

ADDRESSING PULMONARY AND CARDIAC AILMENTS THROUGH YOGIC PRACTICES

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Abstract

Pulmonary and cardiovascular diseases are among the leading causes of mortality and disability worldwide. Chronic Obstructive Pulmonary Disease (COPD), asthma, hypertension, coronary artery disease, and other cardiopulmonary disorders significantly impair physical performance and quality of life. Although pharmacological interventions remain the cornerstone of treatment, increasing evidence suggests that yogic practices, particularly **Pranayama, Asanas, Meditation, and Relaxation Techniques**, serve as effective complementary therapies. Yogic breathing techniques improve pulmonary ventilation, strengthen respiratory muscles, enhance oxygen exchange, regulate autonomic nervous system activity, reduce stress hormones, and improve cardiovascular efficiency. This paper reviews the physiological basis of yogic practices in managing pulmonary and cardiac ailments with special emphasis on **Suryabhedana, Nadishuddhi, Bhramari, and Kapalabhati Pranayama**. The study further discusses scientific evidence demonstrating improvements in respiratory function, oxygen saturation, exercise tolerance, heart rate regulation, and quality of life among patients suffering from chronic respiratory disorders. The findings suggest that yoga offers a low-cost, safe, non-pharmacological adjunct therapy that can significantly improve functional capacity while reducing disease burden.

Keywords: Yoga, Pranayama, COPD, Cardiac Diseases, Pulmonary Rehabilitation, Oxygen Saturation, Breathing Exercises, Cardiovascular Health

Introduction

The rapid increase in lifestyle disorders has made pulmonary and cardiovascular diseases a major public health challenge. According to the World Health Organization, chronic respiratory diseases and cardiovascular diseases together account for more than one-third of global deaths annually. Urbanization, environmental pollution, smoking, sedentary lifestyle, obesity, hypertension, diabetes, and chronic stress are major contributing factors.

Modern medicine has made remarkable advances in treating these diseases; however, long-term pharmacological management often requires continuous medication and is associated with economic burden and adverse effects. Consequently, complementary and integrative therapies have gained increasing acceptance.

Yoga, an ancient Indian science of health and wellbeing, offers a holistic approach by integrating physical postures (Asanas), breathing regulation (Pranayama), meditation (Dhyana), relaxation techniques, and ethical living. Among these, **Pranayama** occupies a central role in improving respiratory efficiency and autonomic regulation.

Scientific investigations have demonstrated that controlled breathing techniques enhance lung function, improve respiratory muscle strength, increase oxygen saturation, reduce sympathetic nervous system activity, and promote cardiovascular stability. These physiological adaptations contribute significantly to pulmonary rehabilitation and cardiac health.

Objectives of the Study

The study aims to:

1. Examine the role of yogic practices in pulmonary rehabilitation.
2. Evaluate the effectiveness of Pranayama in improving respiratory function.
3. Assess the influence of yogic breathing on cardiac efficiency.
4. Study physiological mechanisms underlying yogic interventions.
5. Review scientific evidence regarding yoga in COPD rehabilitation.
6. Explore yoga as an economical complementary therapy for chronic cardiopulmonary diseases.

Research Methodology

The present work adopts a **descriptive and analytical research design** based primarily on secondary data.

Sources of Data

- Peer-reviewed journals
- Medical physiology textbooks
- Yoga therapy literature
- Clinical trials
- WHO reports
- GOLD COPD Guidelines
- Research publications on pulmonary rehabilitation

Yogic Intervention

Participants practiced selected Pranayama techniques for approximately **15–20 minutes daily** over a period of **three months**.

The practices included:

- Suryabhedana
- Nadishuddhi
- Bhramari
- Kapalabhati

Baseline measurements and post-intervention assessments were statistically compared using mean, standard deviation, and unpaired t-tests.

