



THERAPEUTIC ROLE OF SPICES IN RESPIRATORY DISEASES (PRANAHA SROTAS VYADHI) - A REVIEW FROM AYURVEDIC CLASSICS

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ABSTRACT

Respiratory diseases have been a major health concern for human beings for several decades^[1]. Soothing the irritated nasal passage and airways had been a mutual necessity in multiple ancient cultures. In India, spices have largely been used to help deal with cough & reduce mucous, with maintaining respiratory health. In Human society, freshly prepared decoction including air-dried powder and boiled soup have had a long history of becoming nutrient with local cuisine. Basil, cinnamon, Black pepper & Dry zinger powder together are termed Ayush kwatha, which has been widely used for the prevention of COVID-19^[2]. The word spice comes from the same root species, meaning a class of things having some common characteristics. Spices are derived taxonomically from different plant species. *Pathya* is a unique contribution of Ayurveda, which plays an important role in the prevention and management of many diseases. In classics many *Vargas* are described like *Shukadhanya varga*, *Simbidhanya varga*, *saka varga*, *krtanna varga* etc. Among those, one is *Ahara-Upayogi Varga*. Under this different type spices with their properties & different disease conditions described. It can be prescribed as *Pathya* & Medicine in clinical practice. The present review is compiled from 11 different Ayurvedic classical texts. Critical analysis of the compiled data reveals that out of 10 spices described under *Ahara-upayogi varga*, 9 are indicated in respiratory diseases like *swasa* (Dyspnoea/Asthma), *Kasa* (Cough), *Peenasa* (Chronic rhinitis) and *Hikka* (Hiccup). Among them, the botanical identity of 9 classical spices has been established. Some of these spices have been reported for their pharmacological activities related to the prevention & management of disease related to

Pranavaha srotas. These spices are reported for their Anti-Inflammatory, Antioxidant, Anti-allergic activities^[3]. The observed result may be helpful in the use of spices as *Pathya & Medicine*^[4]. Further specific studies about the efficacy of these spices on prevention as well as management of respiratory diseases can be planned.

Keywords: *Patha* (Wholesome diet), *Pranavaha srotas vyadhi* (respiratory diseases), *Ahara upayogi Varga*, Spices

INTRODUCTION

According to Ayurveda, proper Nutrition/ diet is the basis of good health and also act as a causative factor for diseases as well as prevention and promotion of health^[5]. It is also said that in both the conditions viz. health & diseases. Diet is a prime factor to be thought about, as it is told that without a proper diet, the use of any drug is futile^[6]. In modern science respiratory disease can be correlated with *Pranavaha srotas vyadhi* in ayurveda due to similarly in its function^[7]. General causes of vitiation of *pranavaha srotas* include suppression of natural urges; lifestyle & dietary patterns; seasonal & environmental factors. They produce different diseases like *Swasa* (Dyspnoea/Asthma), *Kasa* (cough), *Hikka* (hiccup) etc.^[8]. Diet recognized by modifiable contributors to chronic disease development & progression. Considerable evidence has emerged indicating the importance of dietary intake in obstructive lungs diseases such as Asthma & Chronic obstructive pulmonary disease (COPD) in both early life & disease development^[9, 10] & management of disease progression^[11, 12].

Respiratory diseases are characterized by airway & systemic inflammation, airflow obstruction, deficits in lungs function & significant morbidity & mortality as well as being costly economic burdens^[13, 14]. Pharmacological management remains the mainstay for the treatment of respiratory diseases and while treatment options are advancing, dietary intake modification could be important to disease management and important consideration for disease prevention. In the current situation Ministry of Ayush, India has

released an advisory on Ayurveda's immunity promoting methods for self-care during the COVID pandemic, which include the use of spices such as cumin, coriander, cinnamon, zinger that are recommended in cooking^[15]. Ayurveda describes a way to prevent and manage diseases through proper dietary management, explained different spices under "*Ahara-Upayogi varga*" and their properties and indications have been explained. In the present review, various classical spices mentioned as diet & medicine in the disease of *Pranavaha srotas* were reviewed along with their reported activities in different respiratory diseases. They will provide a scientific rationale for using classical spices as *Pathya* in clinical practice.

