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## Nadishodhan pranayama-a cleansing technique: A review article

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### Abstract

Practicing yoga like pranayama is becoming more and more important, as well as increased and more well-liked by the scientific community, as a result of the growing interest of the public in health and alternative therapies. One popular yogic breathing technique Nadishodhan Practicing yoga like pranayama is becoming more and more important, as well as increased Pranayama (NSP) is a well-known yogic breathing method that involves breathing through one nostril at a time while physically closing the other. This study attempted to compile published primary scientific information on the advantages of NSP and describe the impacts of independent NSP on numerous physiological, psychological, and general health issues in different populations. The following terms were entered into Google Scholar, PubMed/Medline, Cinahl, and Web of Science: Breathing through the NSPs, anulom-vilom/anuloma-viloma pranayama, and nada-shodhan/nada-shodhan pranayama. This review report includes 48 studies in total. The autonomic nervous system, the cardiopulmonary system, respiratory function, cognitive functioning, spatially memory as well as improved frontal and vertex function, problem-solving skills, motor memory recall, helps with depression and anxiety and other physiological characteristics were reviewed in this research for strong evidence of good effects. There is evidence that NSP Pranayama Studies on this yogic breathing have not found any negative side effects or tolerance issues.

**Keywords:** Nadishodhan pranayama (NSP), hatha yoga, cleansing, pranayama

### Introduction

We have progressed too far from the time when yoga started first as described in the ancient scriptures<sup>[1]</sup>. Yoga gained popularity in recent years; we are currently living in the year 2022. Both a goal and a method can be found in yoga. Yoga primarily has its roots in the Indian subcontinent and is a moksha shastra, or teaching that leads to a gradual liberation from many forms of human suffering. It is a moksha shastra in this sense, a teaching that leads to a progressive release from the various types of human suffering (Connolly, 2007)<sup>[2]</sup>. The Sanskrit verb "YUJ" i.e., "to join" or "to yoke" is where the word "yoga" originates (to combine)<sup>[3]</sup>. It represents the idea of integrating the body, mind, and spirit of the self while also tying oneself to discipline. The message of yoga is comprehensive for all people. The human body can learn a lot from it. Both the human psyche and the human soul are addressed in its message<sup>[4]</sup>. Yoga is an extremely old discipline. It has been practiced by yogis since the beginning of time. It is widely acknowledged as one of the most significant and priceless endowments of Indian heritage. The Indian sage Patanjali, sometimes referred to as "The Guru of Yoga," developed this antiquated method in his traditional treatise<sup>[5]</sup>. The Yoga Sutras are 2,000-year-old books on the concept of yoga. Yoga includes different practices among which Nadishodhan Pranayama (NSP) is one. Pranayama is a technique balance agent that connects the body's three faults: speech, bile and cough. For a magical experience, it is important to adjust the body's humour to maintain health in the state<sup>[7]</sup>.

There are numerous uses for pranayama in yoga. A fully spiritual understanding of pranayama is provided by Shankaracharya: "The actual rechaka, or exhalation, is freeing the intellect of all illusions. The actual puraka, or inhaling, is the comprehension that "I am Atman, the Ultimate Spirit." The true definition of retention is to uphold this faith without wavering.

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The authentic pranayama is this. Jnana yoga pranayama is a metaphor for this ultimate kind of pranayama [7]. In Hatha Yoga, pranayama is the second stage; in Patanjali's Ashtanga Yoga, it is the fourth. The Patanjali Yoga Sutra states that pranayama is the pause that is created during an inhale or exhale. Using Patanjali, based on the Pause, four different sorts of Kumbhaka were explained. Svastmarama describes eight different forms of Kumbhaka, which is his alternative term for pranayama [8]. The NSP Pranayama is recommended by Hatha Yoga to be practiced before beginning the first eight forms of Pranayama, which will purify the Nadis. The Siva Samhita, Hatha Pradipika and Gheranda Samhita and Vasishta Samhita, all describe NSP pranayama. Additionally, Hatha Pradipika makes explicit reference to the Pranayama's physical and mental effects. There is no question, according to this statement, that mastering pranayama gives one total control over their bodies. It goes on to say that pranayama masters have a thin build, a glossy face, a clear voice, and bright eyes that are disease-free and stimulate the stomach fire [7]. As pranayama is performed while seated on your back in a seat, it differs slightly from other forms. This method makes use of very deep breathing. Take deep, leisurely breaths to fill your tummy. Your stomach ought to expand like a balloon. Hold this position for a few seconds, then ensure that there isn't any air left by tugging the stomach in. Take a deep inhalation to fill the tummy for the second stage. Increase your breathing to allow more air to enter your ribcage. Extract air from your stomach first, then from your rib cage, as you exhale [9].