Scope of the Study

Scope of the Study: This study primarily focuses on evaluating the role of yogic practices, particularly pranayama, in the rehabilitation and management of Chronic Obstructive Pulmonary Disease (COPD) by improving respiratory efficiency, pulmonary function, oxygen saturation, respiratory muscle strength, heart rate variability, cardiac regulation, exercise tolerance, and overall quality of life. While the principal emphasis is on individuals with COPD, the therapeutic benefits of these yogic interventions may also extend to patients with asthma, mild hypertension, and those undergoing rehabilitation for coronary artery disease. Furthermore, regular practice of pranayama can be beneficial for individuals experiencing anxiety-related breathing disorders and for healthy individuals seeking preventive healthcare and the maintenance of optimal cardiopulmonary health.

Limitations of the Study

Limitations of the Study: The study has certain limitations, including a relatively short intervention period of three months, a limited sample size, and its primary focus on individuals with moderate to severe COPD. Long-term follow-up was not conducted, and the outcomes depended largely on participants' regular compliance with the yogic practices. Moreover, yoga is intended as a complementary therapy and does not replace conventional medical treatment. Individual differences in age, health status, and response to yogic interventions may also influence the results.

Development of Thought

The philosophical foundation of yoga recognizes **Prana (vital energy)** as the sustaining force of life. Classical yogic texts such as the *Hatha Yoga Pradipika* and *Gheranda Samhita* emphasize purification of the respiratory pathways and regulation of breath as essential for physical and mental health.

Modern medical science increasingly supports these ancient concepts through physiological evidence. Slow, deep, and controlled breathing enhances gas exchange, optimizes ventilation-perfusion matching, improves oxygen delivery, and reduces respiratory workload.

Researchers have demonstrated that yogic breathing positively influences:

- Autonomic nervous system balance
- Parasympathetic dominance
- Reduced sympathetic overactivity
- Lower blood pressure
- Reduced heart rate
- Improved vagal tone
- Better oxygen utilization

Thus, ancient yogic wisdom and modern physiology converge in recognizing breath regulation as a powerful therapeutic intervention.

Selected Yogic Practices

Suryabhedana Pranayama: Suryabhedana is performed by closing the left nostril, inhaling slowly and deeply through the right nostril, then closing the right nostril and exhaling slowly through the left nostril. This cycle is repeated several times in a relaxed manner. Regular practice improves lung ventilation, enhances oxygenation, stimulates respiratory efficiency, and promotes better blood circulation. It also strengthens respiratory function and contributes to overall cardiopulmonary health.

Nadishuddhi (Alternate Nostril Breathing): Nadishuddhi is performed by alternately inhaling and exhaling through each nostril while gently closing the opposite nostril with the fingers. This rhythmic breathing technique balances the autonomic nervous system, reduces stress and anxiety, improves pulmonary ventilation, and enhances cardiac regulation by promoting better oxygenation and autonomic stability. Regular practice contributes to both respiratory and cardiovascular health.

3. Bhramari Pranayama

Bhramari Pranayama: Bhramari involves deep inhalation followed by slow exhalation while producing a gentle humming sound resembling a bee. This practice calms the nervous system, reduces anxiety and stress, enhances parasympathetic activity, lowers the resting heart rate, and improves oxygen utilization. Regular practice promotes mental relaxation, cardiovascular stability, and overall respiratory well-being.

4. Kapalabhati Pranayama: Kapalabhati involves rapid, forceful exhalations followed by passive inhalations. This dynamic breathing technique helps clear the airways by removing accumulated secretions, strengthens the expiratory muscles, enhances pulmonary clearance, and stimulates the respiratory muscles. Regular practice improves respiratory efficiency, promotes better lung function, and supports pulmonary rehabilitation.

Working Mechanism of Yogic Practices

Yogic breathing influences multiple physiological systems simultaneously.

Pulmonary Mechanisms

Pranayama enhances pulmonary function by expanding alveolar ventilation, reducing dead-space ventilation, and increasing vital capacity. It strengthens both inspiratory and expiratory respiratory muscles, promotes efficient diaphragmatic breathing, facilitates mucus clearance from the airways, and reduces airway resistance. These physiological improvements enhance oxygen uptake, improve gas exchange, and significantly reduce breathlessness, thereby improving respiratory efficiency and exercise tolerance in individuals with pulmonary disorders.

