

Review Article

# The Physiological Effect of Dhauti on Phlegm-Related Disorders: A Narrative Review

Balagovind T P<sup>1</sup>, Abhijna Jinaraj<sup>2</sup>, Archana K<sup>3</sup>, Joychand Singh<sup>4</sup>, Megha Thomas<sup>5</sup>, Mepa Salin<sup>6</sup>, Muhammed Akthar<sup>7</sup>

<sup>1</sup>PG Scholar, Department of Clinical Yoga, Alva's College of Naturopathy & Yogic Sciences.

<sup>2</sup>Assistant Professor, Department of Clinical Naturopathy, Alva's College of Naturopathy & Yogic Sciences.

<sup>3</sup>Associate Professor, Department of Clinical Yoga, Alva's College of Naturopathy & Yogic Sciences.

<sup>4</sup>PG Scholar, Department of Clinical Yoga, Alva's College of Naturopathy & Yogic Sciences.

<sup>5,6,7</sup>Interns, Department of Naturopathy & Yoga, Alva's College of Naturopathy & Yogic Sciences.

DOI: <https://doi.org/10.24321/2394.6547.202305>

## I N F O

### Corresponding Author:

Balagovind T P, PG Scholar, Department of Clinical Yoga Alvas College of Naturopathy & Yogic Sciences.

### E-mail Id:

[balagovindtp@gmail.com](mailto:balagovindtp@gmail.com)

### Orcid Id:

<https://orcid.org/0009-0006-8916-8257>

### How to cite this article:

Balagovind T P, Jinaraj A, Archana K, Singh J, Thomas M, Salin M, Akthar M. The Physiological Effect of Dhauti on Phlegm-Related Disorders: A Narrative Review. J Adv Res Ayur Yoga Unani Sidd Homeo. 2023;10(3&4): 1-10.

Date of Submission: 2023-11-7

Date of Acceptance: 2023-12-10

## A B S T R A C T

**Background:** Phlegm is a pathological product which is formed due to obstruction of body fluid metabolism, leading to the failure of body fluids to circulate accordingly. These reactions cause a persistent, chronic hypersecretion of mucus in the airways, which aggravates respiratory conditions. In this instance, mucus hypersecretion adds to the pathogenesis of several severe respiratory disorders, replacing the protective and homeostatic role of airway mucus production. *Dhauti* is a cleansing technique under *shatkarma* found to be useful in managing phlegm-related disorders. Some studies and trials have shown to be effective in managing phlegm-related disorders. This review has been done to understand the effects of *dhauti* on phlegm-related disorders.

**Method:** Online databases such as PubMed, PubMed Central, Google Scholar, Research Gate Library of Yoga.com, BioMed Central (BMC) and published books like *Asana*, *Pranayama*, *Mudra Bandha*, and *Hatha Yoga Prathipika* were searched. A total of 2,120,915 references from the day the database was created until March 2022, were found through the search. The articles which satisfied the inclusion criteria after removing the duplicates were selected.

**Conclusion:** This review demonstrates that *dhauti* may be a useful treatment for those with conditions linked to phlegm. Safe internal cleansing procedures could help prevent and treat a variety of phlegm-related ailments since improving pulmonary functions, increasing respiratory muscle endurance, lowering airway resistance, and improving lung emptying, all play a vital role in restrictive lung disorders.

**Keywords:** *Dhauti*, Phlegm, Cystic Fibrosis, COPD, Bronchiectasis, NTM Lung Disease

## Introduction

### Phlegm-Related Disorders

A pathological product called phlegm is formed when there is an obstruction to the body's natural fluid metabolism, which interferes with the fluids' ability to circulate properly. Phlegmatic syndrome can be caused by several different things. The formation of pathogenic materials within the body can be attributed to external sources. Phlegm production may result from internal traumas or nutritional variables. The lungs are the site of phlegm collection, while the spleen is responsible for its production. Two types of phlegm are found in clinical settings: visible phlegm and invisible phlegm. Phlegm is associated with several different disorders.<sup>1</sup>

Since mucus secretion is thought to be a basic mechanism for preserving airway homeostasis, almost all regulatory and inflammatory mediators that have been investigated as well as interventions cause an instantaneous increase in mucus production. Many of these mediators also cause increased mucin synthesis, goblet cell hyperplasia, and enhanced expression of mucin genes over long periods. Unlike the beneficial effects of acute secretion, these reactions cause chronic, long-term hypersecretion of airway mucus, which aggravates respiratory illnesses. In these situations, airway mucus secretion's originally protective and homeostatic function is undermined, and instead, protracted hypersecretion aggravates the pathophysiology of several serious respiratory diseases, including bronchiectasis, chronic obstructive pulmonary disease, cystic fibrosis pneumonia and asthma.<sup>2</sup>