The words "Prana" and "Ayama" make up the word "pranayama." Prana, often known as "vital energy" or "life force," is the force that permeates all living and non-living things. The word "Ayama" means "extension or expansion." One of Ashtanga Yoga's eight limbs, pranayama consists of various breathing exercises that are intended to alleviate a variety of physical and mental conditions [10]. Thus, pranayama refers to the growth of the prana dimension. The psychic pathways known as nadis are where Prana's life-giving energy flows. Shodhana is for purification. So, NSP's main goal is to purify the psychic network [11]. Bryant, [12] stated that the primary goals of NSP are to reduce the work of breathing, promote ventilation, relax the entire body, and restore normal respiratory patterns. According to, Novotny & Kravitz, [13] the diaphragm, intercostal muscles, and auxiliary muscles of ventilation are all employed during breathing. In comparison to simply expanding the chest and inhaling while doing so, which is known as horizontal breathing, diaphragmatic breathing-also known as vertical breathing-is thought to be a more effective method of breathing. The diaphragm should be used well during pranayama to obtain more oxygen with minimal effort. The liver, spleen, pancreas, and stomach are connected to the diaphragm on the inferior surface, while the stomach, heart, and lungs are connected to it on the superior surface. These organs work more effectively when the diaphragm moves with efficiency.

We can develop emotional balance and other cognitive factors in addition to our breath by learning to regulate it. We gradually develop a greater energy awareness as a result of becoming more conscious of our breathing, which also makes us more susceptible to our thoughts and the movement of energy within the body [14]. There is a clear link in between respiration and anxiety or well-being, and how you breathe also has an impact on your heart, brain, and nervous system. When under stress, breathing becomes shallower, shorter, and more frequent. This breathing rhythm keeps the arousal level

constant [15].

### **Nadishodhan Pranayama**

As yoga becomes more popular, pranayama is a crucial component of yogabhyasa, the fourth limb of traditional Ashtanga yoga. There are numerous pranayama techniques, and each one is said to have unique psycho-physiological advantages according to ancient teachings [17]. A collection of breathing techniques known as Chandra and Surya nadi (CN and SN, respectively) use NSP breathing (NSP) and uninostril breathing (UNB) patterns, respectively, using the left and/or right nostrils. The technique of nadi shuddhi (NS), which involves using both nostrils alternately in a predetermined manner, further develops this sort of yogic nostril manipulation [17].

In the NSP, on a mat, the individuals are instructed to cross their legs and take a comfortable position. They are instructed to close their eyes, sit up straight, and maintain their composure. Inhale slowly with the left nostril while keeping the right nostril shut with the right hand. After taking a deep breath, tightly compress the left nostril with the ring finger of your right hand. Then you open your right nostril and slowly exhales. After a complete exhale, breathe in via the right nostril. The thumb is then used to exert pressure on the right nostril in order to close it. Your left nostril is finally opened to softly exhale. The mentioned procedure is known as one round/cycle of NSP [18].

Nadis need to be cleansed in order to perform pranayama effectively. The essential point of verse 4 of chapter 2 (Hatha Yoga Pradipika) is that the vayus do not reach a nadi when it is full of contaminants. The three most significant nadis are the Ida, Pingala, and Sushumna; the latter is the center channel and travels through all seven chakras on its way from the base of the spine to the top of the head [19]. In this Perspective, these chakras are the locations where energy, or prana, is stored in this context. "A revolving motion or wheel" is what chakras are. NSP is the first practice that the Hatha Yoga Pradipika (HYP) mentions. This breathing technique known as Shodhana, which means "to purify," is thought to awaken and harmonize the Ida and Pingala nadis [20]. It is said to be decreases heart rate, stress, and tension. The purification of the body's subtle energy channels, or nadis; is said to facilitate the passage of prana during pranayama practice. It is also said to synchronize the both hemispheres of the brain [21].

