



**A CRITICAL REVIEW OF HERBAL STEAM INHALATION FOR THE MANAGEMENT  
OF ACUTE AND CHRONIC RESPIRATORY CONDITIONS**

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**ABSTRACT**

The prevalence of the common cold, which affects two to four individuals annually, has significantly increased globally, making it the most prevalent infectious disease in humans. For many years, herbal remedies have been utilized to both prevent and treat viral respiratory infections (VRI). This is a general overview of these herbs. We go into great detail on the effects and advantages of a variety of antiviral herbs. Due to their inherent immune-stimulating and inflammation-modulating properties, the majority of these herbs can help prevent a cytokine storm, or immunological overreaction, to VRI while still assisting the immune system in better handling the infections. One of the most common homemade methods, steam inhalation is favored in low-income nations due to its accessibility and affordability. Inhaling steam with Tulsi leaves, peppermint, eucalyptus, and turmeric is one such home treatment. Assessing the efficacy of steam inhalation with Tulsi leaves, peppermint, and eucalyptus, and in comparison, to steam inhalation with hot water was the primary goal of the study.

**KEYWORDS:** Common Cold, Steam Inhalation, Tulsi, Peppermint, Eucalyptus.

**INTRODUCTION**

The belief that warm, humidified air relieves respiratory symptoms subjectively by releasing respiratory secretions has made steam inhalation one of the most popular at-home techniques. Even in remote locations, steam inhalation is simply accessible and simple to use at home. It is unknown if inhaling steam reduces the duration of respiratory illness or alleviates its symptoms due to a lack of research. Since the biology of respiratory infections has been better understood and specialized therapies have been developed, it is crucial to consider this traditional treatment in the context of contemporary evidence-based medical practice.

To cure upper respiratory infections, inhale steam. The results showed that the p-value was 0.78 on the first day and 9.72 on the seventh day following the steam inhalation intervention. It was determined that treating acute upper respiratory infections with steam inhalation is beneficial. After using steam inhalation, it was noted that symptoms began to improve on the second day and that full recovery was achieved by the end of the seventh day.

***Mechanism of action of steam in the body***

The fundamental component of steam, heat, affects host defence, physiological immunity, viral load, and pathogenicity. It also triggers adaptive thermoregulatory systems that can adjust body temperature to return to homeostasis. Furthermore, by creating heat stress that mimics fever symptoms, the body's overall temperature rise strengthens the second line of defence. The technique to overcome viral infection depends critically on the environment, source, temperature, humidity, area, and time limit of heat application.

Therefore, there are several ways that heat stress and hyperthermia can help avoid viral infections. Direct inhibition of pathogens results in the immunoregulatory mechanisms that limit inflammatory responses and prevent uncontrolled tissue damage are activated, and the system is improved (both innate and adaptive).

***The common cold***

Sneezing, coughing, sore throats, and nasal stuffiness and discharge are the classic symptoms of a mild upper respiratory disease known as the "common cold." Despite the term's tendency to suggest that there is just one cause, the common cold is a diverse collection of illnesses brought on by a large number of viruses from

various families. The common cold often just affects the upper respiratory tract and is a self-limiting sickness. Colds can occasionally put patients at risk for bacterial problems, and in certain cases, the viral infection spreads to other organs, producing distinct clinical signs.

In addition to the previously recognized influenza viruses, extensive study into the causes of respiratory infections in the 1950s and 1960s resulted in the discovery of adenovirus, parainfluenza virus, rhinovirus, respiratory syncytial virus (RSV), enterovirus, and coronavirus.

### Viruses

Various respiratory viruses employ distinct modes of transmission. Direct hand contact with infected skin and environmental surfaces can transmit rhinovirus and respiratory syncytial virus (RSV). The virus then inoculates itself into the conjunctiva or nasal mucosa. Rhinovirus can also spread through the air, albeit this depends on how long a person is exposed to an infected person. Both direct human-to-person contact and the dissemination of big particle aerosol are ways that the parainfluenza virus (PIV) is communicated. Given the high incidence of reinfection and the high prevalence of infection in children, it seems likely that they are contagious. After a low-titer PIV intranasal challenge, two-thirds of participants experienced flu-like symptoms, which suggests that the infectious dosage of PIV is low. Respiratory secretions that are contaminated propagate RSV. Direct contact with self-inoculation or large particle aerosols seems to be the main route of transmission. It must be spread by direct contact with the sick person or by hand contamination followed by conjunctival introduction. Aerosols of tiny particles are often how influenza spreads.

