SKM YOGA
Yoga Teacher Training Manual

YOGA ANATOMY
The Respiratory System
A Comprehensive Chapter for Yoga Teacher Training

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Foreword from the Founder

> "Breath is the bridge which connects life to consciousness, which unites your body to your thoughts." — Thich Nhat Hanh

In the ancient tradition of yoga, the breath — known as Prana — is considered the very life-force that animates body, mind, and spirit. The Upanishads describe Prana as the foundation of existence; without it, neither body nor mind can function. Breath (Shvasa) is the most tangible manifestation of Prana, and the science of its control is called Pranayama.

In modern yoga teacher training, the respiratory system often receives only a cursory overview. This chapter of the SKM Yoga Teacher Training Manual bridges the gap between classical yogic wisdom and contemporary anatomy and physiology, giving teachers a thorough, practical, and inspiring understanding of breathing.

As a yoga teacher, understanding the respiratory system is not merely academic. It empowers you to guide your students safely through pranayama practices, to choose asanas that support optimal lung function, and to explain — with confidence — why breathing practices are profoundly transformative.

— Dr. Shivam Mishra, Founder, SKM Yoga

Chapter 1: Introduction — Prana and the Breath

1.1 The Yogic Concept of Prana

In yogic philosophy, Prana (Sanskrit: □□□□□) is the universal life force or vital energy that permeates all living beings. The Upanishads describe Prana as the very foundation of existence. Breath (Shvasa) is the most tangible manifestation of Prana, and the science of its control is called Pranayama. The Hatha Yoga Pradipika states: 'When the breath wanders, the mind is unsteady; when the breath is still, the mind is still.'

1.2 The Five Pranas — Pancha Vayu

Classical yoga identifies five movements (Vayus) of Prana within the body, each governing specific physiological zones:

Vayu (Wind Force)	Anatomical Correlation & Function
Prana Vayu	Chest / heart region; governs inhalation and reception of energy.
Apana Vayu	Pelvis and lower abdomen; governs elimination and exhalation (expiratory drive).
Samana Vayu	Navel region; governs digestion; associated with alveolar gas exchange.
Udana Vayu	Throat and head; governs speech, expression, and upward energy movement.
Vyana Vayu	Pervades the whole body; governs circulation and systemic integration.

1.3 Why Breath Matters in Yoga

Breath is the only autonomic function that can be consciously controlled. This makes it the master key to regulating the autonomic nervous system — shifting the body between sympathetic (fight-or-flight) and parasympathetic (rest-and-digest) states. Slow, conscious breathing activates the vagus nerve and induces the relaxation response.

Key Teaching Facts

- Average adult: 12–20 breaths per minute at rest.
- Yogic breathing target: 6–8 breaths per minute — maximises gas exchange and calms the nervous system.
- Deep meditation (Samadhi): breath rate can approach 1–2 breaths per minute.

• Every 1-breath-per-minute reduction in respiratory rate measurably activates the parasympathetic nervous system.

Chapter 2: Anatomy of the Respiratory System

The respiratory system is an elegant, integrated system designed to bring oxygen into the body and expel carbon dioxide. For a yoga teacher, a clear mental map of these structures is essential — both for personal practice and for guiding students safely.

2.1 Overview: Upper and Lower Respiratory Tract

The respiratory tract is divided into two anatomical regions:

- Upper Respiratory Tract: Nose and nasal cavity, Pharynx (throat), Larynx (voice box)
- Lower Respiratory Tract: Trachea (windpipe), Bronchi, Bronchioles, Alveoli (air sacs)

2.2 The Nose and Nasal Cavity

The nose is the primary entry point for breath in yogic practice. Nasal breathing is strongly emphasised in yoga because:

- The nasal mucosa warms, humidifies, and filters incoming air, protecting the delicate lung tissue.
- Nasal cilia trap particles and microorganisms before they reach the lungs.
- Nasal breathing produces nitric oxide (NO) — a powerful bronchodilator and vasodilator.
- The narrow nasal passages create slight resistance that increases lung volume and oxygen absorption.

