoga

Proper breathing techniques are an integral part of any yoga program. Proper breathing is essential to the practice of yoga as it improves focus and brings increased oxygen to the system. While doing a yoga practice, it is a general principle to breathe when the body comes up or the chest opens (such as when the arms move back) and to breathe out when the body goes down or the chest collapses/upper back rounds. Students then are encouraged to breathe fully through the nose while they hold a posture. In general, students should always inhale through their nose during yoga practice, if possible. Breathing through the nose is helpful during yoga practice. Some of the benefits of nose breathing include the following:

- It slows down the breath rate (no gulping air through the mouth)
- It filters out impurities and dust before the air enters the lungs
- It humidifies the air you breathe
- It warms/cools the air to body temperature
- It activates the relaxation response

Yoga Breathing Exercises are an important way to warm up the body and to help students bring their focus to their yoga practice, as well as bring them into a more peaceful state and thereby experience the full benefits of their yoga practice. The breathing practices of hatha yoga incorporate a simple form of meditation within each practice.

Breathing exercises:

1) Relax muscles, allowing them to stretch more easily.
2) Help heal the body by increasing circulation and flexibility.
3) Increase the supply of oxygen, nourishing the brain and body, which helps yoga students practice yoga poses and exercises with greater ease and focus.
4) Send a neurological message of relaxation to the brain and body.
5) Improve concentration and help students stay present in the moment.
6) Help students learn how to relax and control their emotions in daily life.

Physiology of Breathing and Teaching Pranayama

Anatomy and Physiology of Breathing

The primary purposes of the respiratory system are to:

1) Provide a means of gas exchange between the external environment and the body. The respiratory system provides a person with the means of replacing oxygen and removing carbon dioxide from the blood.
2) Help maintain the acid-base balance (ph) of the blood.

The respiratory and cardiovascular systems are interdependent and function as a unit. The respiratory system brings oxygen into the lungs and carries carbon dioxide away. The cardiovascular system distributes oxygen to the cells and tissues and carries carbon dioxide back to the lungs to be expelled during exhalation.

Because of its contact with the external environment, the respiratory system has a strong defense system that cleanses, warms and moisturizes the air before it reaches the lung tissue.

The organs of respiration include the following:

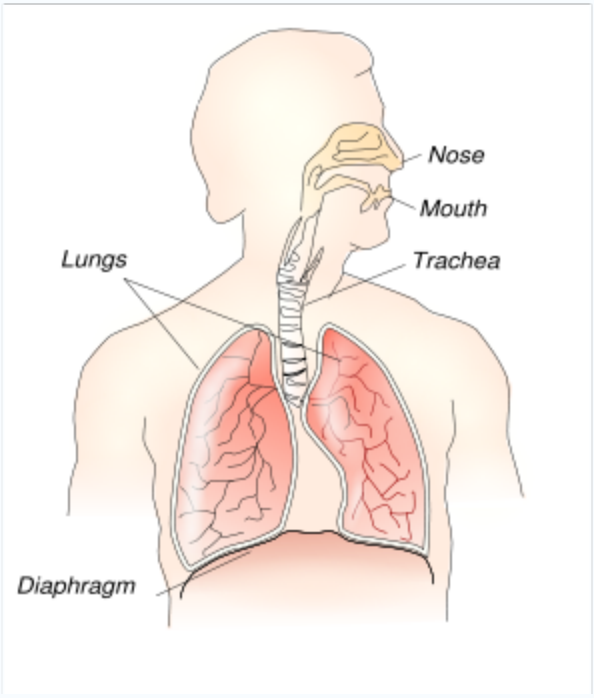
1) Nose
2) Pharynx (back of the throat – connects nose with respiratory system)
3) Larynx (voice box at the top of the trachea)
4) Trachea (connects throat with lungs – made out of cartilage)
5) Bronchial Tree (made up of bronchi, secondary bronchi, bronchioles and terminal bronchioles)
6) Alveoli (150-300 million alveoli with make up 540 square feet of surface of respiratory tissue)
7) Lungs

The muscles of respiration include the following:

1) Diaphragm (thin dome-shaped muscle that attaches to lower ribs and lumbar vertebrae, separating the chest cavity from the abdominal cavity – separates respiratory system from the digestive system). The diaphragm consists of the central tendon, the costal portion and the crural portion. It is the most important muscle of inspiration and is the only skeletal muscle considered essential for life. When the diaphragm contracts, it forces the abdominal contents downward and forward, while the ribs are lifted outward. The outcome is to reduce the intrapleural pressure, which in turn causes the lungs to expand. This expansion of lungs results in a reduction in intrapulmonary pressure below atmospheric, which allows airflow into the lungs.
2) Abdominal muscles (these muscles expand and contract to assist the diaphragm muscle in its work). Abdominal muscles, including the rectus abdominus and the internal oblique contract during exhalation. When these muscles contract, the diaphragm is pushed upward and the ribs are pulled downward. This results in an increase in intrapulmonary pressure and expiration (exhalation) occurs.
3) Intercostal muscles (muscles between the ribs that provide vertical and lateral expansion of the chest cavity).