In developed countries, chronic obstructive pulmonary disease (COPD) is a leading cause of sickness and mortality, and in the years to come, its prevalence is predicted to increase. It appears as a frequent illness with symptoms including coughing up phlegm and dyspnoea. However, because these symptoms are general and generic, COPD may go undiagnosed. The World Health Organisation predicted that COPD would be ranked as the third most prevalent cause of mortality globally in 2020. The course of COPD is continuous and progressive, and episodes brought on by bronchial infections frequently make it worse. Periods of increased acute symptoms, such as cough, dyspnoea, and increased sputum production, are indicative of these exacerbations. These episodes worsen airflow obstruction, lower quality of life, and require regular medication adjustments. The main cause of medical visits is exacerbations.<sup>3</sup>

The primary cause of lung disease in cystic fibrosis (CF) is mainly attributed to the excessive production of highly thick mucus. There is no evidence indicating substantial mucus secretion in CF, and it is evident that CF sputum contains

minimal intact mucin, the main polymeric component of regular mucus. The low viscosity of CF sputum results in reduced effectiveness of cough clearance for eliminating infected phlegm. This diminished clearance is believed to contribute to a prolonged inflammatory condition in the airways, ultimately leading to the development of bronchiectasis.<sup>4</sup>

The symptoms of non-cystic fibrosis bronchiectasis (NCFB) include bacterial infection, inflammation, and irreversible airway dilatation along with continuous production of purulent sputum. It is often seen in the middle and lower lobes, suggesting a breakdown in the cilia's ability to clear mucus and an accumulation of mucus as a result of gravity. Mucopurulent material in the small airways can cause an early and severe obstruction of NCFB, which can make radiographic detection difficult. Uncertainty surrounds the mechanisms causing increased mucus production, inflammation, and airway injury unique to NCFB areas. The importance of mucus concentration in the pathophysiology of muco-obstructive illnesses has recently been brought to light by a thorough understanding of lung mucus clearance in both healthy and sick states.<sup>5</sup>

Asthma is marked by persistent inflammation in the airways and heightened production of mucus, characterised by excessive secretion, increased goblet cell numbers, and enlargement of submucosal glands. The significance of this increased mucus production in asthma has been somewhat overlooked when compared to the focus on airway inflammation. Nevertheless, the accumulation of mucus contributes to limitations in airflow, heightened airway responsiveness, and increased morbidity and mortality in individuals with asthma. The hypersecretion of mucus in the airways, forming a part of the overall airway remodelling process, poses a challenge in asthma. Hence, there is a need for studies exploring the pathophysiology of this phenomenon and investigating therapeutic approaches.<sup>6</sup>

Non-tuberculous mycobacteria (NTM) are prevalent environmental acid-fast bacilli (AFB). While NTMs are not obligate pathogens, they share characteristics such as aerosolisation, resilience, hydrophobicity, and intracellular pathogenicity with the Mycobacterium tuberculosis complex (MBTC). Although the lungs are the primary organ typically affected, NTM can induce illnesses in various other parts of the body. Common extrapulmonary organs affected include lymph nodes, skin/ soft tissue, and disseminated disease. The incidence of NTM disease rises in correlation with increased environmental exposure and immunosuppression. Pulmonary NTM disease frequently coexists with chronic lung diseases.<sup>7</sup>

Pneumonia is an infection-related illness in which the lung becomes inflamed and congested, reducing oxygen exchange and causing symptoms such as coughing and

shortness of breath. It appears on chest imaging as an acute sickness in which the alveolar air gaps in the lung become inflamed and filled with fluid and white blood cells, resulting in the radiographic appearance of consolidation. Pneumonia can be caused by bacterial, viral, or parasitic infections, as well as non-infectious factors. Most severe instances are caused by bacterial infections, notably *Streptococcus pneumoniae* (pneumococcus) and *Haemophilus influenzae*. Clinical pneumonia is defined by the World Health Organization (WHO) as a sudden bout of coughing or difficulty breathing followed by an accelerated respiratory rate.<sup>8</sup>