Yoga Connection: Alternate Nostril Breathing (Nadi Shodhana)

Left nostril → Ida Nadi → Parasympathetic activation (cooling, calming).
Right nostril → Pingala Nadi → Sympathetic activation (warming, energising).
Research shows right-nostril dominance correlates with higher sympathetic tone; left-nostril with lower heart rate.

2.3 Pharynx and Larynx

The pharynx (throat) is a shared passage for air and food. The larynx houses the vocal cords and the epiglottis — a leaf-shaped cartilage critical in Ujjayi pranayama, where partial closure of the glottis creates the characteristic oceanic sound. The larynx is important in:

- Jalandhara Bandha (Chin Lock): Compression of the throat stimulates the carotid baroreceptors, reducing heart rate and blood pressure.
- Ujjayi Breathing: Partial glottal constriction increases intra-thoracic pressure and stimulates the vagus nerve.
- Bhramari (Humming Bee Breath): Vibration of vocal cords increases nitric oxide in the sinuses by up to 15-fold.

2.4 Trachea and the Bronchial Tree

The trachea is a 10–12 cm cartilaginous tube branching at the carina into the right and left main bronchi, then progressively into smaller airways:

Structure	Key Features
Trachea	Single tube; 16–20 C-shaped cartilage rings; ~2 cm diameter; 10–12 cm long.
Main Bronchi	2 branches; right is wider and more vertical — aspirated objects more likely to enter here.
Lobar Bronchi	5 total: 3 right (upper, middle, lower), 2 left (upper, lower).
Segmental Bronchi	10 right, 8–10 left; cartilage decreases progressively.
Bronchioles	No cartilage; <1 mm diameter; smooth muscle controls airway width.
Terminal Bronchioles	Last purely conducting airway; leads to the gas-exchange zone.
Alveolar Ducts	Lead to alveolar sacs; primary site of gas exchange.

Bronchioles are richly supplied with smooth muscle controlled by the autonomic nervous system. Sympathetic stimulation causes bronchodilation; parasympathetic stimulation causes bronchoconstriction. Yogic breathing helps rebalance this autonomic control.

2.5 The Lungs

The lungs are paired, spongy organs occupying the thoracic cavity, surrounded by the pleura (a double-layered membrane allowing frictionless movement during breathing).

Feature	Detail
Right Lung	3 lobes (Upper, Middle, Lower); slightly larger; 55–60% of total lung volume.
Left Lung	2 lobes (Upper, Lower); cardiac notch accommodates the heart.
Apex	Extends 2–3 cm above the clavicle; often compressed in stressed, upper-chest breathers.
Base	Rests on the diaphragm; expands maximally in belly/diaphragmatic breathing.

Alveoli	~300–500 million; total surface area ~70–100 m² (size of a tennis court).

Yoga Teaching Point: Lung Lobes and Asanas

Upper Lobes: Backbends (Bhujangasana, Ustrasana) open the apex — upper-lobe ventilation.

Middle Lobe: Lateral stretches (Trikonasana, Parsvakonasana) open the lateral chest.

Lower Lobes: Diaphragmatic breathing and Balasana activate the base of the lungs.

Three-Part Breath (Dirga Pranayama) ensures all lobes receive equal ventilation.

2.6 The Alveoli — The Breath's Final Destination

Alveoli are microscopic, grape-like air sacs (diameter 0.2–0.5 mm) wrapped in dense capillary networks. Gas exchange occurs across the respiratory membrane — a remarkably thin barrier (~0.5 micrometers) consisting of:

- Type I pneumocytes: Thin, flat cells; ~95% of alveolar surface; primary site of gas exchange.
- Fused basement membrane of epithelial and endothelial cells.
- Capillary endothelium (blood-side barrier).
- Type II pneumocytes: Secrete surfactant — a phospholipid mixture reducing surface tension to prevent alveolar collapse.

Chapter 3: Physiology of Breathing

3.1 Mechanics of Breathing

Breathing (ventilation) is a mechanical process driven by pressure gradients. Boyle's Law governs it: when the volume of a container increases, its internal pressure decreases. The respiratory muscles change thoracic volume, which changes intrapulmonary pressure, which drives airflow.

