# A REVIEW ON EFFECT OF *NADI SHODHAN PRANAYAM* IN *UCHCHHWASA PRAKRIYA* APROPOS PULMONARY FUNCTIONS

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## ABSTRACT

Among the autonomic functions of our body the breathing function can be consciously controlled. The two major steps of breathing are inhalation and exhalation. As per Ayurveda, exhalation is termed as *uchchhwas prakriya* which is an important karma of *Udana vayu. Nadi shodhan Pranayam* is an exercise practiced by alternating the inhalation and exhalation between left and right nostrils involving almost all the respiratory organs.
It is widely admired as a useful technique to enhance human body's mental and physical strength. The present review highlights the characteristics and role of *Nadi shodhan pranayam* on respiratory functions.

Keywords: *Nadi shodhan, Pranayam, uchchhwasa prakriya, puraka, rechaka*

## INTRODUCTION

The vital components of maintaining physical and mental well-being are proper diet, adequate exercise, and a stress-free life. But rapid industrialization, environmental pollution, overcrowding, and sedentary lifestyle have led to deterioration of an individual health status.

About 1 to 3 billion urban residents worldwide are exposed to air pollution level above permissible limits. In many developing countries air quality has deteriorated because of extremely toxic smoke, produced by increasing industrial activity, increasing power generation and constantly increasing motor vehicles using adulterated fuel.

Air pollution leads to both immediate and delayed health effects. The immediate effects are observed mostly on the respiratory system, the resulting state being acute bronchitis, most of the times. The delayed effects most commonly linked with air pollution are chronic bronchitis, lung cancer, bronchial asthma, emphysema and respiratory allergies.[1]

Pollution control is out of reach for ordinary person. To avoid exposure to pollutants in day to day life is rather unavoidable. Due to our changing lifestyle, most of us have to face the air pollution daily. Many toxic gases & harmful particles enter directly in respiratory system, inevitably. They accumulate there day by day & start causing health hazards.

The ill effects of pollution might be minimised if the lungs effectively expel out these unwanted, harmful foreign things. For achieving this purpose, there should be good exhalation during respiration procedure. Can there be some procedure for daily practice to maintain the overall health of respiratory system, so that the pollutants entering the respiratory system can be effectively expelled out and they are unable to harm?

## *UCHCHHWASA PRAKRIYA* AND *NADI SHODHAN PRANAYAM*

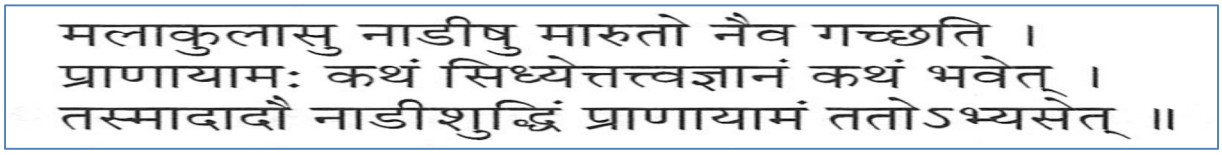
Ayurveda mentions exhalation as *uchchhwasa prakriya*. If it is improved then the consequent hazards can be avoided or minimised. According to *Dalhanacharya*, *Uchchhwasa* (exhalation) is one of the important karmas of *UdanaVayu* (one of the subtypes of *vata dosha*). *Avasthitisthan* (Seat) of *UdanaVayu* is *Urasthan* (chest) whereas; *Kantha, Nasika* and *Nabhi* (Pharynx, Nose & Navel) are its sancharsthan. [2]

*Nadishodhana Pranayam* is practised by alternating the inhalation and exhalation between the left and right nostrils. This exercise involves almost all the respiratory organs like chest, diaphragm right up to the umbilicus while doing *deerghaucchwas* (deep expiration) and *deerghanishwas* (deep inspiration).