4) Sternocleidomastoids (extend from top of sternum and collar bones to the base of the skull behind the ears – lift the ribcage)
5) Erector spinae (long muscles of the back along the spine – they support the spine and allow for openness in the front of the body)

Any muscles that are involved in respiration that are weak or tight will affect a person's ability to breathe in an optimal way. For example, weak erector spinae muscles lead to poor, rounded or slumped posture, which constricts breathing.



The Respiratory System

Among four-legged animals, the respiratory system generally includes tubes, such as the bronchi, used to carry air to the lungs, where gas exchange takes place. A diaphragm pulls air in and pushes it out. Respiratory systems of various types are found in a wide variety of organisms. Even trees have respiratory systems.

In humans and other mammals, the respiratory system consists of the airways, the lungs, and the respiratory muscles that mediate the movement of air into and out of the body. Within the alveolar system of the lungs, molecules of oxygen and carbon dioxide are passively exchanged, by diffusion, between the gaseous environment and the blood. Thus, the respiratory system facilitates oxygenation of the blood with a concomitant removal of carbon dioxide and other gaseous metabolic wastes from the circulation. The system also helps to maintain the acid-base balance of the body through the efficient removal of carbon dioxide from the blood.

Physiology of Breathing and Teaching Pranayama

In humans and other animals, the respiratory system can be conveniently subdivided into an upper respiratory tract (or conducting zone) and lower respiratory tract (respiratory zone), trachea and lungs.

Air moves through the body in the following order:

- Nostrils
- Nasal cavity
- Pharynx (naso-, oro-, laryngo-)
- Larynx (voice box)
- Trachea (wind pipe)
- Thoracic cavity (chest)
- Bronchi (right and left)
- Alveoli (site of gas exchange)

Upper respiratory tract/conducting zone

The conducting zone starts with the nostrils of the nose, which open into the nasopharynx (nasal cavity). The primary functions of the nasal passages are to: 1) filter, 2) warm, 3) moisten, and 4) provide resonance in speech. The nasopharnyx opens into the oropharynx (behind the oral cavity). The oropharynx leads to the laryngopharynx, and empties into the larynx (voicebox), which contains the vocal cords, passing through the glottis, connecting to the trachea (wind pipe).

Lower respiratory tract/respiratory zone

The trachea leads down to the thoracic cavity (chest) where it divides into the right and left "main stem" bronchi. The subdivisions of the bronchus are: primary, secondary, and tertiary divisions (first, second and third levels). In all, they divide 16 more times into even smaller bronchioles.

The bronchioles lead to the respiratory zone of the lungs which consists of respiratory bronchioles, alveolar ducts and the alveoli, the multi-lobulated sacs in which most of the gas exchange occurs.

Breath Control

Ventilation occurs under the control of the autonomic nervous system from the part of the brain stem, the medulla oblongata and the pons. This area of the brain forms the respiration regulatory center, a series of interconnected neurons within the lower and middle brain stem which coordinate respiratory movements. The sections are the pneumotaxic center, the apneustic center, and the dorsal and ventral respiratory groups.

Inhalation

Inhalation is initiated by the diaphragm and supported by the external intercostal muscles. Normal resting respirations are 10 to 18 breaths per minute. A typical inhalation lasts 2 seconds during sleep. During vigorous inhalation (at rates exceeding 35 breaths per minute), or in approaching respiratory failure, accessory muscles of respiration are recruited for support. These consist of sternocleidomastoid, platysma, and the strap muscles of the neck.

Inhalation is driven primarily by the diaphragm. When the diaphragm contracts, the ribcage expands and the contents of the abdomen are moved downward. This results in a larger thoracic volume, which in turn causes a decrease in intrathoracic pressure. As the pressure in the chest falls, air moves into the conducting zone. Here, the air is filtered, warmed, and humidified as it flows to the lungs.

During forced inhalation, as when taking a deep breath, the external intercostal muscles and accessory muscles further expand the thoracic cavity.

Exhalation

Exhalation is generally a passive process, however active or forced exhalation is achieved by the abdominal and the internal intercostal muscles.
The lungs have a natural elasticity; as they recoil from the stretch of inhalation, air flows back out until the pressures in the chest and the atmosphere reach equilibrium.

During forced exhalation, as when blowing out a candle, expiratory muscles including the abdominal muscles and internal intercostal muscles, generate abdominal and thoracic pressure, which forces air out of the lungs.

Circulation

The right side of the heart pumps blood from the right ventricle through the pulmonary semilunar valve into the pulmonary trunk. The trunk branches into right and left pulmonary arteries to the pulmonary blood vessels. The vessels generally accompany the airways and also undergo numerous branchings. Once the gas exchange process is complete in the pulmonary capillaries, blood is returned to the left side of the heart through four pulmonary veins, two from each side. The pulmonary circulation has a very low resistance, due to the short distance within the lungs, compared to the systemic circulation, and for this reason, all the pressures within the pulmonary blood vessels are normally low as compared to the pressure of the systemic circulation loop.

Virtually all the body's blood travels through the lungs every minute. The lungs add and remove many chemical messengers from the blood as it flows through pulmonary capillary bed. The fine capillaries also trap blood clots that have formed in systemic veins.