Inhalation (Inspiration)

1. Inspiratory muscles contract (diaphragm + external intercostals primarily).
2. Thoracic volume increases vertically (diaphragm descends) and laterally (ribs expand).
3. Intrapulmonary pressure falls below atmospheric (approximately −1 to −3 mmHg).
4. Air flows INTO the lungs down the pressure gradient.

Exhalation (Expiration)

5. At rest: passive — inspiratory muscles relax; elastic recoil of lungs drives air out.
6. Forced exhalation (Kapalabhati): abdominal muscles contract, pushing the diaphragm upward.
7. Intrapulmonary pressure rises above atmospheric (+1 to +3 mmHg).
8. Air flows OUT of the lungs.

3.2 Lung Volumes and Capacities

Understanding lung volumes is crucial for yoga teachers, as pranayama directly modifies these parameters:

Volume / Capacity	Value and Significance
Tidal Volume (TV)	~500 mL — volume breathed in/out per normal breath at rest.
Inspiratory Reserve Volume (IRV)	~3,000 mL — extra air inhaled after normal inspiration.
Expiratory Reserve Volume (ERV)	~1,100 mL — extra air forced out after normal expiration.
Residual Volume (RV)	~1,200 mL — air remaining after maximal expiration; cannot be exhaled.
Vital Capacity (VC)	~4,600 mL — max volume moved in one breath; increases with yoga training.
Total Lung Capacity (TLC)	~5,800 mL — total air in lungs at maximal inspiration.

Yoga and Lung Volumes — Research Evidence

- Regular pranayama practice can increase Vital Capacity by 10–20% over 8–12 weeks.
- Bhramari and Anulom Vilom improve peak expiratory flow rate (PEFR) — beneficial in asthma.
- Kapalabhati strengthens expiratory muscles, reducing residual volume and clearing stale air.
- Makarasana (Crocodile Pose) is clinically used to improve diaphragmatic breathing efficiency.

3.3 Gas Exchange and Transport

Pulmonary Gas Exchange (External Respiration)

In the alveoli, gases move by diffusion down their partial pressure gradients across the thin respiratory membrane:

- Oxygen (O_2): Alveolar PO_2 ≈ 104 mmHg > venous blood PO_2 ≈ 40 mmHg → O_2 diffuses INTO blood.
- Carbon Dioxide (CO_2): Venous blood PCO_2 ≈ 45 mmHg > alveolar PCO_2 ≈ 40 mmHg → CO_2 diffuses OUT.

Oxygen Transport

98.5% of oxygen is transported bound to haemoglobin (Hb) in red blood cells as oxyhaemoglobin (HbO_2). Slow breathing increases alveolar O_2 concentration and enhances haemoglobin saturation.

Carbon Dioxide Transport

CO_2 is transported in three forms: 70% as bicarbonate (HCO_3^-) in plasma; 23% bound to haemoglobin (carbaminohaemoglobin); 7% dissolved in plasma. Slow yogic breathing (Ujjayi, Nadi Shodhana) optimises CO_2 levels, maintaining blood pH balance.

3.4 Neural Control of Breathing

- Medullary Respiratory Centre (pre-Bötzinger complex): The 'breathing pacemaker' — sets basic respiratory rhythm.
- Pontine Centres: Fine-tune rhythm; involved in Kumbhaka (breath retention) regulation.
- Peripheral Chemoreceptors (carotid/aortic bodies): Detect changes in O_2, CO_2, and blood pH.
- Central Chemoreceptors (medulla): Respond primarily to CO_2 levels in cerebrospinal fluid.

Neural Pathway of a Yogic Breath

1. Conscious cortical intention to breathe (prefrontal cortex).
2. Signal sent to medullary respiratory centre.
3. Motor signals travel via phrenic nerve (C3–C5) → diaphragm contracts.
4. Intercostal nerves (T1–T12) → intercostal muscles expand the ribcage.
5. Lung stretch receptors activate (Hering-Breuer reflex) → feedback to medulla → expiration begins.
6. Conscious override (Kumbhaka, Ujjayi) can modify this automatic cycle.

