
The Role of Pranayama in Attainment of Mind-Body Balance: A Native Review

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Abstract:

Yoga is an ancient scientific discipline that enhances personality and self-awareness. It helps individuals unlock their unconscious potential through systematic practice. Sages have experienced the transformative effect of yoga for thousands of years and have been engaged in yoga practices. Pranayama, which derives from the Sanskrit word's prana (vital force) and ayama (expansion), is central to Ashtanga Yoga (fourth limb of Patanjali) and Hatha Yoga (second stage). In this paper, the classical knowledge on yogic texts, including Hatha Yoga Pradipika, will be synthesized with the latest neuroscientific data on pranayama in order to investigate its use in enhancing mind-body harmony. Conventional texts emphasize the ability of pranayama to regulate prana, thereby enhancing inner equilibrium. According to modern research, doing 15 minutes of pranayama, including Anuloma Viloma, Nadishudhi, Sheetal, Shithkari, Bhramri, etc., every day may have impressive effects; these practices can optimize the metabolism of glucose and oxygen, nurturing energy, enhancing muscle contractions, and neural activity. Sleep, exercise, emotions, and other physiological functions control the movement of prana in the body. Through practice, pranayama balances the autonomic nervous system, leading to emotional stability through decreasing the dominance of the hypothalamus to reactions to pleasure and pain. It can be a powerful tool for stress management, an increase in productivity, and general well-being. Pranayama also increases cardiovascular health, circulation, detoxification, weight control, hormonal balance, mood stabilization, digestion, and emotional stability. Pranayama is the foundation of overall well-being as it helps an individual experience harmony between the mind and body, which helps one to achieve inner peace and overall wellness.

Keywords: Yoga, Pranayama, mind & body, Health.

Introduction:

Dating back to 300 BCE, the art of pranayama has been applied by sages in secluded caves to achieve good health and survival through natural conditions in the long run. Maharishi Patanjali, a famous ancient scholar, at around 600 BCE, insisted that the rhythm of the breath is the key to calming the mind, which he considered to be the main part of existence (R. B. Singh et al., 2009), and represents the controlled regulation of breathing, an essential part of classical yoga practices that affects both body and mind. Pranayama techniques have been an essential element of classical yoga practices for centuries and concern the regulated control of breathing. It has been noticed that pranayama techniques have significant effects on the bodies and minds, which is beneficial in the holistic health of the patient and equanimity. According to Hatha Yoga Pradipika, irregular breath leads to an unpeaceful state of the mind, whereas a calm and both stable and settled breath generates peace, balance, and stability, and helps a person get to know themselves better (दिगम्बर & झा, 2017).

Pranayama is fundamentally organized into four main parts, namely, Puraka (inhalation), Rechaka (exhalation), Antar Kumbhaka (internal breath retention), and Bahir Kumbhaka (external breath retention) (Nivethitha et al., 2016). Pranayama controls the breathing system, promotes physiological and psychological health, through such techniques as alternate nostril breathing, rapid diaphragmatic breathing, deep and fast breathing, breath retention, and holding techniques (Russo et al., 2017). These disciplines create an essential bridge between the breath and mind, creating a state of balance and wellness.

In a digital and materialistic world, some people are desperately trying to overcome the situation of high rates of competition, which subsequently negatively affects their state of mind. The overwhelming stress and anxiety commonly disrupt the daily routine, so these mental issues are an inevitable aspect of life. Pranayama, which is a key element of the yogic practice, provides a good solution to terminate this cycle. Techniques, including Nadi Shodhana, Bhramari, Anulom Vilom, Sheetali, and Sheetkari (दिगम्बर जी & झा, 2017) are used as therapy to reduce impediments that are caused by stress. When performed individually, pranayama has a variety of health advantages, including mitigating stress, maintaining heart resiliency, and empowering lung capacity (Saxena & Saxena, 2009), and improving mental acuity. Through a conscious control of breathing, these practitioners are thus able to establish balance between body and mind, thus developing resiliency and the deepest sense of inner calm (B. K. Singh et al., 2024).