The main purpose of the *Nadishodhana Pranayam* is to purify the principle channels of energy (*Nadis*) within the body. It is believed that because of our irregular schedules of meals, sleep, stress and other disrupting factors like pollution, the *nadis* are filled with impurities or the toxic substances (*mala*) and are therefore blocked. [3]*Gherand Samhita* advocates that one should perform the alternate nostril breathing before the main Pranayam as it will cleanse these *nadis*.[4] Thus, *Urasthan* and *Nabhisthan* are common areas for *UdanaVayu* and *NadishodhanaPranayam* exercise. By doing the said exercise, one can gain strength to the organs which are the site of *UdanaVayu* and also the channels get purified.[1]

## *NADI SHODHAN* IN SCRIPTURES

All the classical yogic texts describe *nadi* purification as a necessary step to achieve *kevala kumbhaka* (spontaneous retention of breath). Many equate pranayam with *kumbhaka* (retention of breath) while others explain the process to achieve *kumbhaka* as pranayam. In the first case, *nadi shodhan* is treated as an indispensable preliminary practice of *'pranayam*' and in the second as the first *pranayam*, or even the only *pranayam*. The *Gheranda Samhita* says -


मलाकुलासु नाडीषु मारुतो नैव गच्छति ।
प्राणायामः कथं सिध्येत्तत्त्वज्ञानं कथं भवेत् ।
तस्मादादौ नाडीशुद्धिं प्राणायामं ततोऽभ्यसेत् ॥

The *vayu* (*prana*) does not enter the *nadis* as long as they are full of impurities. How then can *pranayam* be accomplished? How can there be knowledge of the *tattwas* (elements of reality)? Therefore, first the *nadis* should be purified, and then *pranayam* should be practised. [5]

In the *Hatha Yoga Pradipika* it is said:

शुद्धिमेति यदा सर्वं नाडीचक्रं मलाकुलम् ।
तदैव जायते योगी प्राणसंग्रहणे क्षमः ॥

All the *nadis* and *chakras* are full of impurities. When they are purified, the *yogi* is able to retain *prana.* [6]

This text treats *nadi shodhan* as a practice separate from, and a prelude to, all other *pranayams*. It describes the traditional form of *nadi shodhan* - alternate nostril breathing with internal retention, and recommends that it can be practised four times a day, gradually increasing the retention to 80 counts.

Dattatreya's *Yoga Shastra* equates pranayam with the practice of *nadi shodhan* and lists this *pranayam* alone, describing its successive higher stages.He recommends that at the beginning it can be practised four times a day for 20 counts with retention to the best of one's ability. If practised in this way for three months, it will purify all the *nadis*. [7]

The same assertion has been made in the *Shiva Samhita* [8]

## CHARACTERISTICS OF *NADI SHODHAN PRANAYAM*

Pranayam essentially consists of a voluntary control on the breathing. Due to this fact many people refer it to as a breathing exercise. It is usually done in a relaxed sitting condition in which the demand for oxygen from the body is minimal. Each cycle of pranayam is a complex voluntary act, consisting of two distinct phases, *Puraka*, and *Rechaka* i.e., inspiration & expiration. [9] The various physiological changes occurring during different phases of pranayam are:

## *PURAKA PHASE* OR INSPIRATION PHASE:

During the phase of *puraka* the lungs are expanded considerably and the walls of alveoli are stretched maximum. After a deep stretching, the stretch receptors located in the alveolar walls are stimulated. In normal breathing, at this stage or even before this, the inhibitory impulses would have been sent to the inspiration centre and the phase of exhalation would have been started in a reflex. But as we continue the phase of inhalation by our strong voluntary control, the normal stretch reflex is inhibited and therefore no exhalation is possible. Under cortical control the chest continues to expand. Thus the stretch receptors are trained to bear up against more and more stretching. During this phase the intra-pulmonary pressure is also raised. As the abdomen is kept slightly inward and controlled, the diaphragm does not move freely. Therefore the alveoli in the upper pulmonary part are filled with air. The inspiratory capacity is used for prolonged phase of *puraka* which has a beneficial effect on the gaseous exchange. *Puraka* is not merely a mechanical prolongation of inspiration but it is done with full concentration of mind.