Chapter 4: The Diaphragm — The Yoga Muscle

The diaphragm is the dome-shaped musculo-fibrous septum separating the thoracic and abdominal cavities. It is the primary muscle of respiration and occupies a central place in yoga anatomy.

4.1 Structure and Attachments

Feature	Detail
Shape	Dome-shaped; right dome (beneath liver) sits higher than the left by ~1.5 cm.
Origin	Sternal part: xiphoid process; Costal part: inner ribs 7–12; Lumbar part: L1–L3 via crura.
Insertion	Central tendon — non-contractile fibrous centre; merges with the pericardium above.
Nerve Supply	Phrenic nerve (C3, C4, C5) — 'C3, 4, 5 keep the diaphragm alive.'
Openings	Aortic hiatus (T12): aorta; Oesophageal hiatus (T10): oesophagus + vagus nerve; Caval (T8): IVC.

4.2 Diaphragmatic Action in Breathing

On contraction during inhalation, the central tendon descends 1–2 cm (quiet breathing) up to 10 cm (deep yogic breathing), enlarging thoracic volume vertically. The costal fibres simultaneously lift and flare the lower ribs outward (bucket-handle movement), expanding the thorax laterally.

On relaxation during exhalation, the diaphragm passively ascends due to elastic lung recoil. In Kapalabhati and Bhastrika, the abdominal muscles actively push the diaphragm upward, creating forceful exhalation.

4.3 The Diaphragm and the Bandhas

The three major bandhas directly engage and modulate diaphragmatic function:

Bandha	Mechanism and Respiratory Effect
Mula Bandha	Root Lock — pelvic floor contraction; provides stable foundation for diaphragmatic excursion; regulates intra-abdominal pressure.
Uddiyana Bandha	Abdominal Lock — performed on external breath retention; diaphragm drawn superiorly by negative intrathoracic pressure; massages thoracic organs.

Jalandhara Bandha	Chin Lock — cervical spine flexes onto sternum; compresses carotid sinus baroreceptors, reflexively slowing heart rate; seals the thoracic breath circuit.
Maha Bandha	Great Lock — all three bandhas simultaneously; powerfully integrates the diaphragm with the complete thoraco-abdominal unit.

4.4 Breathing Patterns

- Diaphragmatic (Abdominal) Breathing: Full diaphragm descent; belly expands on inhale. Maximises tidal volume. Promoted in Shavasana, Makarasana, all supine poses.
- Thoracic (Chest) Breathing: Intercostal muscles dominate; shoulders may elevate. Associated with stress and shallow breathing — often corrected in yoga.
- Clavicular (Apical) Breathing: Only upper chest and shoulders move. Least efficient; uses accessory muscles (SCM, scalenes). Common in chronic stress and COPD.
- Three-Part Breath (Dirga Pranayama): Consciously combines all three zones — belly, ribcage, upper chest — filling the lungs to ~80% of vital capacity.

Chapter 5: Yoga Asanas and the Respiratory System

Every yoga asana influences the respiratory system. Below is a detailed study of key poses, their anatomical effects on respiration, and teaching cues to enhance the breath-asana connection.

5.1 Backbends — Opening the Chest

Bhujangasana — Cobra Pose

Anatomy: Thoracic spine extension; stretching of pectoralis major and minor, serratus anterior, and anterior intercostals. The sternum lifts, increasing antero-posterior thoracic diameter.

Respiratory Effect: Opens the upper and middle lung lobes; lengthens anterior diaphragmatic fibres; encourages clavicular breathing in the full pose; stimulates the sympathetic nervous system mildly.

Teaching Cue: 'As you inhale, let the sternum float forward and upward. Feel the front of your chest expanding like a flower opening to the sun. Breathe into the broadening of your collarbones.'

Ustrasana — Camel Pose

Anatomy: Full thoracic and cervical extension; maximal stretch of anterior thorax including internal intercostals, pectorals, and subclavius. Hip flexors and abdominals also lengthened.