### Cold causing viruses

| <i>virus</i>                | <i>Percentage of cases(%)</i> |
|-----------------------------|-------------------------------|
| Rhinovirus                  | 30-50                         |
| Coronavirus                 | 10-15                         |
| Influenza virus             | 5                             |
| Respiratory syncytial virus | 5                             |
| Parainfluenza virus         | 5                             |
| Adenovirus                  | <5                            |
| Metapneumovirus             | + <sub>2</sub>                |
| Undiscovered virus          | 20-300                        |

### The pathogenesis

A distinguishing feature of respiratory viruses is their capacity to circumvent the defences provided by the host's nonimmunologic systems and the mucociliary escalator. Furthermore, little is known about the pathophysiology of respiratory virus. The most significant cold virus, rhinovirus, causes 80% of upper respiratory infections in the fall and often enters the upper respiratory tract with little harm to the nasal epithelium.

### RHINOVIRUSES ASPECTS

(i) Size. Gradocol membranes with an average pore size of 0.100 $\mu$ m have allowed two strains to pass through, while those with a 0.69  $\mu$ m pore size have kept them. This result might suggest a viral diameter of 64 m.u. Since the viral titres in both cases were only 1015 and 1025, the true size of the virus is likely much smaller, potentially in the range of most enteroviruses, which is roughly 25 to 30 m.u. It is well known, however, that many viruses, if they are of low titre, may be retained by filters.

ii) The tested viruses were inactivated after 30 minutes of heating at 560 degrees and withstood treatment with 20% ether overnight. By mixing with fluorocarbon (Arcton 23) and centrifuging, they have been easily purified.

### Epidemiology

People worldwide are afflicted by the common cold, which is most prevalent in the Northern hemisphere from October to March. Everyone agrees that children are more likely than adults to have colds. Nonetheless, there is significant variation in the reported viral incidence rates. According to AR roll, children can get up to five colds a year, whereas adults only get two to three. Children may get up to eight colds a year, according to other sources. An extensive analysis of the literature revealed that children's common colds often last 10 to 15 days, whereas coughs typically linger up to 25 days, which is longer than An extensive analysis of the literature revealed that children's common colds often last 10 to 15 days, whereas coughs typically linger up to 25 days, which is longer than most people realize.

There is a dose-dependent relationship between psychological stress and cold susceptibility. Given that rhinoviruses are the primary cause of the common cold, the epidemiology of this illness closely resembles that of rhinoviruses. Despite the fact that rhinoviruses are present all year round, the incidence of rhinovirus infections peaks in the fall, followed by a minor outbreak in the spring.

### How can the common cold be distinguished from other conditions?

The signs and symptoms of different illnesses can be confused with those of the common cold. The symptoms of allergic rhinitis are similar, except there may be a seasonal component or obvious allergic exacerbation, and a sore throat is uncommon to accompany it. When the main complaint is painful throat, streptococcal pharyngitis should be taken into consideration. Centre criteria<sup>20</sup> are useful for defining when throat swabs and antibiotics are necessary.

In order to distinguish acute or subacute sinusitis from the common cold, there are no trustworthy clinical scoring criteria. When evaluating the data supporting the use of antibiotics to treat sinusitis, groups advise that symptoms be present.

Not improve after 7–10 days before antibiotics are taken into consideration.

### **Steam Inhalation Capsules**

Therapeutic formulations known as steam inhalation capsules are intended for use in steam treatment to reduce the symptoms of respiratory ailments such as bronchitis, sinusitis, and colds. Essential oils, aromatic compounds, and other active substances with calming, antimicrobial, or decongestant effects are frequently found in these capsules. They emit volatile components when dissolved in hot water, which soothes irritated airways, reduces inflammation, and clears nasal passages.