Gas Exchange

The major function of the respiratory system is gas exchange. As gas exchange occurs, the acid-base balance of the body is maintained as part of homeostasis. If proper ventilation is not maintained two opposing conditions could occur: 1) respiratory acidosis, a life threatening condition, and 2) respiratory alkalosis.

Upon inhalation, gas exchange occurs at the alveoli, the tiny sacs which are the basic functional component of the lungs. The alveolar walls are extremely thin (approx. 0.2 micrometres), and are permeable to gases. The alveoli are lined with pulmonary capillaries, the walls of which are also thin enough to permit gas exchange. All gases diffuse from the alveolar air to the blood in the pulmonary capillaries, as carbon dioxide diffuses in the opposite direction, from capillary blood to alveolar air. At this point, the pulmonary blood is oxygen-rich, and the lungs are holding carbon dioxide. Exhalation follows, thereby ridding the body of the carbon dioxide and completing the cycle of respiration.

In an average resting adult, the lungs take up about 250ml of oxygen every minute while excreting about 200ml of carbon dioxide. During an average breath, an adult will exchange from 500 ml to 700 ml of air. This average breath capacity is called the tidal volume.

Respiratory Volumes:
During normal breathing about 500 ml of air are taken in with each inhalation (inspiration) and the same amount flows out with each exhalation (expiration). This is called “tidal volume.” About 350 ml of air actually arrive at the alveoli. The remaining air (150 ml) fills the open spaces of the lungs and passage ways of the respiratory systems.

By breathing in as deeply as possible, we can inhale up to an average of 3,100 ml of air beyond the usual 500 ml. This is called the “inspiratory reserve volume.” The maximum amount of air an individual can take in is called the “inspiratory capacity” and is calculated by: inspiratory capacity = tidal volume + inspiratory reserve volume

By inhaling normally and exhaling forcefully, we expel approximately 1,200 ml of air beyond the tidal volume. This extra 1,200 ml is called the “expiratory reserve volume.” After a forcible expiration, some air still remains in the lungs (in the alveoli). This air amounts to about 1200 ml and is called the “residual volume.” The air remaining in the lungs after death is called the “minimal volume.”

Total lung capacity = tidal volume + inspiratory reserve volume + residual volume + minimal volume

Cardiovascular System

The cardiovascular system is composed of the blood, the blood vessels and the heart. The cardiovascular system has the following functions:

1) Circulates oxygen and nutrients to the cells
2) Carries carbon dioxide and metabolic wastes from the cells
3) Protects against disease
4) Helps regulate body temperature
5) Prevents serious blood loss after injury through the formation of clots

The organs of circulation include:

1) Heart (pumps the blood throughout the system)
2) Arteries (move blood away from the heart – pulmonary arteries carry old blood CO2 away to lungs) Arteries are thicker than veins and their muscular walls help propel blood.
3) Arterioles (branches off arteries)
4) Capillaries (where the exchange of oxygen and carbon dioxide takes place)
5) Venules (branches that come together to make veins)
6) Veins (blood vessels that bring blood to the heart – pulmonary vein carries fresh blood to the heart) Unlike arteries, veins have valves that prevent blood from flowing backward.

Cardiac muscle is myogenic (able to contract and relax on its own). It is a specialized muscle found nowhere else but in the heart because it has its own conducting system. This is in contrast with skeletal muscle, which requires either conscious or reflex nervous stimuli. The heart's rhythmic contractions occur spontaneously, although the waves or nerves can be changed by nervous frequency influences such as exercise or the perception of danger.

The rhythmic sequence of contractions is coordinated by the sinoatrial and atrioventricular nodes. The sinoatrial node, often known as the cardiac pacemaker, is located in the upper wall of the right atrium and is responsible for the wave of electrical stimulation that initiates atria contraction. Once the wave reaches the atrioventricular node, situated in the lower right atrium, it is conducted through the bundle of His and causes contraction of the ventricles. The time taken for the wave to reach this node from the sinoatrial nerve creates a delay between the contractions of the two chambers and ensures that each contraction is coordinated simultaneously throughout all of the heart. In the event of severe pathology, the Purkinje fibers can also act as a pacemaker; this is usually not the case because their rate of spontaneous firing is considerably lower than that of the other pacemakers and hence is over-ridden.

The bundle of His is a collection of heart muscle cells specialized for electrical conduction that transmits the electrical impulses from the AV node (located between the atria and the ventricles) to the point of the apex of the fascicular branches. The fascicular branches then lead to the Purkinje fibers which innervate the ventricles,

causing the cardiac muscle of the ventricles to contract at a paced interval. These specialized muscle fibers in the heart were named after the Swiss cardiologist Wilhelm His, Jr., who discovered them in 1893.