Mucus-related disorders, including chronic bronchitis, have several aetiological causes, including smoking, pollution in the environment, occupational exposures, infections, as well as hereditary and family effects. These are the main causes of chronic bronchitis. Based on the triggers, two main aetiological groups for bronchial asthma are often recognised: extrinsic (allergic/ atopic) and intrinsic (non-allergic/ idiosyncratic) asthma. A third variety exists as well, distinguished by a mixed pattern that doesn't cleanly fit into either of the two primary groups.<sup>9</sup>

COPD makes it challenging to inhale a sufficient amount of air, leading to various complications and fostering lung infections due to inadequate oxygen levels. This condition can result in lung tissue damage, leading to pneumothorax (collapsed lung) and impaired gas exchange, characterised by reduced oxygen and increased carbon dioxide in the bloodstream due to incomplete breathing cycles. Additionally, COPD can contribute to heart issues, including atrial fibrillation, as it damages nerve fibres connected to the heart, causing irregular heartbeats or arrhythmia. Other associated problems encompass osteoporosis, weakened arms and legs, weight fluctuations, sleep disturbances, depression, anxiety, lung cancer, pulmonary hypertension, and secondary polycythaemia. Complications arising from cystic fibrosis extend to the respiratory, digestive, and reproductive systems, as well as other organs. These complications include damaged airways leading to bronchiectasis, chronic infections, nasal polyps, haemoptysis (coughing up blood), acute exacerbations, diabetes, liver disease, intestinal obstruction, distal intestinal obstruction syndrome (DIOS), infertility in men, and reduced fertility in women.<sup>10</sup>

An estimated 227.3 million cases of COPD in people who are 30 years of age and above were predicted by the meta-regression epidemiological analysis for the specified year. America was found to have the highest incidence, whilst Southeast Asia had the lowest. The frequency among men (30 years of age and older) was 14.3%, which was far greater

than the 7.6% reported for women in the same age group. The primary cause, identified as NTM, was shown to be responsible for a wide variety of cases. A growing amount of data points to an increase in NTM lung illnesses and hospitalisations associated with them, especially in areas where TB is not as common.<sup>11,12</sup>

When managing a severe acute exacerbation of chronic obstructive pulmonary disease (AECOPD), pharmacological and non-pharmacological therapies are employed. Inhaled bronchodilators, steroids, and antibiotics are among the pharmacological interventions. Treatments for non-pharmacological conditions include oxygen therapy, non-invasive mechanical ventilation (NIMV), high-flow nasal cannula (HFNC) oxygen therapy, and pulmonary rehabilitation (PR).<sup>13</sup>

Numerous pathological changes, including those related to the absorption, distribution, metabolism, and excretion of antibacterial medicines, can be significantly impacted by cystic fibrosis. Therefore, to maximise the effectiveness of antibiotic therapy, it is critical to identify the pharmacokinetic abnormalities in CF patients.<sup>14</sup>

Patients with bronchiectasis may benefit from occasional antibiotic usage and physiotherapy, which are traditional forms of treatment. Nevertheless, there isn't any solid proof that these therapies change how the illness develops naturally.<sup>15</sup>

### Dhauti

Yoga is a priceless modern inheritance rather than a long-forgotten myth from antiquity. It remains a fundamental necessity for the now and a cornerstone of culture for the future. Yoga, which addresses the physical, vital, mental, emotional, psychic, and spiritual elements of an individual, is the science of virtuous living and may be easily incorporated into daily life. Yuj, which means "to join" or "unity," is the Sanskrit word from which the word "yoga" is derived. As a symbol of the union of personal and collective awareness, this oneness has spiritual importance. The eight branches of the complete yoga system are called "Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana, Samadhi," or Ashtanga yoga for short. Additionally, "*Medashleshmaadhikahapoorvamshatkarmaanesa-maacharet Anyastunaacharettaanidoshaanaamsam-abhaavataha*"

dhauti is recognised as one of the therapeutic approaches to managing conditions related to mucus.