### **How to Use Steam Inhalation Capsules with Hot Water**

1. To prevent burns, heat water until it is steaming but not boiling.
2. Fill a steam inhalation device or a heat-safe basin with the hot water.
3. Put the capsule in.
4. If necessary, cut or puncture the capsule (according to the packaging's directions). Pour one capsule's contents into the boiling water.
5. Certain capsules could disintegrate on their own without requiring any cutting.
6. Breathe in the fumes.
7. To prevent scorching, keep your face away from the bowl or other object.
8. To get the most out of the steam, cover the bowl and your head with a towel.
9. Shut your eyes and take a deep breath through your mouth and nose.

### **Time frame**

For five to ten minutes, or as advised by the product's directions, inhale the steam.

If necessary, take breaks, and if you experience any discomfort or annoyance, cease right away.

### **After-Inhalation Treatment**

When the session is over, gently massage your face dry.

After use, take some time to rest and stay away from chilly air.

### **Precautions**

**Temperature Safety:** To avoid burns, make sure the water is not boiling.

**Allergies:** Determine whether you have any allergies to any of the capsule's substances.

**Elderly people and children:** To avoid mishaps, supervise their use.

**Frequency:** Adhere to the suggested frequency (e.g., once or twice a day); avoid overusing.

## **HERBAL PLANTS PROFILE**

### **Tulsi (*Ocimum sanctum*)**

Holy basil, or Tulsi (*Ocimum sanctum*), is a highly valued herb in traditional medical systems like Ayurveda. Tulsi sometimes referred to as the "Queen of

Herbs," has been used for ages because of its many medicinal uses. It is a strong adaptogen with a variety of pharmacological properties, including immunomodulatory, antibacterial, anti-inflammatory, and antioxidant actions.

Because of its essential oils, which include active ingredients including eugenol, cineole, and methyl eugenol is a crucial component of steam inhalation capsules. When steam is inhaled, these substances are released as vapours, offering various respiratory advantages.



**Figure 01: Image of Tulsi.**

### **Taxonomy classification**

- **Biological Source:** Leaves of the plant
- **Family:** Lamiaceae
- **Kingdom:** Plantae
- **Subkingdom:** Tracheobionta (Vascular plants)
- **Subdivision:** Spermatophytina (Seed plants)
- **Division:** Magnoliophyta (Angiosperms)
- **Class:** Magnoliopsida (Dicotyledons)
- **Subclass:** Asteridae
- **Order:** Lamiales
- **Genus:** *Ocimum*
- **Species:** *Ocimum sanctum*.

### **Properties**

**Decongestant Properties:** By lowering inflammation and encouraging mucus evacuation, tulsi helps relieve congestion in the sinuses and nose. **Antimicrobial Effects:** It helps fight against respiratory infections like the flu and the common cold by destroying bacteria, viruses, and fungi. **Calming Action:** Tulsi's fragrant components soothe sensitive respiratory passages, reducing coughing and irritation of the throat. **Immunity Boost:** The immunomodulatory properties of tulsi strengthen the body's defences against respiratory infections.

### **Eucalyptus**

The Myrtaceae family of flowering trees and shrubs includes the genus *Eucalyptus*, which contains more than 700 species. Due to its many uses, this native Australian plant is now grown all over the world. The leaves of

eucalyptus trees, which are evergreen, yield eucalyptus oil, which has therapeutic qualities. Cineole (eucalyptol) is the main fragrant component found in abundance in the leaves.



Figure 02: Image of Eucalyptus.