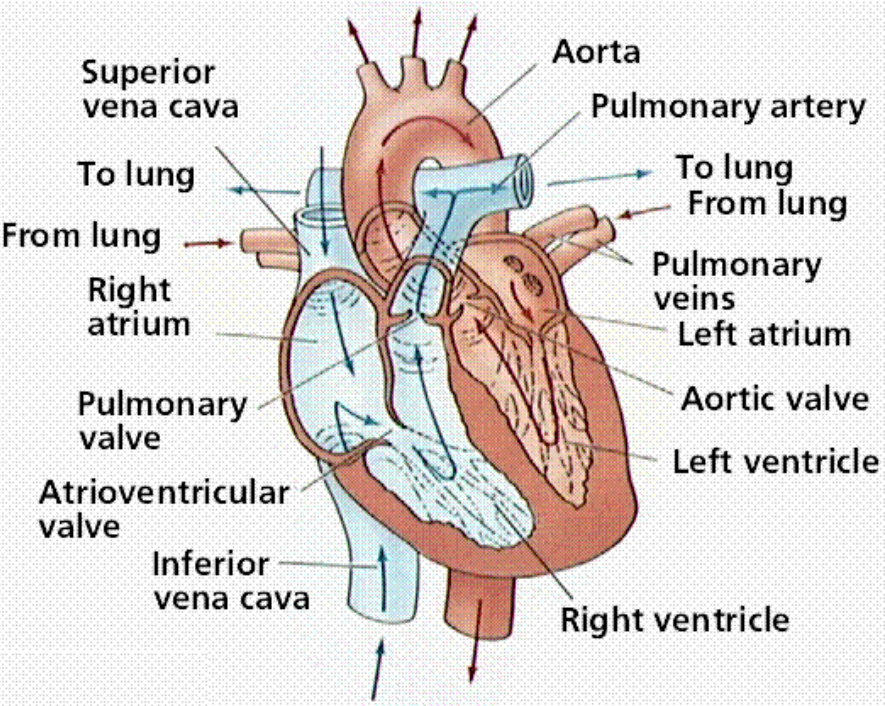
Cardiac muscle is very specialized, as it is the only type of muscle that has an internal rhythm; i.e., it is myogenic which means that it can naturally contract and relax without receiving electrical impulses from nerves. When a cell of cardiac muscle is placed next to another, they will beat in unison.

The fibers of the Bundle of His allow electrical conduction to occur more easily and quickly than typical cardiac muscle. They are an important part of the electrical conduction system of the heart as they transmit the impulse from the AV node (the ventricular pacemaker) to the rest of the heart. The bundle of His branches into the three bundle branches: the right and left anterior and left posterior bundle branches that run along the interventricular septum. The bundles give rise to thin filaments known as Purkinje fibers. These fibers distribute the impulse to the ventricular muscle. Together, the bundle branches and purkinje network comprise the ventricular conduction system. It takes about 0.03-0.04s for the impulse to travel from the bundle of His to the ventricular muscle.

Poorly oxygenated blood collects in two major veins: the superior vena cava and the inferior vena cava. The superior and inferior vena cava empty into the right atrium. The coronary sinus which brings blood back from the heart itself also empties into the right atrium. The right atrium is the larger of the two atria although it receives the same amount of blood. The blood is then pumped through the tricuspid valve, or right atrioventricular valve, into the right ventricle. From the right ventricle, blood is pumped through the pulmonary semi-lunar valve into the pulmonary artery. This blood leaves the heart by the pulmonary arteries and travels through the lungs (where it is oxygenated) and into the pulmonary veins. The oxygenated blood then enters the left atrium. From the left atrium, the blood then travels through the bicuspid valve, also called mitral or left atrioventricular valve, into the left ventricle. The left ventricle is thicker and more muscular than the right ventricle because it pumps blood at a higher pressure. Also, the right ventricle cannot be too powerful or it would cause pulmonary hypertension in the lungs. From the left ventricle, blood is pumped through the aortic semi-lunar valve into the aorta.

Once the blood goes through systemic circulation, peripheral tissues will extract oxygen from the blood, which will again be collected inside the vena cava and the process will continue. Peripheral tissues do not fully deoxygenate the blood, thus venous blood does have oxygen, only in a lower concentration in comparison to arterial blood. The release of oxygen from erythrocytes is regulated. The diffusion of oxygen from red blood cells increases with an increase of carbon dioxide in tissues, increase in temperature, or a decrease in pH. Such characteristics are exhibited by tissues undergoing high metabolism, as they require increased levels of oxygen.

Anatomy of the Heart



Checking In with Your Breath

Exercise 1

It's important to take a few moments throughout the day or before practicing pranayama to gauge the initial quality of your breath. To get a general impression of your breathing, take a moment to sit and sense your breathing. Write down answers as you ask yourself the following questions:

1) Where do I feel my breathing? Can you feel where the movement of your breath originates?

2) What does my breathing feel like? Is it rough, jerky or rhythmic? Does it feel smooth or mechanical.

3) What is the frequency of your breath? Is it fast or slow. Set a kitchen timer or have a partner watch you breathe for 15 seconds. How many times did you complete a full breath within that time?

4) Is there a noticeable difference in the length of your inhale and exhale? Which is longer?

5) How does your body move as you breathe? Place your hands on your belly and notice the movement of your belly in and out as you breathe. Place your hands on your hips and feel your hips expand as you breathe in. Notice the movement in your shoulders and chest. Where in your body do you feel movement with your breath? Explain what you feel.

Breath and Movement

Before we begin practicing pranayama, it's helpful to bring more awareness to the breath and to notice the connection between breath and movement.