If there is an excess of fat or mucus, it is recommended to perform the six cleansing techniques, known as *shatkarmas*, before engaging in *pranayama*. However, individuals with

balanced *doshas*, including phlegm, wind, and bile, may not find it necessary to practice these techniques.<sup>16</sup>

The purification of the body through the six cleansing techniques, known as *shatkarma*, is considered a secret practice with remarkable and varied outcomes, highly revered by accomplished yogis. *Hatha* yoga is renowned for these techniques, comprising six distinct methods, each encompassing a range of practices. *Dhauti*, one of these techniques, is categorised into four parts as per the *Gheranda Samhita*: *Antar* (internal) *dhauti*, *Danta* (teeth) *dhauti*, *Hrid* (cardiac) *dhauti*, and *Moolashodana* (rectal cleansing). *Antar dhauti* involves four practices: *Vatsara* or *Plavini dhauti* (expelling air through the anus), *Varisara* (*shankhprakashalana*) *dhauti* (purging a significant amount of water through the bowels), *Vahnisara* (*Agnisara kriya*) *dhauti* (rapid expansion and contraction of the abdomen), and *Bahiskrita* (rectal cleaning) *dhauti* (washing the rectum with the hands). *Hrid dhauti* comprises three practices: *Danda* (stick) *dhauti* (inserting a soft banana stem into the stomach), *Vastra* (cloth) *dhauti* (swallowing a long, thin strip of cloth), and *Vaman* (*kunjil* and *vyaghara kriya*) *dhauti* (regurgitating the stomach contents). *Danta* (teeth) *dhauti* is divided into four practices: *Jiva* (tongue) *dhauti* (cleansing the tongue by rubbing it downward with the joined first finger and thumb and then squeezing it), *Karna* (ear) *dhauti* (cleaning the ears with the middle finger and nothing smaller), *Kapalrandhra* (frontal sinuses) *dhauti* (cleaning the upper back portion of the palate), and *Chakshu* (eyes) *dhauti* (bathing the eyes with tepid, saline water, urine). A strip of cloth, approximately 3 inches wide and 15 cubits long, is moistened with warm water, swallowed through the passage demonstrated by the guru, and then retrieved. This practice is referred to as *Dhauti Karma*.

It must be noted that the strip should be gripped with the teeth while its end is moistened with a tiny bit of warm water. One cubit should be consumed on the first day, two on the second, three on the third, and so on. It should be consumed gradually, day by day. Following swallowing, the stomach should be rotated from left to right in a circular manner. The strip should then be carefully and slowly extracted. It is a fact that *Dhauti Karma* may certainly treat illnesses like asthma, cough, spleen enlargement, leprosy, and a host of other maladies caused by excess phlegm.<sup>17</sup>

The three *doshas*, or body humour, *vata* (wind), *pitta* (bile), and *kapha* (mucus), are balanced by *shatkarmas*. Overall

imbalance can result from imbalances in these *doshas*. *Dhauti* is one of these methods; by clearing blockages in nadis and cleansing all the *chakras*, it helps to boost the immune system, lessen excess mucus, improve respiratory functions, purify the blood, and revitalise the entire pranic body. By doing this, the energy levels can be raised and the five *pranas* can be brought back into balance. These methods also help release emotional barriers, pent-up emotions, and heart-heaviness brought on by pressures and conflicts from the outside as well as from within.<sup>16</sup>

## Aim and Objective

### Aim

To assess the effectiveness of dhauti in the management of phlegm-related disorders

### Objective

To understand various physiological changes behind the effectiveness of dhauti

### Method

The search for citations on the keywords 'dhauti,' 'phlegm,' 'COPD,' 'cystic fibrosis,' 'bronchiectasis,' 'asthma,' and 'NTM lung disease' was conducted across various sources, including the online databases PubMed, PubMed Central, Google Scholar, ResearchGate, libraryofyoga.com, BioMed Central (BMC), and published books such as 'Asana Pranayama Mudra Bandha,' 'Hatha Yoga Pradipika,' and 'yoga therapy.' The search encompassed references from the inception of the databases until March 2022, spanning the period from 2000 to the present. A total of 2,120,915 references were identified.

The review focused on experimental papers, case studies, and case series in English that investigated the impact of dhauti on disorders related to phlegm. Studies combining dhauti with other acupuncture practices and those addressing conditions unrelated to phlegm were excluded. Additionally, studies not in English or lacking available abstracts were excluded. Following the application of inclusion and exclusion criteria and the removal of duplicates, a subset of studies was chosen for the final review.

### Results

Table 1 shows a description of the articles that were included in the present study.