#### Taxonomy classification

- **Biological source:** leaves of the plant
- **Kingdom:** Plantae
- **Clade:** Angiosperms
- **Clade:** Eudicots
- **Clade:** Rosids
- **Order:** Myrtales
- **Family:** Myrtaceae
- **Genus:** *Eucalyptus*
- **Species:** *Eucalyptus globulus* (blue gum)

#### Properties

1. The main component, eucalyptol (cineole), helps clear nasal congestion by reducing mucus in the airways.
2. Antiseptic and Antimicrobial Properties: It can help fight bacteria, viruses, and fungi in the respiratory tract.
3. Relief from Cough and Cold Symptoms: Eucalyptus oil soothes the throat and reduces irritation, providing relief from cough.
4. Bronchodilation: It may aid in opening up airways, helping people with conditions like asthma or bronchitis breathe more easily.
5. Aromatherapy Benefits: The oil's aroma can calm the mind, promoting relaxation and better sleep during illnesses.

#### Peppermint oil

Because of its many medicinal benefits, peppermint oil—which is made from the leaves of the peppermint plant (*Mentha piperita*)—is frequently used in herbal treatments. Peppermint oil is a crucial component of steam inhalation capsules since it helps to improve breathing and relieve respiratory irritation.



Figure 03: Image of Peppermint oil.

#### Taxonomy classification

- **Biological Source:** Leaves of the plant
- **Family:** Lamiaceae
- **Kingdom:** Plantae
- **Subkingdom:** Tracheobionta (Vascular plants)
- **Subdivision:** Spermatophytina (Seed plants)
- **Division:** Magnoliophyta (Angiosperms)
- **Class:** Magnoliopsida (Dicotyledons)
- **Subclass:** Asteridae
- **Order:** Lamiales
- **Genus:** *Mentha*
- **Species:** Various species such as *Mentha piperita* (peppermint), and *Mentha spicata* (spearmint).

#### Active ingredients found in peppermint oil include

**Menthol:** Well-known for its ability to calm and cool the respiratory system.

**Menthone:** Adds to the fragrant qualities of the oil.

**1,8-Cineole (Eucalyptol):** Offers antibacterial and decongestant properties.

**Peppermint Oil's Therapeutic Applications in Steam Inhalation Capsules.**

Decongestion Breathing becomes easier because of the menthol in peppermint oil, which relaxes the muscles in the nasal passages. Colds, sinusitis, and nasal congestion can all benefit from its ability to soften mucus and encourage its removal.

**Antimicrobial Action:** The antibacterial, antiviral, and antifungal qualities of peppermint oil aid in the fight against respiratory system infections.

**Relieving Irritation:** Menthol's cooling properties relieve dry coughing, scratchy sensations in the respiratory tract, and irritation of the throat.

**Relief from Headaches:** Stress headaches that are frequently linked to sinusitis or colds might be lessened by inhaling the fumes of peppermint oil.

**Energizing and revitalizing:** Peppermint oil's refreshing scent energizes and revitalizes, lessening the weariness that frequently accompanies respiratory ailments.

## DISCUSSION

The review's conclusions demonstrate the important impact that inhaling herbal steam can have in treating the symptoms of the common cold and other respiratory conditions. The active ingredients in tulsi, eucalyptus, and peppermint, such as eugenol, cineole, and menthol, have shown increased effectiveness when added to steam inhalation when compared to simple hot water steam. Strong antibacterial, anti-inflammatory, and decongestant qualities make these substances perfect for easing respiratory pain.

The capacity of steam inhalation to transfer moist heat directly to the respiratory passages is its mode of action. Simulating the fever response improves immune system activation in addition to relieving mucus and clearing nasal obstructions. Furthermore, the targeted heat decreases inflammation and viral pathogenicity, resulting in immediate symptom relief. The quick onset of therapeutic advantages is demonstrated by the improvement seen by the second day of treatment and the complete recovery by the seventh day. A convenient and effective method of delivering these advantages is through the use of steam inhalation capsules, which contain standardized dosages of essential oils. They are especially appropriate for both home and clinical settings due to their safety and convenience of use, especially in settings with limited resources. In addition, compared to pharmaceutical therapies, this therapy's non-invasiveness and minimal risk of adverse effects further improve patient compliance.

The effectiveness of inhaling herbal steam, however, varies depending on several variables, including temperature, duration, and patient response. Additionally, there aren't enough extensive, standardized clinical studies to confirm its long-term advantages and ideal formulations. To fill these gaps, future studies should concentrate on improving capsule formulations and investigating the wider therapeutic uses of herbal steam inhalation in respiratory care.