Exercise 2

- Start standing with your feet a little more than hip width apart.
- Bring your focus to your breath.
- Let your belly relax and let your breath flow effortlessly.
- As you inhale, let your breath move your hands out slightly.
- As you exhale, feel your hands relax your hands back to your sides.
- Continue this for a few breaths
- Breathe a little more deeply and this time slightly draw your shoulders and hands back, opening your palms forward. Notice how your movement helps to deepen your breath.
- Continue this for about 5-6 breaths
- On your next inhale, actively bring your hands out to the side and back, squeezing your shoulder blades back.
- On your exhale, bring your hands together in front of you, dropping your chin to your chest.
- Notice how this more active movement creates a deeper breath.
- Concentrate on connecting your breath with your movement.

Notice how adding movement deepens your breath.

Pranayama

The practice of pranayama was first described by Patanjali in the Yoga Sutras. The word pranayama is a sanskrit word that means control (yama) of the life force (prana). It is used to describe various yogic breathing exercises that help give control of life force or breath. Although pranayama can encompass more than breath, we will focus on the breathing exercises of pranayama, since this is what you will be teaching to beginning and intermediate yoga students.

The practice of pranayama should be taken up step by step – starting with the simpler breathing exercises and working up towards more challenging pranayama. In practicing pranayama it is important to find a sitting position in which we can remain for a period of time without getting stiff. Whatever sitting posture you choose, it's important that the spine remain upright to make the breathing exercises more effective.

Some suggestions for sitting position for pranayama include:

1) sitting cross legged (easy sitting position)
2) kneeling
3) sitting back on heels (sitting down from kneeling)
4) sitting on a stool or on a chair
5) sitting in lotus position
6) or standing

Whatever form of sitting that you or your students choose, it is important to keep the spine upright. Before beginning pranayama, instruct students to reach up through the top of their head to lengthen the spine then draw the shoulders back and relax them down.

Aspects of the Breath in Pranayama

In sanskrit, exhalation is called "rechaka," inhalation is called "puraka," and suspension of breath is known as "kumbhaka." Pranayama signifies the control of these operations.

Yoga defines the following physical effects of suspension of breath:

- Exercise nerves
- Equalization of inhalation and exhalation
- Decrease in thought and the speed of thoughts

According to Patanjali, when a person can suspend respiratory movements for five minutes and twenty-four seconds, that person is considered adept at pranayama. It is said that after this amount of time, one can perceive the existence of the universal life force within him or herself.

Physiology of Breathing and Teaching Pranayama

In pranayama, it is thought that people take in prana as they inhale, and throwing out apana when they exhale. The more prana a person takes in, the more vitality they may attain. Ordinarily, our breathing habits are irregular and erratic, which affects our overall health, heart function and metabolism. Pranayama helps people learn to regulate and focus on their breath.

Purposes of Pranayama

The main purposes of pranayama are:

1) To oxygenate the blood and not allow the energy from oxygenation to dissipate.
2) To eliminate as much waste material as possible.
3) To maintain a balance between inside and outside pressures.
4) To develop control over our thoughts.

Benefits of Breathing Exercises and Pranayama:

Practicing pranayama can help:

1) Relieve of stress and stress related disorders
2) Improve autonomic functions
3) Relieve of the symptoms of asthma
4) Improve concentration and focus
5) Improve the oxidative status of an individual
6) Relax muscles and allow them to stretch more easily
7) Increase body temperature and circulation
8) Increase the supply of oxygen to the brain and body, improving efficiency
9) Send a neurological message of relaxation to the brain and body by triggering parasympathetic nervous system activity
10) Relieve mild depression and anxiety, while increasing calmness.
11) Improve lung function and capacity

Try the breathing exercises and pranayama on the next pages and see how they work for you and how to teach them to your students.

1. Simple Breathing Exercise

This is a simple exercise that helps students learn to focus and understand their breath, while reducing any distractions or strain on the body.

Benefits:

- Relieves stress
- Energizes the body

Steps:

- Have students lie flat on their backs in Savasana (Corpse pose) with their arms at their sides, palms turned up.
- Inhale slowly and deeply, imagining that breath is filling your feet
- Exhale
- Repeat three more times with your focus on your feet, feeling the energy flow to your feet
- Then do the same thing for the calves, thighs, hips, abdomen, chest, arms, hands, shoulders, neck, throat, jaw and facial muscles.

Teaching Points:
Have students imagine they are bringing energy to a particular area of their body as they inhale. Have them imagine the energy flowing more rapidly through that part of their body. With proper concentration, many students will actually feel like that area of their body is becoming slightly warmer.

2. Mood Lifting Breathing Exercise

Benefits:

- Helps relieve depression and anxiety
- Relaxes the mind and body

Steps:

- Begin in a seated position (sitting anyway that is comfortable)
- Sit up tall, reaching up through the top of the head to lengthen the spine
- Close your eyes, and close your mouth and begin breathing through your nose
- Bring your focus to your breath, making it more long and relaxed
- As you breathe in, imagine that you are breathing in joy, peace and calm, filling your whole body with happiness
- As you breathe out, imagine letting go and feel your body relax
- Continue this visualization as you breathe in and out for about 8-10 breaths.