Table I. Details of Research Articles Used in the Study

S. No.	Title of the Article (Year of Publication)	Names of Authors (Name of Journal)	Methodology	Variables	Result	Conclusion
1	Health and therapeutic benefits of shatkarma: a narrative review of scientific studies (2021)	PS Swathi, BR Ragavendra, AA Saoji (Journal of Ayurveda and Integrative Medicine) <sup>18</sup>	Six purifying techniques, called shatkriyas in the Hatha yoga school, are recommended to balance a person's constitution. There is a lack of comprehensive literature regarding scientific investigations on the health advantages of shatkriyas, despite the fact that this topic has been discussed extensively. Thus, the goal of this study is to compile scientific data about shatkriyas' physiological and medicinal effects.	Dhauti vagal tone Vital capacity forced inspiratory volume, expiratory reserve volume, and respiratory rate.	The authors' practice improves pulmonary functions such as increased forced inspiratory volume, increased vagal tone, improved slow vital capacity, and decreased expiratory volume and respiratory rate. The outcomes also point to a possible improvement in respiratory muscles' endurance and a decrease in airway resistance.	Existing literature suggests that the use of dhauti has been shown to enhance respiratory functioning and be helpful in conditions related to phlegm. The material that is now accessible makes it clear that this yogic cleansing technique is safe to practise under the guidance of a qualified instructor and has the ability to improve health and treat certain illnesses.
2	An ayurvedic perspective of hrid dhauti in shatkarmas and its impact upon human physiology (2021)	S Kumar, N Joshi (Dev Sanskriti: Inter-disciplinary International Journal) <sup>19</sup>	This research aims to investigate the physiological impact of hrid dhauti from the perspective of Ayurveda.	Hrid dhauti cough, asthma, Hamilton anxiety scale	Hrid dhauti treats the presence of mucus, which is connected to ailments like cough and asthma, by concentrating on the heart and chest area. By removing excess mucus from the stomach, this technique helps with conditions including leprosy, asthma, and cough. Additionally, by improving blood circulation and fostering a state of quiet and relaxation in the mind, it enhances mental well-being and increases happiness.	According to hatha yoga and Ayurveda, physical ailments result from imbalances of vata, pitta, and kapha elements. Shatkarma plays a vital role in bringing these components back into harmony, making the body feel lighter and helping to relieve respiratory conditions with its powerful cleaning methods. Thus, before pursuing more complex practices, it is advised to carry out these purifying methods, especially hrid dhauti.

3	Immediate effect of vaman dhauti on tridosha - a pre-post control study (2019)	F Wenyi, P Gudapti, PV Kumar (Scholarly Publications of SVYASA) <sup>20</sup>	The experiment was conducted on long-term residential students of SVYASA (sample size 34). Both healthy females and males belonging to the age group of 20–40 years were included.	Vaman dhauti	The decrease in the bala of the experimental group was statistically significant. Pitta level increased statistically in the control group whereas, the decrease in pitta in the experimental group was not statistically significant. The decrease in the imbalance in tridosha in the control group was 4.28% whereas, that in the experimental group was 29%. This suggests that the experimental group's tridosha shifted more favourably than the control group. It's crucial to remember, though, that none of these modifications attained statistical significance.	The imbalance in tridoshas decreased in the control as well as experimental groups. This indicates that the practice of vaman dhauti reduces imbalances and helps in the improvement of a person's health.
4	Voluntarily induced vomiting- A yoga technique to enhance pulmonary functions in healthy humans (2018)	R Balakrishnan, RM Nanjundaiah, NK Manjunath (Journal of Ayurvedic Integral Medicine) <sup>21</sup>	The purpose of this research was to examine the effects of voluntary induced vomiting (VIV) on pulmonary functions in both rookie and seasoned practitioners, with an emphasis on possible therapeutic uses. There were eighteen healthy participants in the research (experienced: 9, naïve: 9).	Slow and forced vital capacity, inspiratory expiratory reserve volume, respiratory rate, and tidal volume	In comparison to the group's novices, the experienced group's slow vital capacity (F113 = 5.699: p = 0.03) rose. The comparison revealed a striking difference, with the experienced group showing no change in SVC (p = 0.01) and the novices showing a substantial decrease in ERV (p = 0.04) and SVC (p = 0.01), respectively.	By using the previously described findings, we have developed a theoretical comprehension of the possible mode of operation for VIV and proposed directions for further investigation. Based on the study's findings, we can conclude that practising VIV on a daily basis should help to improve respiratory muscles' endurance and decrease airway resistance. This implies that it may be helpful in treating lung conditions that are restrictive, such as bronchitis and bronchial asthma.