Physiological Mechanism of Pranayama:

Through the regular application of the pranayama, yogis can affect very diverse body and mental functions, such as metabolic processes, biochemical processes, neurocognitive capabilities, and regulatory functions (Joshi et al., 2024). Constant practice of pranayama is crucial in the prevention and treatment of respiratory diseases, heart endurance, and hormonal regulation. It is also helpful in promoting better digestion, weight control, improved energy supply, emotional control, proper nutrient absorption, mood control, and skin health. More so, pranayama enhances elasticity and the nervous and endocrine systems (Trakroo & Bhavanani, 2016). At the same time, Kumbhaka, a critical stage of pranayama that involves holding the breath, is reported to produce theta waves on electroencephalography.

The practices facilitate the healthy functioning of the key glands that include the thyroid, parathyroid, pituitary, and adrenal glands, as well as the proper functioning of the muscles and sufficient circulation of the body (Naragatti, 2025). Besides physiological advantages, pranayama proves to be extremely beneficial for stress management and the elimination of depression symptoms. Pranayama and pranic activity breathing are the biggest processes that are closely related to the nervous system, which is the basis of mental clarity and emotional stability (Natarajan et al., 2024). Pranayama is an effective instrument to manage the mind, leading to a clear state of mind and holistic well-being.

Improvement in Respiratory Efficiency & Oxygenation:

Pranayama is extremely crucial in elevating respiratory efficiency, oxygenation, and general cell functioning, leading to better health and vitality (Kartik & Muthiboyina, 2024). It increases the capacity of the lungs and strengthens respiratory performance through frequent practice. Puraka is a process whereby the air is inhaled gradually and deeply, which leads to the elastic tissue of the lungs being expanded to increase the ventilation and exchange of gases. This helps to provide an efficient diffusion of oxygen and carbon dioxide, increase the circulation of the lung tissues, and support the strength of the elastic fibers (Das et al., 2022). Relaxation occurs in the body during exhalation (Rechaka), and the tone and functionality of the diaphragm and intercostal muscles are strengthened by breath retention after a deep inhale (Bhalekar, 2018a).

Subsequently, deep breathing also has a positive effect on the parasympathetic nervous system, which results in a state of calmness and balance. It will also improve the vagal tone, which activates mucous membranes, to increase the volume of the mucus and bile activity that strengthens the overall respiratory health (Gore, 2012)

Impact of Pranayama on the Autonomic Nervous System:

To attain self-reliance, the hypothalamus, on the pleasure centers and pain centers, will allow the control of the autonomic nervous system, and this will be possible due to the long-term practice of pranayama (Bhalekar, 2018 b). Pranayama affects physiological processes in the body; consequently, heart rate, blood sugar concentration, and oxygen consumption are reduced, while theta waves become more active. This brings about a harmonious interaction between the sympathetic and parasympathetic nervous systems and leads to physical and mental harmony.

Slow and deep breathing types of pranayama - Anuloma Vilom, Surya Bhedana, and Nadi Shodhana improve the efficiency of the ANS by reinforcing the activity of the parasympathetic system (Bali, 2024). The practices also elevate the baseline oxygen consumption, suggesting a surge in adrenal medulla sympathetic production. Pranayama further induces theta waves, enhances melatonin secretions, and induces a deep feeling of relaxation, which adds up to well-being.

Harmonizing Mind and Body:

Pranayama, a controlled breathing method, is also very useful in terms of mental and emotional health (Jain & Sharma, 2017). It is a simple mindfulness practice where one can minimize their levels of stress, anxiety, and mental turbulence, and at the same time enhance their concentration and mental performance. The pranayama process is founded on intensive breathing exercises that activate the vagus nerve to produce considerable neurotransmitters: serotonin and gamma-aminobutyric acid (GABA), which produce a sense of balance and relaxation (Santra, 2022).

Practice of pranayama also leads to endurance and helps to conquer all the challenges of life and existing stressful situations with the right view of life. Beyond this, pranayama positively affects the state of mind of a person, but also the state of the body, relevant in every situation. Pranayama can also be an effective method in treating psychosomatic disorders because physical and emotional symptoms are related to each other, and it is necessary to harmonize the mind and body. Breathing control after a regular period of time can treat diseases like ulcers, psoriasis, migraines, and headaches.

Pranayama is a cleansing tool, making the brain clean and sharp, to focus on a single object. It is based on the tradition of the discipline of yoga, which fosters holistic health and vitality. Although

it's a simple technique, regular practice of pranayama has tremendous physical and psychological health effects, providing a transformational way to good health.