Teaching Points:
This breathing exercise is really about visualization. Students can focus on the good feelings entering their body as they inhale, or they can visualize a soft warm light entering and filling their body on each inhale.

3. Abdominal Breathing

Abdominal Breathing is a deliberate breath that expands and relaxes the abdominal area only. The chest remains still and quiet. Abdominal breathing differs from healthy natural breathing only in that it is voluntary (deliberate) rather than involuntary (passive, effortless).

Benefits:

- Strengthens the diaphragm muscle
- Massages internal organs
- Stimulates the Relaxation Response through the movement of the diaphragm
- Increases internal awareness of relationship between breath and body, especially abdomen, pelvis and lower back

Steps:

- Close your mouth and begin breathing through your nose.
- Relax your belly
- As you inhale, allow your belly to gently expand
- Exhale, feel your belly relax back towards your spine.
- Breathe slowly, focusing on the flow of your breath in and out through your nose.

Teaching Points:
To add some resistance and further strengthen the diaphragm, students can try this breathing exercise in child's pose (see photo below) – allowing the belly to press against the thighs on inhale, or they can try this exercise in crocodile (see below) – allowing the belly to press against the floor on inhale and relax on exhale.

Child's Pose

Crocodile

4. Complete Yogic Breath (full yogic breathing)

This is a slow, deep breathing that fills the lungs, so that the abdomen, ribcage and upper chest expand on the inhale and relax back into place on the exhale.

Benefits:

- Exercises and aerates the lungs
- Quiets the mind
- Deepens relaxation
- Increases circulation

Steps:

- Lie on your back
- Exhale completely
- On inhale, first the abdomen expands with air, then the rib cage and finally, the chest (the inhale should feel like a wave of air rolling up the front of the body)
- Exhaling completely, allow muscles to relax and slightly drop, gently pressing the belly back towards the spine
- Repeat 8-10 times

Teaching Points:

Have students focus on exhaling completely by pressing a little more out even once they think the exhalation is complete. This allows the lungs to be more empty for the full inhalation.

Encourage students to keep the breath smooth and deep, so it flows in a rhythmic motion through their nose.

5. Alternate Nostril Breathing (Nadi Shodhana Pranayama)

Benefits:

- Clears sinuses
- Brings the two sides of the body back into balance
- Improves focus and concentration

Steps:

- Bring the right hand to your nose
- Place the right thumb gently on the right nostril and the right pinky and ring finger on the left nostril. Place the index finger and middle finger just above the bridge of the nose
- Exhale, then inhale completely
- Block the right nostril with the right thumb, exhale through the left nostril (exhale slowly to count of four)
- Switch, releasing the right nostril and blocking left nostril, exhale right (slow, full exhalation)
- Inhale right (full inhale to slow count of four or five)
- Switch, releasing the left nostril, block the right nostril, exhale left, inhale left
- Switch, releasing the right nostril, block the left nostril, exhale right, inhale right
- Continue this pattern of breathing, switching the side that is blocked after each inhalation
- Repeat for 8-10 breaths
- Make sure you are inhaling and exhaling slowly and completely

Teaching Points:

Talk students through the practice for the first four breaths so they get a feeling for the length of each breath and when to switch. Each inhalation or exhalation should last to a slow count to four or five. After the first four breaths, give students a few minutes to practice on their own.

6. Ujjayi Pranayama

The prefix “ud” means upward or expanding. It also conveys the sense of power. “Jaya” means success. In ujjayi pranayama the lungs are fully expanded with the chest opened forward. Ujjayi pranayama is easily recognizable by the sound – a soft hissing sound the breath makes once the throat is slightly closed.

Benefits:

- Strengthens the nervous system and digestive system
- Eliminates phlegm
- Warms the body

Steps:

- Begin in sitting or standing position
- Exhale completely through the nose
- Slightly close the back of the throat (glottis) and inhale deeply through the nose
- Keep the back of the throat slightly closed as you exhale through the nose
- You should hear an echo like sound (like a soft Darth Vader or an ocean wave) as you breathe in and out
- Repeat 8-10 times

Teaching Points:
Ujjayi pranayama can be used when holding a variety of yoga postures to help energize the body and bring the focus to the breath. Strengthening postures fit best with ujjayi breath, such as Warrior 1, Warrior 2 (see below).

Warrior 1

Warrior 2

7. Shining Skull Breath (Kapalabhati Pranayama)

Benefits:

- Strengthens the diaphragm
- Increases energy
- Strengthens abdominal muscles

Steps:

- Exhale completely, pressing all the air out through the nose
- Allow the inhalation to happen automatically – let the air simply fill the void left by the exhalation
- Then, pull the abdominal muscles in quickly forcing the air out through the nostrils in a quick thrust
- Again, allow the inhalation to happen automatically.
- Pull the abdominal muscles in quickly, forcing the air out through the nostrils
- All your effort should be spent on the exhalation
- Repeat 8-12 times
- Rest, taking a few slow deep breaths
- Then repeat another 8-12 breaths

Teaching Points:
Instruct students to breathe slowly and with control. As they exhale, students should press the air out through their nostrils in one smooth continuous breath. Breathing too quickly may cause students to feel slightly dizzy. Remind students to stop if they begin to feel any sense of dizziness.