Herbal steam inhalation is a viable, accessible, and reasonably priced respiratory health intervention that has the potential to enhance patient outcomes and supplement traditional therapies, according to this research.

## CONCLUSION

The application of steam inhalation capsules offers a viable, affordable, and practical solution for reducing cold symptoms. These capsules offer a safe and effective way to administer therapeutic steam because they are made with essential oils including eucalyptus, menthol, and camphor. This technique helps to improve respiratory comfort, lessen throat irritation, and relieve congestion in the nose. The evaluation highlights this method's effectiveness and safety, stressing its non-invasiveness and low side effects in comparison to pharmacological treatments. These capsules can also

improve patient compliance and provide relief during acute respiratory episodes when incorporated into routine healthcare procedures. To determine their wider therapeutic potential, future studies should concentrate on refining formulations, figuring out the exact mechanisms of action, and carrying out extensive clinical trials.

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## REFERENCE

1. Antony, Pinky. A Study To Assess The Effectiveness Of Steam Inhalation With Tulsi Leaf And Turmeric As A Remedy To Relieve Coryza Among Children In Selected Community Areas. MS thesis. Rajiv Gandhi University of Health Sciences (India), 2013.
2. Pitkaranta A, Hayden FG. Rhinoviruses: important respiratory pathogens. *Ann Med*, 1998; 30: 529- 537.
3. Couch RB. The common cold: control? *J Infect Dis*, 1984; 150: 167 - 173.
4. Diehl HS. Medicinal treatment of the common cold. *JAMA*, 1933; 101: 2042 - 2049.
5. Bender BG, Berning S, Dudden R, Milgrom H, Tran ZV. Sedation and performance impairment of diphenhydramine and second-generation antihistamines: a metaanalysis. *J Allergy Clin Immunol*, 2003; 111(4): 770-776.
6. Singh M, Singhi S, Walia BN. Evaluation of steam therapy in acute lower respiratory tract infections: a pilot study. *Indian Paediatr*, 1990; 27: 945-951.
7. Saleem, Anam Mohd, Seema Rani, and Sheny Daniel. "Effectiveness of Tulsi leaves and turmeric in a steam inhalation to relieve symptoms of the common cold." *International Journal of Nursing & Midwifery Research (E-ISSN: 2455-9318)*, 2019; 6.2&3: 45-51.
8. Chowdhury, Md Nafees Rahman, et al. "Theoretical effectiveness of steam inhalation against SARS-CoV-2 infection: updates on clinical trials, mechanism of actions, and traditional approaches." *Heliyon*, 2022; 8.1.
9. Cafasso J. Steam inhalation. 2018. Available from: <https://www.healthline.com/health/steam-inhalation>.
10. Lakshamma VT. Home-based stem inhalation for treating upper respiratory tract infection. *Nightingale nursing times*, 2009; 9-11.
11. Priyanka, Rawat HCL, Gupta H. Effectiveness of steam inhalation with Tulsi leaves and turmeric versus steam inhalation with plain water to relieve respiratory symptoms of nasal congestion among children. *Baba Faridkot University Nursing Journal*, 2015; 9(2): 6-10. Available from: <http://www.indianjournals.com>