5	Physiological effect of kriyas: cleansing techniques (2017)	SK Patra (International Journal of Yoga - Philosophy, Psychology and Parapsychology) <sup>22</sup>	This theoretical scientific article provides a comprehensive explanation of all types of kriyas outlined in hatha yoga, along with their corresponding physiological effects.	Dhauti	In Ayurveda and yoga, the three humours, known as tridoshas, should ideally be in a balanced state. The shatkarma practices aim to revitalise and rejuvenate various organ systems for optimal well-being.	One term best describes the effects of shatkarma: cleansing. Energy may flow easily through the body's systems and improve one's ability to work, think, digest, taste, and enjoy life in general. Acknowledging the profound consequences of karma, yogis reverse it, attaining perfection and realising the full capacity of human potential.
6	Vaman vyapad (complications of emesis) in children (2016)	R Rathi, B Rathi (Journal of Indian System of Medicine) <sup>23</sup>	A case series vamana vyapad on children suffering from vipadika childhood asthma, mukhadushika with amla pitta vyadhis was selected for the study.	Singh Personal Stress Source Inventory (SPSSI)	The children are reluctant to take vamana vyapad repeatedly to expel all vitiated doshas from the body. Thus, proper care and precautions should be taken to prevent complications.	Considering the apatarpak nature of vamana karma, selection of patient, drugs, procedure's duration, and type of vamana (instant or with snehpan) must be taken into account while performing in children. In the selection of podiatric patients for vamana factors like physiological aspects like Agni (digestive capacity), age, strength, disease condition, appetite, kosha (nature of digestion), prakriti (body composition) etc. play a vital role. The result of any panchakarma can be turned favourable if executed well with all precautions to prevent vyapad with chatushpad a's co-operation. This study is the first attempt of its kind to throw light on the vamana vyapad experienced in the paediatric age group clinically and the measures to be incorporated while performing the same irrespective of its type whether classical or sadyo.

7	Physiological and biochemical changes with vamana procedure (2012)	B Gupta, SC Mahapatra, R Makhija, A Kumar, NM Jirankalgikar, MM Padhi, RB Devalla (AYU) <sup>24</sup>	The vamana karma process is used to cleanse the body and get rid of doshas in both healthy and sick people. This entails examining post-procedure physiological and biochemical alterations to understand its effects on healthy subjects.	Physical examinations along with physiological parameters, routine blood examination, total leucocyte count, DLC & Hb%	During the vamana process, there was a minor rise in respiratory rate, which thereafter returned to normal. Throughout the operation, the range of respiration rates was 16 to 26 per minute.	<p>The findings affirm that vamana, when conducted systematically, is a safe panchakarma procedure. This cleansing process enhances appetite, regulates bowel habits, and improves sleep patterns. It also contributes to a reduction in low-density lipoprotein (LDL) and serum cholesterol levels through its Kapha-hara action.</p> <p>While there are mild elevations in blood pressure, pulse, temperature, and respiration during the vamana procedure, attributed to sympathetic stimulation, caution is recommended in hypertensive individuals. Vamana improves appetite, regularises bowel habits, alleviates post-meal abdominal heaviness, and mildly cleanses intestinal flora, maintaining Bacteroides and E. coli within normal limits.</p>
8	Kunjara – the yogic stomach wash (1992)	G Yogeshwar (Ancient Science of Life) <sup>25</sup>	Kunjara or vamana, the classic yogic stomach wash, is a straightforward and effective way to keep your stomach free of illness.	Kunjara	Yogic gastric auto-lavage has benefits comparable to fasting, and regular practice can help avoid bile and phlegm-related illnesses.	This exercise strengthens the heart and respiratory system because they are both indirectly impacted. For conditions including dyspepsia, constipation, and digestive troubles, it is helpful. For best results, this workout should be done first thing in the morning on an empty stomach.



## Discussion

After practising *dhauti*, there is an improvement in pulmonary functions and increased vagal tone. Vagus, the tenth cranial nerve, coordinates the vomiting reflex. Specific vagal afferent mechanoreceptors from the stomach respond to muscle contractions and tension, conveying mechanical information to the nucleus tractus solitarius (NTS) through the jugular and nodose ganglion. The NTS, with strong neurological connections to respiratory control areas, reduces gastric wall tension and acid production. This signal also enhances diaphragmatic function and influences respiratory muscles, submucosal glands, and pulmonary vasculature, reducing airway resistance and promoting oxygen diffusion. *Dhauti* improves slow vital capacity and forced inspiratory volume, and decreases expiratory reserve volume and respiratory rate. It results in increased respiratory muscle endurance, reduced airway resistance, and enhanced lung emptying, potentially benefiting restrictive lung disorders. Thus, cost-effective and safe internal cleansing practices could contribute to preventing and managing various phlegm-related disorders.<sup>18,21</sup>

