

# Yoga and pulmonary diseases: an evidence based review

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## **Abstract**

**Introduction:** Yoga has consistently demonstrated improved pulmonary parameters in several scientific studies, both in healthy and in diseased individuals. Beneficial changes documented include increases in vital capacity, tidal volume, FeV1, Fev1/FVC ratio, expiratory reserve volume and breath holding time and many other pulmonary parameters. These changes suggest a potential preventive and therapeutic role of yoga in pulmonary diseases.

**Method and Materials:** All citations listed in PubMed under ‘yoga and respiratory diseases’ were reviewed. Other relevant grey scientific material was also consulted.

**Results:** Although limited in number, all randomized controlled studies reported an improvement in the three main subjective problems faced by these patients, namely, breathlessness, fatigue, stress, insomnia and poor quality of life. The objective changes underlying these benefits included yoga induced strengthening of the inspiratory and expiratory muscles, increased parasympathetic tone, improved tolerance to hypoxia and hypercapnea by the medullary regulatory center and via other complex neuro-endocrine factors. Benefits are also noted in caregivers.

**Conclusions:** Chronic lower respiratory diseases remain incurable and impose tremendous suffering on people and society. There has been an explosion in clinical studies studying the pulmonary health benefits of yoga. The evidence based adjunctive therapeutic efficacy of yoga in COPD and asthma generated by these trials is persuasive. Yoga is easy to learn and practice, is almost free and is extremely safe. Yoga is ideally suited for India as a complementary modality in the management of lower respiratory disorders.

**Key Words:** Yoga, COPD, Asthma

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## **Introduction:**

Respiratory diseases are a major health burden on the world population. They are among the leading causes of death worldwide. Lower respiratory infections (mostly pneumonia and tuberculosis), lung cancer and chronic obstructive pulmonary disease (COPD) together accounted for 9.5 million deaths worldwide during 2008. This amounted to one-sixth of the global death burden. The World Health Organization (WHO) also estimated that the same four diseases accounted for one-tenth of the disability-adjusted life-years lost worldwide

in 2008. (ERS, 2015) Bronchial asthma also features prominently in its prevalence and impact, especially in children. India has an embarrassing world ranking in its respiratory disease prevalence and impact. According to the latest WHO data, lung disease related deaths in India reached 1,061,863 or 11.97% of total deaths in 2014. The age adjusted death rate was 126.99 per 100,000 of population and ranked India #1 in the world. (WLF, 2015)

Yoga with physical postures, breathing exercises, meditation and relaxation may play an important role in the complementary management of lower respiratory diseases. Several emerging trials have supported its modulating effects on the pulmonary function, both in healthy individuals, (Madanmohan et al, 2008) those with respiratory diseases (Santana et al, 2013) and those with non-respiratory conditions. (Asha et al, 2015) This article reviews the evidence based data established by these studies.

### **Methods:**

A systemic review of scientific publications cited by PubMed was done during October 2015. Additional studies were identified by searching bibliographies of reviews and were consulted. Other relevant published scientific material was also used.

### **Results:**

There were 517 citations under 'yoga and breathing' dating back to 1956. Under 'yoga and health benefits' revealed 233 citations dating back to 1997; under 'yoga and asthma' there were 93 citations dating back to 1963; under 'yoga and COPD', there were 19 citations dating back to 1998 and 2 under 'yoga and bronchitis' dating back to 1998. Yoga and lung cancer revealed 9 listings dating back to 2004.

### **Discussion:**

Chronic respiratory diseases are common disabling diseases affecting a significant percentage of the worldwide human population. The most common of these are COPD, asthma and occupational lung diseases. Risk factors include tobacco smoke, air pollution, occupational chemicals and dusts, and lower respiratory infections during childhood. Although not curable, a host of pharmacological and non-pharmacological modalities are available to help control symptoms and improve the

quality of life for these patients. Yoga is emerging as a valuable complementary modality, especially in COPD and bronchial asthma.

### **Healthy Individuals:**

There is a statistically significant increase in vital capacity, tidal volume, expiratory reserve volume, breath holding and endurance time, and peak expiratory flow rate following yoga training. (Karthik et al, 2014; Shobha et al, 2014) Other studies have noted a reduction in respiratory rate and an increase in FEV1, FEV1% and maximum voluntary ventilation after short-term yoga practice (Ries et al, 2007; Makwana et al, 1998; Madanmohan et al, 1992) Several factors are responsible for the beneficial effects seen in these patients with yoga training. Yoga practice aids in toning up general body systems, (Udupa et al, 1972) relaxing the chest muscles and expanding the lungs, raising energy levels and improving respiratory stamina, and simultaneously calming the body (Chanavirut et al, 2006) Yoga also helps patients to breathe more deeply by utilizing the shoulder, thoracic, and abdominal muscles efficiently (Vedanthan, 2003) The strength of expiratory as well as inspiratory muscles is increased. (Madan et al, 1992; Reddy, 2010; Santaella et al, 2011) Yoga also improves blood circulation. (Posadzki et al, 2009) There is an increase in parasympathetic tone and an improved tolerance to hypoxia and hypercapnea by the medullary regulatory center, directly and via other complex neuro-endocrine factors, thereby lowering the respiratory rate. (Joshi et al, 1992) Yoga also reduces associated stress and anxiety. (Parshad et al, 2004; Brown et al, 2009; Hoffmann et al, 2015; Pascoe et al, 2015)