Evidence-Based Insights on Pranayama:

B, Ankad & S, Ankad. (2011) examined “Effect of Short Pranayama and Meditation on Respiratory Parameters in Healthy Individuals.” This experiment was conducted on 50 healthy participants (24 males & 26 females) aged 20-60 years. Participants engaged in a formal two-hour yoga class each day for 15 days (supervised by experts). Respiratory parameters, breath-holding times, PEFR, and chest expansion measures were taken by investigators at the end of the initial intervention period and after completing the study. Statistical analysis depicted overall improvement in each category, regardless of gender, age, and types of BMI, due to pranayamic techniques & meditation in enhancing respiratory efficiency (B et al., 2011).

Bagade, Angesh & Bonde, Megha. (2018) The purpose of the study was to evaluate “the effect of pranayama on the respiratory endurance of young adults.” Fifty-three samples were made to survive an endurance test of 40 mm Hg pre- and post a 12-week pranayama training program. The research experimented on such vital respiratory parameters as the max expiratory pressure (MEP), the max inspiratory pressure (MIP), and the breath-holding time (BHTE) after expiration and the inspiration (BHTi). The outcomes of the statistical analysis based on a paired t-test showed that there were significant improvements. Also, the 40-mmHg test was an indication of a 50% improvement, which highlighted the effectiveness of pranayama to improve respiratory endurance (Bagade et al., 2018).

Srivastava, RD & Jain, Nidhi. (2005) investigated the effect of alternate nostril breathing (ANB) on 40 healthy subjects aged 17-22 years, 20 male and 20 female. The study analyzed the major parameters before and after performing a 15-minute ANB procedure, as well as eight weeks of regular practice (15 minutes/day). The outcome of both individual and long-term practice was significantly different for respiratory rates (RR), heart rates (HR), and values of systolic blood pressure (SBP), which were improved by the end of the eighth week. This study clearly shows that ANB can stimulate Parasympathetic Dominance, which implies it could be beneficial as an additional therapy for diseases like COPD and Hypertension. (Srivastava et al., 2005).

Bargel, Sheela, & Nalgirkar, Vivek (2022) studied the impact of breathing through the left nostril upon cardiac and pulmonary functions, along with reaction time, in 106 young individuals. Each of these individuals performed 45 minutes of LNB over a period of two weeks, during which an

assessment of the individuals was conducted before and after the intervention. From this study, it has been revealed that “SBP, DBP, pulse rate (PR), and respiratory rate (RR) are significantly reduced, which depicts an enhanced level of cardiovascular efficiency. This depicts that LNB possesses efficacy to deal with respiratory-cardiovascular dysfunction, along with an improvement in cognitive speed (Bargal et al., 2022).

Garg, Rinku & Malhotra, Varun. (2016). Experimented to test the influence of the breathing methods of (RNB), (LNB), and (ANB) on verbal and spatial memory in 51 females (ages 18-25). Separated into three groups (n=17), the groups followed a breathing technique for 45 minutes daily for a week. The memory was evaluated prior to the intervention and after the intervention using the Wechsler Adult Intelligence Scale. ANOVA scores showed that digit spans (forward and backward) and associative learning, as well as spatial memory scores ($p < 0.005$), were increased in all the groups and thus indicated that nostril-specific breathing may enhance memory recollection and cognitive ability (Garg et al., 2016).

Anand, Abhishek & Patwardhan, Kishor. (2018). Measured “the effects of pranayama on the mental and physical health of well university students.” One hundred eight of the participants (17-28 years of age) were divided into an experiment group, where they performed Anuloma-Viloma and Bhastrika pranayama during 12 weeks, and the control group, which received no training. The Mental Health Inventory Questionnaire measured pre- and post-physical fitness and mental well-being. The Pranayama group was significantly better physically fitted, and improvement in mental health, and the control group did not report any significant changes. Altogether, regular pranayama training seems to increase fitness among healthy university students (Anand et al., 2018).