Respiratory Effect: Dramatically increases thoracic volume; all lung lobes expand. The trachea elongates and opens. Tidal volume increases significantly.

Therapeutic Use: Prescribed in yoga therapy for kyphosis, restricted chest mobility, and mild COPD to re-mobilise the rib cage and counteract the barrel-chest posture.

Matsyasana — Fish Pose

Anatomy: Thoracic extension supported on forearms; neck extended; chest passively elevated. Passive stretch of intercostals, scalenes, and sternocleidomastoid (SCM).

Respiratory Effect: Fully opens the apical lung fields; used in yoga therapy to improve apical ventilation in atelectasis (collapse of upper lobes). Lengthens and opens the trachea.

Teaching Cue: 'Breathe into the top of your lungs — the area just below your collarbones — as if filling a vessel from the bottom all the way up to the very brim.'

5.2 Forward Bends — Activating the Lower Lobes

Paschimottanasana — Seated Forward Bend

Anatomy: Spinal flexion with abdomen folding into thighs. Posterior thorax opens; posterior diaphragm stretches. Posterior basal lung fields expand on inhalation.

Respiratory Effect: Increases posterior basal (lower lobe) ventilation; activates parasympathetic nervous system; reduces respiratory rate. Extended exhalation in this pose stimulates vagal tone.

Teaching Cue: 'On each exhale, soften the belly and fold a little deeper. Inhale into the back of your lungs — feel your back ribs spread apart like wings.'

Balasana — Child's Pose

Anatomy: Flexion of hips, knees, and spine; forehead resting on the floor. Abdomen presses lightly against thighs. Posterior thorax fully accessible.

Respiratory Effect: Posterior and lateral lower lobe ventilation maximised. The weight of the body on the anterior chest encourages proprioceptive awareness of the posterior breath. The signature restorative breath-observation pose.

Teaching Cue: 'Notice how the back of your body breathes. Each inhale quietly inflates the back like a balloon; each exhale, that balloon softens. Let the breath do all the work.'

5.3 Lateral Stretches — Expanding the Lateral Thorax

Trikonasana — Triangle Pose

Anatomy: Lateral flexion of the spine; the superior intercostal spaces on the lengthened side open fully; the inferior side compresses. Serratus anterior, latissimus dorsi, and quadratus lumborum are engaged.

Respiratory Effect: The uppermost intercostal spaces expand dramatically on the lengthened side, ventilating the upper and middle lobes of that lung. One of the most effective asanas for lateral chest expansion.

Teaching Cue: 'Inhale and imagine the space between each rib on the long side of your body expanding like an accordion. Your upper lung is filling from the side like a bellows.'

5.4 Inversions — Diaphragm and Venous Return

Viparita Karani — Legs-Up-the-Wall Pose

Anatomy: Gentle inversion; legs elevated; thorax at floor level.

Respiratory Effect: Improves venous return; reduces the work of breathing; equalises upper and lower lobe ventilation and perfusion. Ideal for respiratory rehabilitation and stress-related breathing disorders.

Contraindications: Uncontrolled hypertension, glaucoma, retinal detachment, active respiratory infection.

5.5 Twists — Wringing Out Respiratory Musculature

Ardha Matsyendrasana — Half Lord of the Fishes

Anatomy: Rotation of thoracic spine; one side of intercostals compressed, opposite side stretched. Oblique abdominals engaged.

Respiratory Effect: Creates asymmetric ventilation — the compressed side is 'squeezed' on exhalation; on release, fresh air is drawn in. Twists have a cyclic clearing effect on pleural fluid and costal cartilage.

Teaching Cue: 'Exhale as you deepen the twist — wring out the old air. Inhale to lengthen your spine first, creating space. Ribs on one side like a closed book, on the other like open pages.'

5.6 Supine Poses — Diaphragmatic Freedom

Shavasana — Corpse Pose

Anatomy: Complete muscular relaxation; supine; all respiratory accessory muscles released. The diaphragm functions with minimal resistance.