### **Nadishodhan pranayama and research intervention**

Researchers from all over the world are interested in the physiological and psychological effects of NSP. Recent studies have reported these effects, which include differences in O<sub>2</sub> consumption, metabolism and body weight, blood glucose, involuntary blink rates, intraocular pressure, heart rate (HR), stroke volume, and end-diastolic volume [22, 23]. NSP has been shown to significantly change cardiopulmonary responses and enhance straightforward problem-solving [24]. According to recent studies, practicing yoga breathing alternately through the right, left, or both nostrils cause significant autonomic alterations [25]. NSP increases vitality, regulates heart rate and blood pressure, and may help to improve overall health and wellbeing [26].

Yogic breathing techniques NSP has beneficial effects on the autonomic nervous system. The metabolic rate is slowed by a decrease in sympathetic output and an increase in parasympathetic discharge. This study shows that performing yogic breathing techniques regularly has positive, long-term health advantages regarding the way the body responds to

stressors [27]. Singh *et al.*, [28] in their study involved 30 healthy male volunteers between the ages of 18 and 24. A six weeks NSP training regime was administered. This had daily sessions that lasted 30 minutes and lasted for six weeks. The vital capacity substantially increased ( $P < 0.01$ ) between the experimental and control groups, according to the results. Systolic blood pressure ( $P < 0.05$ ) and basal heart rate ( $P < 0.01$ ) both showed a substantial reduction. To increase vital capacity, manage heart rate and blood pressure, and promote health status and wellbeing, a programme of 'NSP training' may be advised.

Additionally, the effectiveness of NSP in reducing stress in medical students was tested utilising Biofeedback parameters as a tool. Using a biofeedback device, 30 medical students from various levels of the MBBS programme were assessed. Baseline readings of temperature, heart rate, breathing rate, EMG, and EEG were also taken. The gadget included compositing software to display the total relaxation% in the finished report based on these considerations. The group practised NSP for 20 minutes a day for three months while being observed. The factors were compared and re-evaluated. The perceived stress measure was administered to the study participants both before and after the intervention in order to monitor changes in their results. The patients who practised pranayama for three months reported significantly more relaxation than at baseline measurements of temperature ( $p = 0.005$ ). Following pranayama, perceived stress levels were also significantly lower ( $p < 0.001$ ). This implied that alternative nostril breathing is an efficient strategy for lowering stress [29].

Yoga is a tried-and-true method for bringing about positive behavioral adjustments that promote wellbeing. Joshi *et al.*, [30] in their study conclusively demonstrated the benefits of practicing NSP for improving well-being, memory recall, stress relief, and physical relaxation. It was found that 75% of the participants felt healthier, 80% had better memory recall, 75% had less mental stress, and 90% had more physical relaxation. The qualities of Feeling Strong, Memory Recall, and Physical Relaxation are all improved by NSP. It lowers mental stress levels, which are a major contributor to people's wellbeing being disturbed. Control and regulation of the aforementioned features are crucial to improving engineering students' wellness. It is safe to say that NSP, regardless of the age of its practitioners, has a tremendous potential to improve their wellness. Stančák & Kuna [15], stated that NSP has an impact on brain hemisphericity. This mechanism is triggered by the air passing through the nostrils, which activates the opposing (contralateral) side of the brain through nerve endings located just below the mucous layer within the nostrils. Because the opposing side of the brain controls the nerves that control both side of the body, increasing ventilation in one nostril causes the other side of the brain to become more nervously active. This pranayama stimulates and relaxes the autonomous nervous system in accordance with how each side of the brain is specialized in distinct activities and processes.

In one study sixty volunteers were split into two groups, 30 for the intervention and 30 for the control. For 12 weeks, the pranayama group was exposed to it. Using a computerized spirometer, the pulmonary function parameters were captured on Spiro excel. The forcing vital capacity (FVC), forceful expiratory volume in 1st second (FEV1), peak expiratory flow rate, with maximum voluntary ventilation were the five lung function measures that were measured in both groups before and after the intervention. When compared to the control

group, the interventional group's analysis values showed a considerable improvement. This might be caused by the lungs expanding and contracting to their maximum capacity, which increases the respiratory muscles' strength, recruitment, and endurance. NSP pranayama may enhance respiratory function and is recommended as a crucial technique for postmenopausal women to maintain a healthy lifestyle [13].