Upadhyay, Janu (2023) conducted a randomized comparative trial, where the researchers sampled out pre-diagnosed hypertensive patients in an inpatient naturopathy hospital (100 patients). The researchers randomly allocated them into two groups. One group did Nadi Shodhana Pranayama for 20 minutes, whereas the other did Bhramari Pranayama for the same duration. “Heart rate variability (HRV) and auditory reaction time (ART)” were measured before and immediately after the single session. The results suggest that the two types of pranayama can enhance reaction time and potentially sympatho-vagal balance. (Upadhyay et al., 2023).

Ankad et al. (2011) researched that half of healthy adults applied daily pranayama and meditation for 15 days, and they reported a considerable decrease in the resting pulse rate, systolic and diastolic blood pressure, and mean arterial pressure. It has been found that, in addition to the benefits of

cardiovascular health with long-term yoga practices, short-term interventions are beneficial. Those advantages were similar in terms of gender, age, and BMI groups, proving the advantages of such practices in harmonizing the mind and the body to enhance the performance of the heart among healthy individuals (Ankad et al., 2011).

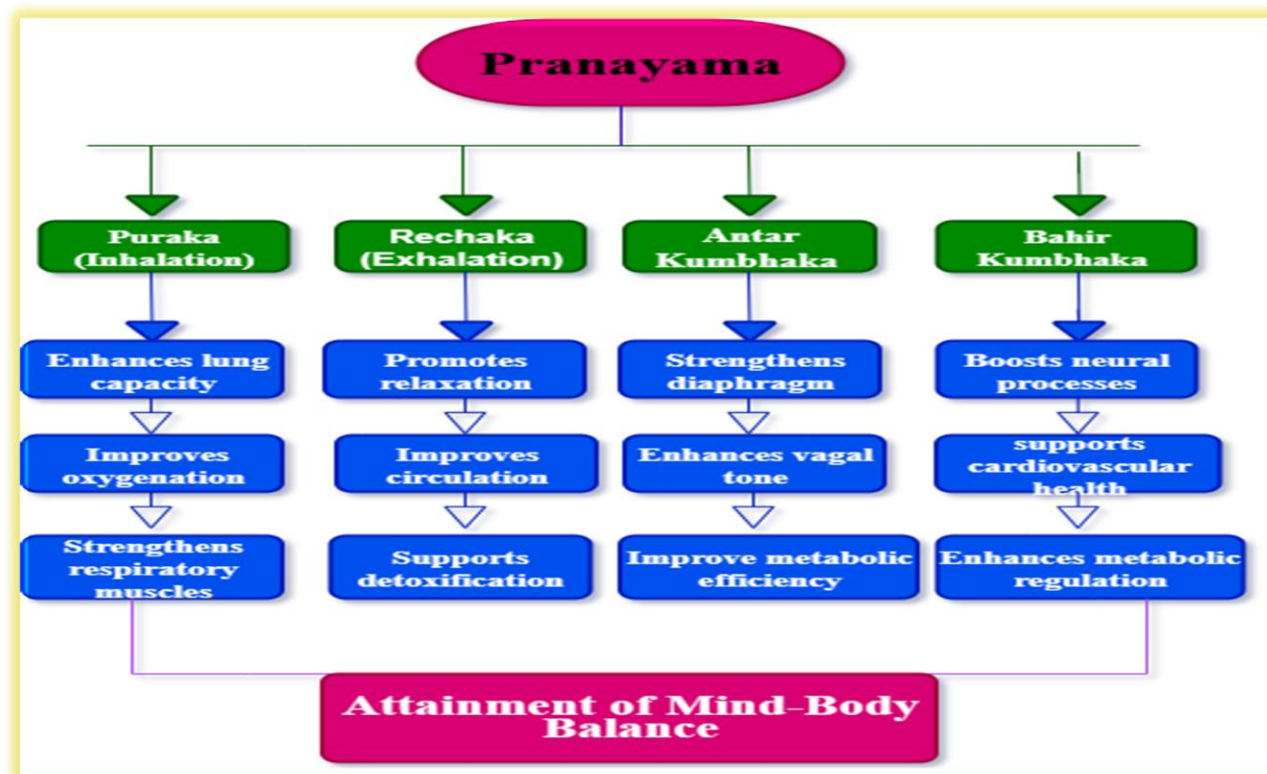
Thanalakshmi et al. (2020) studied a RCT of 50 patients with primary hypertension who received daily Sheetal pranayama over three months, and 50 who were the controls who did not receive the intervention. The Pranayama group exhibited profound decreases in BP and increased HRV, which suggested increased parasympathetic dominance. These findings emphasize the efficacy of Sheetal Pranayama regular practice in cardiac autonomic stability and enhancement of the interrelation between mind and body in HTB (Thanalakshmi et al., 2020).