Variation: Espresso Breath – You can do Kapalabhati with arm movements, reaching arms overhead on inhale, and pulling fists down to shoulders on exhale.

8. Bellows Breath (Bastriki Pranayama)

Benefits:

- Strengthens the diaphragm
- Increases energy
- Strengthens abdominal muscles
- Clears nasal passages

Steps:

- Bastriki is similar to Kapalabhati, but rather than allowing the inhalation to happen automatically, it is forced and shorter
- Inhale through the nose, keeping abdomen somewhat firm
- Then, pull the abdominal muscles in quickly forcing the air out through the nostrils in a quick thrust
- Again, draw the breath in through the nose, keeping the belly somewhat firm
- Pull the abdominal muscles in quickly, forcing the air out through the nostrils
- Breath should be pumped in and out, taking about 1 second for inhalation and 1 second for exhalation
- Repeat 6-8 times
- Conclude with some slow, deep breaths

Teaching Points:

Like the shining skull breath, remind students to maintain control over their breath by keeping it smooth and steady, this time controlling both the inhalation and exhalation (rather than just the exhalation as in shining skull breath).

*Note: Bastriki Pranayama is not appropriate for some students. There is a chance of becoming dizzy with rapid breathing. For this reason, it is best to conclude the practice with some slow long breaths to help relax the body. Take special care in teaching this practice, teaching it only to more advanced classes and reminding students to try just a couple of breaths to start.

9. Standing Chest Expansion Breath (Elbows Up)

This is a good breathing exercise to practice at the start of an active class. It opens up the throat and upper back. It can be practiced whenever necessary.

Benefits:

- Increases energy
- Opens chest and improves breathing
- Stretches the shoulders and upper back

Steps:

- Start standing with feet hips width apart
- Interlace fingers, placing knuckles under chin (elbows down at your chest)
- Inhaling through the nose, lift elbows out and up, then drop head back
- Begin exhaling through your mouth
- Bring your elbows together in front of you and then down to your chest
- Bring your head forward back to the starting position
- Repeat this again, doing 6-8 rounds.

10. Viloma Pranayama

Benefits:

- Strengthens the respiratory system.
- Relaxes the body

Steps:

- Lie straight and relaxed on your back. Close your eyes and lie quietly for a minute.
- Exhale completely until lungs feel empty.
- Inhale for 2 or 3 seconds, pause and hold the breath for 2 or 3 seconds.
- Without exhaling, inhale again for 2 or 3 seconds.
- Repeat this process until the lungs are completely full. One complete inhalation may include 4 to 5 pauses, but there should be no strain throughout the practice.
- Hold the breath for a second or two.
- Exhale for 2 or 3 seconds, pause and hold the breath for 2 or 3 seconds.
- Without inhaling, exhale again for 2 seconds, then hold the breath for 2 seconds
- Repeat this process until the lungs feel completely empty. One complete exhalation may include 4 to 5 pauses.
- Repeat the inhale and exhale 3-4 more times.
- After your last exhalation, gradually relax your abdomen.

11. Shitali Pranayama

Shitali means cooling. This pranayama cools the system and hence the name. It can be practiced at any time, at any place and whenever necessary.

Benefits:

- Cools the body and calms the nervous system
- Improves digestion
- Relieves headache

Steps:

- Sit in a comfortable position.
- Open your mouth slightly, in such a way that the tip of your tongue should be closer to both lines of the teeth.
- Inhale fresh air slowly and steadily between the lines of the teeth with a medium speed. Inhaling should be in such a way that the incoming air touches the tongue all the way from the tip to the very base.
- When you have inhaled enough air, exhale through both nostrils at a medium speed.
- Again inhale through the mouth in the same way and continue this process for up to 5 rounds.

12. Lion's Breath

This breathing exercise helps to warm up the body and clear the throat. It's best to practice it at the beginning of a yoga practice.

Benefits:

- Clears the throat and tones the muscles of the throat
- Warms up the body
- Relieves jaw and face tension
- Increases energy
- Improves voice projection

Steps:

- Start sitting in thunderbolt posture (kneeling sitting back on heels)
- Place your hands on your thighs
- Inhale through your nose
- As you begin exhaling through your mouth, lean forward and open your mouth wide, sticking out your tongue.
- Repeat 6-8 times

12. So Hum Breath

This pranayama helps improve concentration and focus, and is energizing. It can be practiced at the beginning of yoga practice or at any time during the practice.

Benefits:

- Clears sinuses
- Improves focus and concentration
- Relieves headache

Steps:

- Sit in a comfortable seated position.
- As you say the word “so”, students inhale, and as you say the word “hum” students exhale.
- Start by saying the words “so, hum” slowly, taking at least 2 seconds to say each word. Say the words at this speed for 8 rounds
- Say the words “so, hum” a little more quickly, so students now breathe in and out more quickly (about 1 second per word). Do this for 8 rounds.
- Say the words, “so, hum” more quickly, saying both words within one seconds. Do this for 16 rounds.
- Go back to the slowest version (each word taking 2 seconds) for the next 8 rounds.
- Continue this pattern for one more session.