Asthma episodes are brought on by enlarged bronchioles, and excessive mucus in the bronchi causes inflammation that results in bronchitis. By generating intra-thoracic negative pressure, *dhauti* clears the bronchioles of mucus. By putting a rubber tube into the trachea, *danda* can alleviate bronchitis, COPD, cough, and cold via stimulation of the trachea and inhibition of smooth muscle contraction.<sup>19</sup>

Increased gastric secretions from *vahnisara* affect the pancreatic and endocrine/ exocrine processes. *Danda dhauti* is good for sinusitis since it clears the upper palate. The *vastra dhauti* method in *hrid dhauti* helps clear the upper gastrointestinal tract of extra phlegm by having the patient swallow a cotton towel.<sup>22</sup>

The breathing rate increases slightly throughout the *vamana* process and then returns to normal, ranging from 16 to 26 breaths per minute. By *kapha hara* action, it decreases blood cholesterol and LDL levels. Sympathetic stimulation may cause mild elevations in blood pressure, pulse, temperature, and breathing, hence, its usage in hypertensive people should be avoided.<sup>24</sup>

According to *Hatha Yoga Pradipika*, a combination of these *dhauti* techniques clears the respiratory and digestive systems, getting rid of extra mucus, toxins, and excess bile. The illnesses brought on by these imbalances are lessened by this restoration of the body's normal chemical equilibrium.<sup>17</sup>

## Limitation

Only eight studies were included in the current analysis, with limited studies focusing on the physiological effect of

*dhauti* on phlegm-related disorders. Moreover, the current study analysed data for only a few years.

## Scope of Further Research

A comprehensive, long-term, and well-designed randomised study is needed to assess the long-term safety, efficacy, and adherence to treating phlegm-related illnesses in all age groups. Systematic exploration can be used to determine the best method for treating lung illnesses and ailments such as asthma, COPD, and others.

## Conclusion

Internal cleaning methods, or *dhauti*, treat digestive issues and enhance respiratory health. The review illustrates how *dhauti* can improve lung functions and relieve symptoms of phlegm-related conditions such as pneumonia, bronchial asthma, COPD, bronchiectasis, cystic fibrosis, and NTM lung illnesses. The results are based on respiratory rate, decreased expiratory reserve volume, forced inspiratory volume, and enhanced slow vital capacity. The findings may help patients with restrictive lung diseases by indicating increased lung emptying, less airway resistance, and improved respiratory muscle endurance. Thus, these safe, affordable methods of internal cleaning may help prevent and treat a variety of phlegm-related conditions.

**Conflict of Interest:** This research has no conflict of interest.

## References

1. Xi D, Fa X. A review on the herbs combination for phlegm disease treatment. *Int Univ Coll*. 2019 Jul;27(3):45.
2. Rogers DF. Physiology of airway mucus secretion and pathophysiology of hypersecretion. *Respir Care*. 2007 Sep;52(9):1134-46. [PubMed] [Google Scholar]
3. Walters J. COPD - diagnosis management and the role of the GP. *Aust Fam Physician*. 2010 Mar;39(3):100-3. [PubMed] [Google Scholar]
4. Geller DE, Rubin BK. Respiratory care and cystic fibrosis. *Respir Care*. 2009;54(6):796-800. [PubMed] [Google Scholar]
5. Ramsey KA, Chen AC, Radicioni G, Lourie R, Martin M, Broomfield A, Sheng YH, Hasnain SZ, Radford-Smith G, Simms LA, Burr L, Thornton DJ, Bowler SD, Livengood S, Ceppe A, Knowles MR, Noone Sr PG, Donaldson SH, Hill DB, Ehre C, Button B, Alexis NE, Kesimer M, Boucher RC, McGuckin MA. Airway mucus hyperconcentration in non-cystic fibrosis bronchiectasis. *Am J Respir Crit Care Med*. 2020;201(6):661-70. [PubMed] [Google Scholar]
6. Morcillo EJ, Cortijo J. Mucus and MUC in asthma. *Curr Opin Pulm Med*. 2006 Jan;12(1):1-6. [PubMed] [Google Scholar]
7. Karamat A, Ambreen A, Ishtiaq A, Tahseen S, Rahman MA, Mustafa T. Isolation of non-tuberculous mycobacteria among tuberculosis patients, a study