Pranayama has been shown to modify the heart's autonomic state, improving respiratory and cardiovascular health. To test if practicing NSP for twenty minutes has any immediate impact on heart rate, diastolic and systolic blood pressure, peak rate of expiratory flow and simple problem-solving abilities, a study was planned with this in mind. Ten first-year physiotherapy students who are in good health volunteered for this study. Their age was ranged from 17 to 20 including five men and women respectively. They have no prior experience with pranayama. They had a strong drive to take part in this educational activity. Each subject's study procedures were completed independently at the same time of day, between 4-5 pm. Before and after conducting NSP, all the chosen physiological markers were measured. The matched patients underwent 2 sets of controls in which they were either allowed to unwind on a couch or to close their eyes and breathe quietly for 20 minutes. A substantial decrease in basal heart rate ( $P < 0.0001$ ) and the systolic blood pressure ( $P < 0.001$ ) was seen after 20 minutes of NSP. Following pranayama practice, the peak expiratory rate greatly increased ( $P < 0.01$ ) and the time needed to solve easy problems significantly decreased ( $P < 0.0001$ ). In contrast, after 20 minutes, neither of the control patients' respiratory or cardiovascular measures had changed significantly. According to the current study, NSP quickly changes cardiopulmonary responses and enhances straightforward problem-solving [32].

Durairaj & Arumugam [33], determined how NSP practice affected college students' essential capacities. 20 male students from the Various Department of Manonmaniam Sundaranar University in Tirunelveli & Tamil Nadu, India, were chosen at random to participate in the study. They were aged between 22 and 28. The chosen participants were randomized into two groups at random; group "A" practiced yoga NSPa pranayama ( $n = 10$ ) while group "B" served as the control group ( $n = 10$ ) For six weeks, Group "A" practiced NSP pranayama three times per week for an hour each session. The control group did not receive any special training, although they did engage in routine activities. The vital capacity was measured using a spirometer as the dependent variable. On a few key criterion variables, pre and post-test data were gathered before and right after the training procedure. The Analysis of Covariance (ANCOVA) for a chosen variable was used to statistically compare the pre- and post-test scores. The results showed that the abdominal strength of the NSP group had greatly increased. The control group, however, had not significantly improved in terms of essential capability.

In the year 2019, The Dr. D Y Patil Hospital and Research Centre's Cardiovascular and Thoracic Surgery Intensive Care Unit in Pune served as the site of the experimental study's execution. Purposive sampling was used, and the sample size was 30. The inclusion criteria were patients who were post-CABG (coronary artery bypass graft), between the ages of 55 and 75, were male or female, scored between 8 and 9 on the (Depression Anxiety and Stress Scale) DASS-21 scale, and were not on a ventilator. Traditional movements and NSP were performed for a total of 30 minutes. Peak expiratory flow rate and the DASS-21 scale were compared before and

after the intervention using a paired t test. Since the p value was less than 0.05, it was deemed statistically significant. The study finds that NSP, when combined with traditional physical therapy, improves lung function and lowers stress, anxiety, and depressive symptoms in those who have undergone CABG<sup>[34]</sup>.

### Conclusion

There is strong evidence that regular NSP leads to improvements in cognitive, physiological, and overall health concerns. More clinical trials are necessary to assess the effects of NSP breathing in clinical groups and to establish the most beneficial frequency and duration intervals.

Studies have revealed that NSP is connected with lower blood pressure and heart rates, providing strong evidence for its beneficial effects on cardiovascular function. High levels of data link frequent NSP practice to improvements in pulmonary function testing. NSP is linked to improvements in cognitive function, such as increased frontal, vertex, and improved motor, visual, and spatial memory. There are proofs that NSP improves anxiety and depressive illnesses. Studies have not shown any negative effects or tolerance issues with this breathing technique. NSP had more noticeable acute effects in those who have previously practiced yoga, suggesting that consistent use of this technique has beneficial consequences.

There is strong evidence that NSP has positive effects on cognitive function, physiological function, and general/therapeutic health benefits. To assess the effects of NSP in clinical populations and to establish the optimal frequency and duration parameters for maximal benefits, more clinical trials are necessary. Evidence suggests that pranayama has therapeutic effects and is a simple, affordable therapy. The research that is now available points to both physical and psychological advantages. However, the research varied widely in terms of sample size, methodological rigor, and pranayama methodology. In order to give conclusive proof and to provide a greater understanding of the fundamental mechanisms of the therapeutic and clinical effects of NSP, additional high-quality Randomized Control trials (RCTs) are necessary.

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### Conflicts of interest

There are no conflicts of interest from Author side.

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