13. Buzzing Breath

This pranayama helps calm the nervous system and bring a person into a meditative state. It can be practiced at any time during a yoga practice.

Benefits:

- Calms the nervous system
- Improves focus
- Eases anxiety

Steps:

- Sit in a comfortable seated position
- You can either place your index fingers in your ears and close your eyes, or you can place your thumbs in your ears and use your fingers to cover your eyes.
- Take a deep breath in through your nose, then as you exhale through your nose make a humming sound in your throat.
- Continue exhaling as you make the humming sound for as long as you can.
- Then inhale and repeat.
- Do four rounds of the buzzing breath

- When you are finished, sit for a few moments with your eyes still closed.

14. 4,4,6,2 Breath

This pranayama helps improve concentration and create more mindfulness. It's usually best to practice this technique at the beginning or end of yoga practice.

Benefits:

- Improves concentration
- Lowers heart rate and blood pressure
- Relaxes muscular tension

Steps:

- Lie on your back and place one hand on your belly and one hand on your heart.
- Inhale slowly to a count of four
- Hold your breath for a count of four
- Exhale slowly to a count of six
- Hold your breath for a count of two.
- Repeat this breathing pattern six to eight more times.
- When you are done, slowly open your eyes and allow your breathing to return to its natural state.

Bandhas

Bandhas (locks) can be used with pranayama to make the exercises more effective. The word bandha means to lock or bind and are helpful in having more control over the breath and the movement of energy through the body. The three main bandhas include the following:

- Mula bandha (root lock)
- Uddiyana bandha (navel lock)
- Jalandhara bandha (chin lock)

Uddiyana Bandha (Navel Lock)

When practicing uddiyana bandha, it's important to practice on an empty stomach. Make sure to only practice this lock after a full exhalation (holding the breath out).

Steps

- Start in a standing position with feet a little wider than hip width
- Bend your knees, placing your hands just above your knees on your thighs
- Inhale deeply, then exhale completely (exhaling all your air out)
- Squeeze your abdominal muscles to push out all of your air then hold your breath out.
- As you hold your breath after exhalation, pull your stomach in and up (bringing your navel up and back towards your spine).
- Hold your stomach in and up for a few seconds, then drop your stomach and let your muscles completely relax (while still holding your breath)
- Once your muscles are relaxed, inhale fully, and take a few slow deep breaths
- Repeat this process 3-6 times
- **Note: Make sure to relax your belly first before you inhale. If you don't relax your belly first, you be likely to gasp air in quickly.

Once you are familiar with this exercise, you can try pumping your stomach as you keep your breath held out.

Using with Postures:
Try using uddiyana bandha while in down dog. The effects of gravity in down dog can help you to pull the stomach up and in more effectively.

Mula Bandha (Root Lock)

Mula Bandha can be practiced by holding your breath at the end of an exhalation or the end of an inhalation.

Steps

- Start in easy seated position
- Inhale, then exhale fully
- As you hold your breath after the exhalation, contract and pull up the anal sphincter muscle and then the abdominal muscles.
- You want to contract and lift the tripod at the base of your pelvis, while you press your tailbone towards the floor.
- Release and relax, then inhale fully
- Repeat 4-8 times

Mula Bandha can be used with a variety of seated postures or in child's pose.

Jalandhara Bandha (Chin Lock)

You can practice the chin lock by either holding your breath out (like the others bandhas) or by holding your breath in (holding breath after inhaling). It is most often practiced holding the breath in

Steps

- Exhale, then inhale through your nose
- Hold your breath in after you inhale and bring your chin to the hollow part of your throat. Instead of dropping the chin, you want to pull your chin back towards your throat (not dropping the forehead much)
- Press your shoulders blades down and round the shoulders slightly forward, as you press your chin as close in as possible
- Stay in this position for a few seconds
- Lift your chin and exhale fully
- Take a few deep breaths
- Repeat 3-6 times

Using with postures:

Jalandhara is great to use with Bridge pose. Used with bridge pose, it can help to lengthen the back of the neck and release the shoulders.

Review Questions

These questions are for your own review and don't need to be submitted.

1. How does our breath change when we are emotionally upset?
2. What are some reasons someone may develop poor breathing habits?
3. What does it mean to "breath diaphragmatically?" How do you do it? Explain the benefits of diaphragmatic breathing.
4. Why is breathing through the nose helpful?
5. What are the primary purposes of the respiratory system?
6. What are the primary functions of the nasal passages?
7. Name the organs of respiration. Name the muscles of respiration.
8. Explain the process of gas exchange in the respiratory system.
9. How many breaths per minute do people take during normal resting respiration?
10. Name the accessory muscles of respiration. When are they recruited for support?
11. Which muscle is the primary driver of inhalation?
12. What is the equation to find total lung capacity?
13. Name the functions of the cardiovascular system and the organs of circulation.
14. How does cardiac muscle differ from skeletal muscle?
15. What does the word "pranayama" mean?
16. When selecting a sitting position for pranayama, what is an important consideration?
17. Name 7 of the benefits of practicing pranayama (breathing exercises).
18. Select three of the breathing exercises presented. Give the teaching steps and benefits for those three yoga breathing exercises (pranayama).

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