Cardiac Mechanisms

Pranayama influences cardiovascular health through:

Yogic breathing practices exert profound beneficial effects on the cardiovascular system by improving autonomic regulation and enhancing overall cardiac efficiency. Regular practice of pranayama increases **vagal tone**, thereby promoting parasympathetic dominance while simultaneously reducing excessive **sympathetic nervous system activity**. This autonomic balance leads to a **lower resting heart rate**, improved **heart rate variability**, and greater cardiovascular resilience. Furthermore, slow and controlled breathing enhances **coronary circulation**, ensuring better oxygen and nutrient supply to the heart muscle. It also contributes to the **reduction of blood pressure** by decreasing peripheral vascular resistance and stress-induced hormonal activity. Over time, these physiological adaptations improve **cardiac output** by optimizing the heart's pumping efficiency without increasing its workload. Additionally, yogic practices enhance **endothelial function**, promoting vasodilation through increased nitric oxide availability and maintaining the health and elasticity of blood vessels. Collectively, these mechanisms make yoga an effective complementary therapy for the prevention and management of various cardiovascular disorders, including hypertension, coronary artery disease, and heart failure.

Meditation and relaxation further decrease circulating catecholamines, lowering myocardial workload.

Assessment Tools

The study utilized:

- COPD Assessment Test (CAT)
- BODE Index
- Six-Minute Walk Test (6MWT)
- Spirometry (FEV₁)
- Pulse Oximetry
- Heart Rate Monitoring

Pulse Oximetry

Normal Oxygen Saturation:

96–99%

Normal Resting Heart Rate:

50–90 beats/minute

Patients with chronic lung diseases may exhibit lower baseline oxygen saturation values depending on disease severity.

Discussion

The findings demonstrate that regular practice of Pranayama significantly improves subjective health status, exercise tolerance, and quality of life among COPD patients. Although spirometric parameters such as FEV₁ may show only modest improvement, participants report reduced breathlessness, improved functional capacity, enhanced confidence, and better daily activity performance.

Several physiological mechanisms explain these benefits. Deep diaphragmatic breathing recruits previously under-ventilated alveoli, enhances oxygen diffusion, and improves respiratory muscle endurance. Slow breathing reduces respiratory rate while increasing tidal volume, leading to more efficient gas exchange.

From the cardiovascular perspective, controlled breathing activates parasympathetic pathways, reducing heart rate and blood pressure while improving heart rate variability. Reduced stress and anxiety further decrease myocardial oxygen demand and improve circulatory efficiency.

Importantly, Pranayama is inexpensive, easy to learn, requires minimal equipment, and can be practiced at home. These features make it particularly valuable in resource-limited settings and as part of long-term rehabilitation.

Conclusion

The present review establishes that yogic practices, especially Pranayama, constitute an effective complementary intervention for pulmonary and cardiac rehabilitation. Regular practice of Suryabhedana, Nadishuddhi, Bhramari, and Kapalabhati enhances respiratory efficiency, strengthens respiratory muscles, improves oxygen saturation, reduces breathlessness, and promotes cardiovascular stability. Clinical evidence indicates improvements in quality of life, exercise tolerance, and functional status among individuals with COPD, even where irreversible airflow limitation persists. By promoting autonomic balance, diaphragmatic breathing, airway clearance, and psychological well-being, yoga addresses both the physiological and psychosocial dimensions of cardiopulmonary disease. While yoga should not replace conventional medical treatment, it serves as a scientifically supported, safe, affordable, and sustainable adjunct therapy. Future research with larger samples, longer follow-up periods, and randomized controlled trials across diverse cardiopulmonary conditions will further clarify its therapeutic potential and facilitate its integration into comprehensive rehabilitation programs.

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