Radhiga et al. (2024) conducted a pilot randomized trial with 24 hypertensive patients aged 30–65 years, comparing 10 minutes of Sheetal pranayama with kumbhaka (1:2:2 ratio) to simple breath awareness. The other group simply focused on breath awareness while sitting for the same duration. The pranayama group exhibited a notable reduction in both systolic and diastolic blood pressure, while the control group reduced only systolic pressure, with no changes in cerebrovascular hemodynamics in either group (Radhiga et al., 2024).

Method:

Throughout this review, we have incorporated evidence-based research to analyze the effectiveness of pranayama in attaining mind-body unity through comparing and combining the results of RCTs, systematic reviews, and clinical studies with ancient wisdom presented in Hatha Yoga Pradipika. We have examined one of the studies by Fincham et al. to learn more about the advantages of controlled breathing in alleviating stress and depressive symptoms by balancing the autonomic nervous system (Fincham et al., 2023). Research works done by Chetry et al. prove the efficacy of pranayama in enhancing the quality and efficiency of sleep, mental capabilities, and respiratory functions (Chetry et al., 2024). We examine its impacts in terms of control and management of heart issues, hormonal balance, and heightened psychological power. Accordingly, this review strengthens our research paper since it highlights the physiological benefits of pranayama to enhance the degree of oxygenation and the regulation of the autonomic nervous system in the body, and the psychological benefits of pranayama to combat stress.

Figure 1:



Discussion:

Pranayama is a useful technique that is used to maintain mental health, through enhancing the overall efficiency of the breathing patterns and relaxing stressful body reactions, which will ensure the proper functioning of the respiratory system. In India, the yoga tradition has been preserved over centuries as an ancient tradition, which is beneficial in keeping the mental and physical processes of the body. In the traditional Indian philosophies, the pranayama technique serves a significant role in balancing the three nadis, Ida, Pingala, and Sushumna, which assist in maintaining physical fitness in general (Tripathi & Dwivedi, 2025).

Scientific research findings show that pranayama is a good preventive and reliever of stress-related diseases that influence the body (Bentley et al., 2023). The scientific studies have demonstrated that there is a direct inhibitory effect of a specific form of pranayama on the (HPA) axis response to stress (Kirkwood et al., 2005). It assists in minimizing psychological changes, stress, anxiety, depression, and frustration in the body, as well as enhancing muscle building, better oxygenation of the cells, the elimination of waste gases, enhanced blood flow, and the creation of a profound connection between the body and the mind. A study involving 50 male participants found that alternate nostril breathing (ANB) boosted the ability of shape and size discrimination exercises, but simple awareness of

breathing and sitting did reduce state anxiety significantly (Telles et al., 2019). Additional research pointed to the fact that the subject became faster and more precise in the letter cancellation test when he practiced Anuloma-Viloma pranayama regularly. And also, through the pranayama known as Anuloma-Viloma, Suryabhedana, and Chandrabhedana, scores on verbal and spatial memory tests have also emerged high. Bhastrika, Bhramari, Nadishodhan, Sheetali, Sheetkari, and Ujjayi are practices that help to control the heart rate, mind stability, memory, blood pressure, and lung capacity, hence ensuring holistic health and vitality.

Conclusion

The creation of pranayama is a method that is part of Yoga, which is necessary to harmonize the flow of prana or life-force within the body and mind to achieve a balanced state of well-being. Pranayama is a powerful approach in the present-day stressful environment of the modern lifestyle, wherein the rates of mental consciousness, physical health, emotional stability, and spirituality are elevated. It fosters self-consciousness and enhances the forces of resilience in a person. As an easy and cost-effective practice, Pranayama has a wide range of psycho-physiological advantages. The breath, according to the Hatha Yoga Pradipika, is the life force in its own, since the existence of breath is the existence of life, and the lack of breath is the cessation of life.

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