Respiratory Effect: Allows observation of pure diaphragmatic breathing without postural demands. Respiratory rate naturally slows. Parasympathetic nervous system maximally activated. Ideal for breath-awareness in Yoga Nidra.

Teaching Cue: 'Let your breath breathe you. There is no effort — only observation. Notice how your belly rises gently on the inhale, and falls softly on the exhale, like the quiet tide.'

Makarasana — Crocodile Pose

Anatomy: Prone position; forehead or chin resting on crossed forearms; abdomen against the floor.

Respiratory Effect: Clinically shown to increase functional residual capacity and reduce respiratory rate. The floor provides direct biofeedback for diaphragmatic breathing — the belly is felt pushing against the floor on inhalation. Preferred therapeutic pose for asthma and COPD rehabilitation.

Teaching Cue: 'Feel your belly pressing into the floor as you inhale. The floor is your biofeedback teacher. On each exhalation, soften completely into the earth.'

Chapter 6: Pranayama — Science of Breath Control

Pranayama (Prana = life force + Ayama = expansion) is the fourth limb of Patanjali's Ashtanga Yoga. It encompasses systematic breathing techniques that regulate, extend, and ultimately transcend the automatic breath cycle.

6.1 The Four Components of Pranayama

Component	Description and Function
Puraka	Controlled inhalation — active, drawing prana into the body.
Kumbhaka	Breath retention — internal (Antara: after inhalation) or external (Bahya: after exhalation).
Rechaka	Controlled exhalation — releasing prana, CO_2, and mental tension.
Shunyaka	Spontaneous pause between breaths — the 'zero breath'; beyond volition.

6.2 Major Pranayama Techniques

1. Nadi Shodhana — Alternate Nostril Breathing

Technique: Alternating inhalation and exhalation through each nostril using Vishnu Mudra (thumb closes right nostril; ring and little fingers close left nostril).

Physiology: Balances activity of left and right cerebral hemispheres; synchronises autonomic nervous system; normalises blood pressure; reduces cortisol. Slows respiratory rate to 6–8 breaths/min; increases CO_2 tolerance; improves SpO_2.

Ratio: Beginners — 1:1:1 (inhale : hold : exhale). Advanced — 1:4:2 (classic yogic ratio).

2. Ujjayi — Ocean / Victorious Breath

Technique: Partial constriction of the glottis creating a soft oceanic hissing sound on both inhalation and exhalation. Nasal breathing throughout.

Physiology: The partial glottal closure creates a Positive End-Expiratory Pressure (PEEP) effect, keeping alveoli open and improving gas exchange. Stimulates the vagus nerve. Reduces anxiety and sympathetic arousal. Used in yoga therapy for hypertension, insomnia, and thyroid disorders.

3. Kapalabhati — Skull-Shining Breath

Technique: Rapid, forceful exhalations through the nose (1–2 per second) with passive inhalation. Classified as a Shat Karma (cleansing technique) in classical yoga.

Anatomy: Primary muscles: internal obliques, external obliques, rectus abdominis, and transverse abdominis — all compressing the abdomen and forcing the diaphragm upward.

Physiology: Stimulates the sympathetic nervous system; clears mucus from airways; activates the solar plexus region.

Kapalabhati Contraindications

Pregnancy, hypertension, cardiac conditions, glaucoma, active abdominal hernia, recent abdominal surgery, heavy menstruation, epilepsy.

Always teach beginners with slow, gentle strokes before increasing speed.

4. Bhramari — Humming Bee Breath

Technique: Inhalation through the nose followed by exhalation with a continuous humming sound, often with Shanmukhi Mudra (eyes and ears closed with fingers).

Physiology: The humming sound increases sinus nitric oxide (NO) production by up to 15-fold (confirmed by Nobel Prize research, 1998). NO is a potent bronchodilator, vasodilator, and anti-microbial agent. Reduces blood pressure; slows heart rate; profoundly calms the nervous system. Shown to improve sinusitis, hypertension, and anxiety disorders.