- /ijor.aspx?target=ijor:bfunj&volume=9&issue=2&article=002 [Google Scholar].
12. Johnston SL, Pattemore PK, Sanderson G, et al. Community study of the role of viral infections in exacerbations of asthma in 9 – 11-year-old children. *BMJ*, 1995; 310(6989): 1225–9.
  13. Seemungal T, Harper-Owen R, Bhowmik A, et al. Respiratory viruses, symptoms, and inflammatory markers in acute exacerbations and stable chronic obstructive pulmonary disease. *Am J Respir Crit Care Med*, 2001; 164(9): 1618–23.
  14. Yeager CL, Ashmun RA, Williams RK, et al. Human aminopeptidase N is a receptor for human coronavirus 229E. *Nature*, 1992; 357(6377): 420–2.
  15. Waki N, Yajima N, Sukanuma H, et al. Oral administration of *Lactobacillus brevis* KB290 to mice alleviates clinical symptoms following influenza virus infection. *Lett Appl Microbiol*, 2014; 58: 87-93.
  16. Khare D, Godbole NM, Pawar SD, et al. Calcitriol [1,25[OH]<sub>2</sub> D<sub>3</sub>] pre- and post-treatment suppresses inflammatory response to influenza A (H1N1) infection in human lung A549 epithelial cells. *Eur J Nutr*, 2013; 52: 1405-1415.
  17. Rees JR, Hendricks K, Barry EL, et al. Vitamin D3 supplementation and upper respiratory tract infections in a randomized, controlled trial. *Clin Infect Dis*, 2013; 57: 1384-1392.
  18. Mammari, Nour, et al. "Natural products for the prevention and treatment of common cold and viral respiratory infections." *Pharmaceuticals*, 2023; 16.5: 662.
  19. Arroll, B.; Kenealy, T. Antibiotics for the Common Cold. *Cochrane Database Syst. Rev*, 2002; 3: CD000247. [Google Scholar] [CrossRef]
  20. *Common Colds: Overview*; Institute for Quality and Efficiency in Health Care (IQWiG): Köln, Germany, 2020.
  21. Fokkens, W.J.; Lund, V.J.; Hopkins, C.; Hellings, P.W.; Kern, R.; Reitsma, S.; Toppila-Salmi, S.; Bernal-Sprekelsen, M.; Mullol, J.; Alobid, I.; et al. European Position Paper on Rhinosinusitis and Nasal Polyps 2020. *Rhinology*, 2020; 58: 1–464. [Google Scholar] [CrossRef] [PubMed]
  22. Jaume, F.; Valls-Mateus, M.; Mullol, J. Common Cold and Acute Rhinosinusitis: Up-to-Date Management in 2020. *Curr. Allergy Asthma Rep*, 2020; 20: 28. [Google Scholar] [CrossRef]
  23. Nakano, Y.; Watari, T.; Adachi, K.; Watanabe, K.; Otsuki, K.; Amano, Y.; Takaki, Y.; Onigata, K. Survey of Potentially Inappropriate Prescriptions for Common Cold Symptoms in Japan: A Cross-Sectional Study. *PLoS ONE*, 2022; 17: e0265874. [Google Scholar] [CrossRef] [PubMed].
  24. Singh DK, Hajra PK. Floristic diversity. In *Changing Perspective of Biodiversity Status in the Himalaya*, Gujral GS, Sharma V, Eds. British Council Division, British High Commission Publication, Wildlife Youth Services: New Delhi, India, 1996; 23–38.
  25. Samant SS, Dhar U, Palni LMS. Medicinal Plants of Indian Himalaya: Diversity Distribution Potential Values; G.B. Pant Institute of Himalayan Environment and Development: Almora, India, 1998.
  26. Chandorkar, N.; Tambe, S.; Amin, P.; Madankar, C. A systematic and comprehensive review of current understanding of the pharmacological actions, molecular mechanisms, and clinical implications of the genus *Eucalyptus*. *Phyto. Plus*, 2021; 1: 100089. [CrossRef]
  27. Valenzuela, C.E.; Ballesta, P.; Ahmar, S.; Fiaz, S.; Heidari, P.; Maldonado, C.; Mora-Poblete, F. Haplotype- and SNP-Based GWAS for Growth and Wood Quality Traits in *Eucalyptus cladocalyx* Trees under Arid Conditions. *Plants*, 2021; 10: 148. [CrossRef].
  28. Hussain, A.I., Anwar, F., Nigam, P.S., Ashraf, M. and Gilani, A.H. 2010. Seasonal variation in content, chemical composition and antimicrobial and cytotoxic activities of essential oils from four *Mentha* species. *Journal of the Science of Food and Agriculture*, 90: 1827-1836.
  29. Kerman, E. and Kucera, L. 1967. Antiviral substances in plants of the mint family. Peppermint and other mint plants. *Proceedings of the Society for Experimental Biology and Medicine*, 124: 874-875.