- from a tertiary care hospital in Lahore, Pakistan. *BMC Infect Dis.* 2021 Apr;21(1):381. [PubMed] [Google Scholar]
8. Scott JA, Brooks WA, Peiris JS, Holtzman D, Mulholland EK. Pneumonia research to reduce childhood mortality in the developing world. *J Clin Invest.* 2008 Apr;118(4):1291-300. [PubMed] [Google Scholar]
  9. Mohan H. Textbook of pathology. 5th ed. Missouri, USA: Jaypee Medical Publishers; 2005. p. 495-502.
  10. Mohan H. Textbook of pathology. 7th ed. Missouri, USA: Jaypee Medical Publishers; 2015. p. 485-87.
  11. Adeloje D, Chua S, Lee C, Basquill C, Papan A, Theodoratou E, Nair H, Gasevic D, Sridhar D, Campell H, Chan KY, Sheikh A, Rudan I; Global Health Epidemiology Reference Group (GHERG). Global and regional estimates of COPD prevalence: systematic review and meta-analysis. *J Glob Health.* 2015 Dec;5(2):020415. [PubMed] [Google Scholar]
  12. Porvaznik I, Solovic I, Mokry J. Non-tuberculous mycobacteria: classification, diagnostics, and therapy. *Adv Exp Med Biol.* 2017;944(5):19-25. [PubMed]
  13. Crisafulli E, Barbeta E, Ielpo A, Torres A. Management of severe acute exacerbations of COPD: an updated narrative review. *Multidiscip Respir Med.* 2018 Oct;13:36. [PubMed] [Google Scholar]
  14. Castagnola E, Cangemi G, Mesini A, Castellani C, Martelli A, Cattaneo D, Mattioli F. Pharmacokinetics and pharmacodynamics of antibiotics in cystic fibrosis: a narrative review. *Int J Antimicrob Agents.* 2021 Sep;58(3):106381. [PubMed] [Google Scholar]
  15. Evans DJ, Bara AI, Greenstone M. Prolonged antibiotics for purulent bronchiectasis in children and adults. *Cochrane Database Syst Rev.* 2007 Apr;18(2):CD001392. [PubMed] [Google Scholar]
  16. Saraswati SS. Asana pranayama mudra bandha. 4th ed. Bihar, India: Yogic Publication Trust; 2013. p. 496-514.
  17. Mukthibodhananda S. Hatha yoga pradipika. 4th ed. Bihar, India: Yogic Publication Trust; 2012. p. 191-2.
  18. Swathi PS, Ragavendra BR, Saoji AA. Health and therapeutic benefits of shatkarma: a narrative review of scientific studies. *J Ayurveda Integr Med.* 2021;12(1):206-12. [PubMed] [Google Scholar]
  19. Kumar S, Joshi N. An ayurvedic perspective of hrid dhauti in shatkarmas and its impact upon human physiology. *Dev Sanskriti Interdiscip Int J.* 2021;17:36-42. [Google Scholar]
  20. Wenyi F, Gudapti P, Kumar PV. Immediate effect of vaman dhauti on tridosha (as measured by nadi tarangini)-a pre-post control study. *Int J Yoga Allied Sci.* 2019 Sep;13(4):34.
  21. Balakrishnan R, Nanjundaiah RM, Manjunath NK. Voluntarily induced vomiting - a yoga technique to enhance pulmonary functions in healthy humans. *J Ayurveda Integr Med.* 2018;9(3):213-6. [PubMed] [Google Scholar]
  22. Patra SK. Physiological effects of kriyas: cleansing techniques. *Int J Yoga Philos Psychol Parapsychol.* 2017 Dec;5(1):3-5. [Google Scholar]
  23. Rathi R, Rathi B. Vaman vyapad (complications of emesis) in children. *J Indian Syst Med.* 2016 Sep;4(3):155-60. [Google Scholar]
  24. Gupta B, Mahapatra SC, Makhija R, Kumar A, Jirankalgikar NM, Padhi MM, Devalla RB. Physiological and biochemical changes with vama procedure. *Ayu.* 2012;33(3):348-55. [PubMed] [Google Scholar]
  25. Yogeshwar G. Kunjara - the yogic stomach wash. *Anc Sci Life.* 1992;12(1-2):261-3. [PubMed] [Google Scholar]