### **COPD:**

Chronic obstructive pulmonary disease (COPD) is an important cause of morbidity

and mortality and poses a major public health problem. (Murray et al, 1997) According to the latest WHO estimates, there were 64 million people with COPD and 3 million people died of COPD in 2004. The numbers of deaths from COPD are on the rise in the US. (Jiemin et al, 2015) WHO predicts that COPD will become the third leading cause of death worldwide by 2030.(WHO, 2004) More than 90% of COPD deaths occur in low- and middle-income countries. Its social burden is expected to rank fifth in the world by 2020 (Viegi et al, 2007; Murray et al, 1997) COPD is characterized by irreversible airflow obstruction, a gradual decline in lung function, loss of lung tissue, reduced quality of life, and high rates of mortality.(NIH, 2006)The Global Initiative for Chronic Obstructive Lung Disease (GOLD) management includes a reduction in symptoms, complications, and exacerbations, improved exercise tolerance, improved health status, and reduced mortality. (Vestbo et al, 2013) Some of these goals can be achieved by initiating breathing exercises in these patients. (Holland et al, 2012) Yoga practice incorporates pranayama- breathing exercises that teach slow breathing, breath holding and vigorous inspiratory and expiratory excursions. Yoga has been shown to be beneficial in patients with COPD. (Tandon,1978; Kulpati et al, 1982; DorAnne et al, 2009; Liu et al, 2014)Besides the other benefits seen in otherwise healthy individuals, yoga also improves the diffusion capacity in this group.(Ritu et al, 2012) It is well tolerated by these patients. (Pomidori et al, 2009) Associated stress and anxiety is reduced. (Hoffmann et al, 2015; Pascoe et al, 2015) The quality of life is also improved. (Fulambarker et al, 2012) A recent report finds yoga program comparable to conventional COPD rehabilitation. (Guleria et al, 2015)

### **Asthma:**

About 300 million people are suffering from asthma globally. (Masoli et al, 2004; Bateman et al, 2007; Beasley et al, 2011)It is a common disease among children, and most asthma-related deaths occur in low- and lower-middle income countries. (WHO: 2015) About 10% of this asthma burden belongs to India. Asthma is characterized by reversible airway obstruction. Exercise has shown to have benefits in patients with asthma. (Bacon, 2015) Yoga has also been effective in patients with asthma as a complementary modality.(Sabina et al, 2005; Sodhi et al, 2009; Burgess et al, 2011; Rao et al, 2014)Pulmonary function parameters are improved in asthmatic patients, (Singh et al, 2012) and clinical studies have showed significant improvement in PEFR, VC, FVC, FEV1, FEV/FEC %, MVV, ESR and absolute eosinophil count. (Sathyaprabha et al, 2001) Asthma is associated with chronic inflammation, (Bently et al, 1992) and yoga improves inflammatory markers in these patients. (Shruti et al, 2014) The number of asthmatic attacks are reduced, there is a reduction in rescue medication use and the reduction of medicines is earlier than that achieved with conventional treatment alone. (Demeke et al, 2010; Vempati et al, 2009; Fulambarker et al, 2012)Asthmatics suffer from associated anxiety and stress, and these emotional factors are positively impacted by yoga. (Hoffmann et al, 2015; Pascoe et al, 2015)The quality of life is improved in these patients. (Bidwell et al, 2012; Sodhi et al, 2014) No adverse effects have been reported with yoga practice in asthmatics. (Cramer et al, 2014)

### **Other respiratory diseases**

Several studies have documented the use of yoga to relieve pain and associated stress, anxiety and sleep disorders, both in patients and their caregivers. (McCall et al, 2015; Mibury et al, 2015) Yoga improves the

quality of life in the patients and caregivers. (Fouladbakhsh et al, 2014) Evidence based clinical information on the benefits of yoga in the management of other respiratory diseases is lacking.

### **Conclusions:**

Chronic lower respiratory diseases remain incurable and impose tremendous suffering on people and society. There has been an

explosion in clinical studies studying the pulmonary health benefits of yoga. The evidence based adjunctive therapeutic efficacy of yoga in COPD and asthma generated by these trials is persuasive. Yoga is easy to learn and practice, is almost free and is extremely safe. Yoga is ideally suited for India as a complementary modality in the management of lower respiratory disorders.

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