## *RECHAKA PHASE* OR EXPIRATION PHASE:

As compared to normal exhalation, *rechaka* is a voluntarily controlled exhalation. In order to increase the duration of *rechaka* as per the time ratio, one has to control the time (duration), force, ventilation and the flow of air. In this the exhalatory force is reduced and the air is allowed to escape slowly. For this purpose, exhalation is carried out through one nostril only. Thus by creating a slight airway restriction, one can regulate volume of air to be expelled out per unit of time. This helps in prolongation of exhalation and reduction of the force of outgoing air. In *rechaka*, expiratory reserve volume is used for exhaling completely before starting the next *puraka* phase. Hence, the intra-pulmonary pressure slowly reduces and the alveoli are gradually deflated. By this time when one is exhaling slowly the percentage of carbon dioxide is still increasing in the blood and the chemo- receptors in the medulla are trying to inhibit exhalation and to start inhalation by stimulating the inspiratory centre. Similarly the peripheral chemo- receptors are also trying to bring about inspiration in a reflex as they are sensitive to the lower oxygen concentration in the blood.

## *NADI SHODHAN PRANAYAM* ON RESPIRATORY FUNCTIONS

A systematic review of clinical trials on Alternate nostril breathing (ANB) by Shreya Ghiya in International Journal of Research in Medical Sciences proved the following:[10]

Eight studies evaluated the effects of ANB on pulmonary function tests. Seven studies noted increase in PEFR, while one study reported no changes in PEFR after practicing ANB. Other PFTs evaluated were FEF 25-75%, FVC and $FEV_1$, VC and MVV which were improved significantly after regular practice of ANB.

Bhardwaj evaluated the effects of ANB in patients suffering from rhinusitis over 40 days. This study found improved clinical, endoscopic, radiological features associated with disease as well MCC tests. [10]

Other studies that proved statistically significant effects of *Nadi shodhan pranayam* were as follows:

Eighteen percent improvement of $O_2$ consumption was observed after a 1-month ANB exercise.[11] Significantly increased $VO_2$ max (maximal oxygen uptake) and basal metabolic rate were found after deep breathing exercise in healthy participants and medical students.[12] Central and peripheral chemoreceptors become adapted to anoxia and acclimatized to hypercapnia by practicing breath-holding exercises.[13] Significant improvements were found in breath holding time (BHT), forced expiratory volume in $1^{st}$ sec ($FEV_1$)/forced vital capacity (FVC)%, and tidal volume among medical students after breathing exercise.[14] A statistically significant improvement was observed in FVC, $FEV_1$, maximum expiratory pressure, maximum inspiratory pressure, peak expiratory flow rate (PEFR), and expiratory reserve volume (ERV) among healthy young subjects and also in healthy medical students.[15,16.17] In one study, on status asthmaticus, breathing exercise relieved bronchoconstriction.[18] It improved lung capacity.[18] FVC, $FEV_1$, inspiratory reserve volume, and maximum voluntary ventilation were significantly improved. [18]

Marked improvement in the lung functions after ANB was observed among asthmatic and COPD patients. [19,20] Several studies showed the decreased frequency of attacks, less use of drugs, and improvement in diffusing capacity indicated by the transfer factor of the lung for carbon monoxide.[21,22] COPD assessment test score was increased in COPD patients after breathing exercise.[21.22]

## CONCLUSION

*Urasthan* and *Nabhisthan* are the common areas for *UdanaVayu* and *Nadishodhan Pranayam* exercise. By doing the said exercise, one can gain strength to the organs which are the site of *UdanaVayu* and also the channels get purified. All the participating organs of respiration like diaphragm, respiratory muscles, accessory respiratory muscles, lungs will also get good exercise & due to this their force of *ucchawas* will increase. The shifting of sympathovagal balance towards parasympathetic predominance also may play a role for such improvements. From reviewing the results, it becomes distinctly possible that structured and systematic performance of *Nadi shodhan Pranayam* can be a useful measure for the improvement of respiratory endurance and functions.

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