5. Kumbhaka — Breath Retention

Internal Kumbhaka (Antara Kumbhaka): Retention after full inhalation. Increases alveolar O_2 absorption; builds intra-thoracic pressure; purifies blood.

External Kumbhaka (Bahya Kumbhaka): Retention after full exhalation. Powerful chemoreceptor stimulus; activates Uddiyana Bandha naturally; creates deep meditative stillness.

Kumbhaka Safety Guidelines for Teachers

- Never teach Kumbhaka to beginners — establish stable pranayama foundation first (3–6 months minimum).
- Do NOT teach to students with hypertension, cardiac arrhythmia, epilepsy, or pregnancy.
- Begin with a 1:1 inhale-to-hold ratio; never force the retention.
- Ensure students can maintain the bandhas comfortably before adding retention.
- Always practise in a safe, supervised, seated environment — never supine.

Chapter 7: Respiratory Conditions and Yoga Therapy

A yoga teacher is not a physician, but an informed teacher can support students with respiratory conditions by choosing appropriate asanas, pranayamas, and modifications. This chapter provides evidence-based guidance.

7.1 Asthma

Asthma is a chronic inflammatory airway disease characterised by reversible bronchospasm, airway oedema, and excess mucus production. Triggers include allergens, cold air, exercise, and stress.

- Slow diaphragmatic breathing reduces respiratory rate and decreases trigger sensitivity.
- Bhramari increases nasal nitric oxide — a natural bronchodilator.
- Yoga reduces cortisol and adrenaline, which are major asthma triggers.
- Buteyko-style reduced-volume breathing (related to pranayama) has clinical evidence for reducing asthma medication use.

Asthma — Recommended and Contraindicated Practices

RECOMMENDED: Shavasana, Makarasana, Setu Bandhasana, Nadi Shodhana, Bhramari, Ujjayi.

AVOID: Kapalabhati, Bhastrika, and any pose that triggers breath-holding anxiety.

Always have a student's rescue inhaler accessible during yoga sessions.

7.2 COPD — Chronic Obstructive Pulmonary Disease

COPD includes chronic bronchitis and emphysema — characterised by irreversible airflow limitation. Patients often have air trapping, barrel chest, and use of accessory muscles for breathing.

- Pursed-lip breathing (analogous to Ujjayi exhalation) reduces air trapping by providing back-pressure to keep airways open.
- Diaphragmatic breathing retraining (especially in Makarasana) reduces the dysfunctional accessory muscle pattern.
- Gentle backbends improve thoracic mobility and reduce the kyphotic compensation.
- Walking pranayama (coordinating steps with breath) improves exercise tolerance.

7.3 Anxiety-Related Hyperventilation

Chronic over-breathing depletes CO_2, causing respiratory alkalosis — producing dizziness, tingling, chest tightness, and panic. This is extremely common in modern populations.

- Extended exhalation (ratio 1:2 inhale:exhale) rapidly raises CO_2 and restores acid-base balance.

- Nadi Shodhana with a 4:8 ratio normalises breathing within one session.
- Yoga Nidra and restorative poses retrain the nervous system away from chronic sympathetic hyperarousal.

7.4 Long-COVID Respiratory Rehabilitation

Following COVID-19 infection, many patients experience residual breathlessness, reduced exercise tolerance, and anxiety-related breathing pattern disorders. Yoga is an evidence-supported complementary rehabilitation modality.

- Supine pranayama (Shavasana pranayama) allows practice even for deconditioned patients.
- Gradual progression: restorative poses → seated poses → gentle standing poses.
- Bhramari reduces anxiety and improves nasal hygiene.
- Avoid vigorous breath practices (Kapalabhati, Bhastrika) until pulmonary function is normalised.

Chapter 8: Assessment and Teaching Cues

8.1 Observing Your Student's Breath

As a yoga teacher, your eye must be trained to observe breathing patterns. Use this framework:

Parameter	What to Observe
Respiratory Rate	Count breaths/minute at rest — normal: 12–20; yoga target: 6–10/min.
Chest vs. Belly	Does belly or chest lead the breath? Chest-dominant suggests stress pattern.
Nostril vs. Mouth	Mouth breathing indicates poor nasal breathing habits; refer to Neti/nasal hygiene.
Symmetry	Do both sides of the rib cage expand equally? Asymmetry may indicate scoliosis.
Exhalation Length	Is exhalation at least as long as inhalation? Short exhales suggest anxiety or COPD.
Accessory Muscles	Do shoulders rise dramatically on inhale? Suggests shallow clavicular breathing.
Breath Sound	Wheezing, stridor, or crackles? Always refer to a medical professional.
Breath in Asana	Can the student maintain smooth breathing throughout? Held breath = exceeded capacity.

8.2 Universal Teaching Cues for Breath in Asana

- 'If you cannot breathe smoothly in this pose, come out slightly until you can.'
- 'Let the breath lead the movement — inhale to prepare, exhale to deepen.'
- 'Your breath is your teacher. If it becomes rough or held, listen to it.'
- 'Fill your lungs like a three-storey building: ground floor (belly), middle floor (ribcage), top floor (upper chest).'
- 'On every exhalation, surrender a little more of your effort. On every inhalation, invite a little more ease.'
- 'The quality of your breath is the quality of your yoga.'

8.3 Class Sequencing for Respiratory Health

A well-designed class for respiratory health follows this evidence-based sequence:

9. Opening: Supine breath awareness (5 min) — Shavasana or Makarasana observation.
10. Warm-up: Gentle spinal movements (Cat-Cow, Tadagi Mudra) to mobilise the thorax.
11. Standing poses: Trikonasana, Parsvakonasana — lateral thoracic expansion.
12. Backbends: Bhujangasana, Setu Bandhasana — anterior thorax opening.
13. Twists: Ardha Matsyendrasana — wringing and releasing thoracic muscles.
14. Forward bends: Balasana, Paschimottanasana — posterior lung activation, exhalation deepening.
15. Inversion: Viparita Karani — venous return and autonomic regulation.
16. Pranayama: Nadi Shodhana then Bhramari (10 min).
17. Closing: Yoga Nidra or Shavasana (10–15 min).

Appendix: Glossary of Respiratory Anatomy Terms

Term	Definition
Alveoli	Tiny air sacs in the lungs; site of gas exchange.
Apnea	Temporary cessation of breathing.
Bronchi	Primary airways branching from the trachea into each lung.
Bronchioles	Smaller airways within the lung, lacking cartilage.
Chemoreceptors	Sensory cells responding to changes in O_2, CO_2, and pH.
Compliance	Ease with which the lungs can be inflated; yoga improves thoracic compliance.
Cilia	Hair-like projections in airways that clear mucus and particles.
Diaphragm	Primary muscle of breathing; dome-shaped musculo-fibrous septum.
Dyspnoea	Subjective feeling of breathlessness.
Epiglottis	Cartilage flap preventing food entering the trachea; key in Ujjayi.
Glottis	Opening between the vocal cords; partially closed in Ujjayi pranayama.
Haemoglobin	Iron-containing protein in red blood cells; carries oxygen.
Hypercapnia	Elevated CO_2 in blood — can be intentionally induced in Kumbhaka.
Intercostals	Muscles between the ribs; external intercostals assist inhalation.
Larynx	Voice box; site of glottal action in Ujjayi and Bhramari.
Nitric Oxide (NO)	Gaseous signalling molecule; bronchodilator; increased by nasal breathing and Bhramari.
Phrenic Nerve	Nerve from C3–C5 controlling the diaphragm.
Pleura	Double membrane surrounding each lung.
Residual Volume	Air remaining in lungs after maximal exhalation; cannot be exhaled.
Surfactant	Phospholipid mixture reducing alveolar surface tension; prevents collapse.
Tidal Volume	Volume of air breathed in or out per normal breath (~500 mL).

Trachea	Windpipe; carries air between larynx and bronchi.
Vital Capacity	Maximum volume of air moved in one breath; increases with yoga practice.

SKM YOGA — TEACHER TRAINING MANUAL

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