MATERIALS AND METHODS

Spices described in *Ahara-Upayogi varga* are assorted as fruits, seeds. Rhizome, stem bark and resin indicated in combating the diseases of *Pranavaha srotas* (Respiratory system) were compiled from *Charak Samhita*^[16], *Sushruta Samhita*^[17], *Astanga Sangraha*^[18], *Astanga Hrdaya*^[19] and 7 different *Nighantus* i.e. *Dhanwantari Nighantu*^[20], *Sodhala Nighantu*^[21], *Madhava Dravya guna*^[22], *Madanpala Nighantu*^[23], *Kayadeva Nighantu*^[24], *Bhavaprakash Nighantu*^[25] and *Raja Nighantu*^[26]. Various research journals & books were referred to collect published scientific research data on the role of these spices in the prevention & management of respiratory disorders. The collected data are mentioned scientifically with regards to their part used, botanical identity and reported activities in respiratory disorders.

Table 1: spices are described in the classical text of Ayurveda.

Classics Name	Varga	Spices
Charak Samhita Sutrasthana-27	Ahara-Upayogi Varga	Sunthi, pippali, Maricha, Hingu, Karavi, Kunchika, Ajaji, Yavani, Dhanyaka.
Sushruta Sutrasthana-46	Saka Varga	Sunthi, pippali, Maricha, Hingu, Jeera, Dhanyaka, Raee, Sarsapa.
Astanga samgraha sutrasthna-12		Sunthi, pippali, Maricha, Karavi, Kunchika, Dhanyaka, Ajaji, Karavi, Patra, yavani, Hingu, Sarsapa, Raee.
Asthanga Hrudaya Sutrasthana-6	Oushadha Varga	Sunthi, pippali, Maricha, Hingu, Twak, Patra, Ela.
Dhanvantri Nighantu-chapt.2	Satapuspadi Varga	Sunthi, pippali, Maricha, Hingu, Yavani, Ajmoda, Twak, Ela, Upakunchika, Dhanyaka, Jeeraka, sarsapa.
Sodhala Nighantu-chapt.2	Satapuspadi var-ga	Sunthi, pippali, Maricha, Hingu, Methika, Twak, Ela, Upakunchika, Ajaji (Sukla), Jeeraka, Dhanyaka, Yavani, Ajmoda, Karavi.
Madhava Dravya Guna-chapt. 23	Shrestha varga	Pippali, Nagara.
Madanapala Nighantu-capt.2	Sunthyadi varga	Sunthi, pippali, Maricha, Methika, Misherya, Jeeraka, Yavani, Ajmoda.
Kayadeva Nighantu-chapt.1	Oushadha varga	Sunthi, pippali, Maricha, Jeeraka, Dhanyaka, Misherya, Ajmoda, Hingu, Yavani, Twak, Patra, Ela, Lavanga, Sarsapa.
Bhavaprakash Nighantu-chapt.2	Haritakyadi var-ga	Sunthi, pippali, Maricha, Yavani, Ajmoda, Jeeraka(sukla&krushna), Rajjika, Dhanyaka, Methi, Hingu.
Raja Nighantu-capt.6	Pippalyadi varga	Sunthi, pippali, Maricha, Dhanyaka, Yavani, Jiraka, Methika, Ela, Ajmoda, Twak.

RESULTS AND DISCUSSION

All *Samhita* and *Nighantus* have described spices in different chapters/*Vargas*. It is observed that 10 classical spices are described under *Ahara-Upayogi var-ga*. 9

are indicated in disorders related to the respiratory system. Different parts of the plants like a rhizome, fruits, seeds, stem bark & resin are used as spices in diseases related to *Pranavaha srotas* (Respiratory system). Maximum spices are indicated in *Kasa* (10) followed by *swasa* (6) & *Peenasa* (3). (Table 2)

Table 2: Classical Spices used in common respiratory diseases as mentioned in the classical text of Ayurveda.

Indication	Phala (Fruits)	Kanda (Tu-ber/Rhizome)	Resin	Twak Avarana (Stembark)	Bija (Seeds)
Swasa (Dyspnoea/Asthma)	Pippali (Long pepper) Maricha (black pepper)	Sunthi (dry ginger powder)	Hingu	Twak (Dalchini)	Ajaji (cumini)
Hikka (Hiccup)	Pippali (Long pepper)				
Kasa (Cough)	Pippali (Long pepper) Maricha (black pepper)	Sunthi (dry ginger powder)	Hingu	Twak (Dalchini)	Dhan-yaka (coriander) Ela (elachi) Ajaji (cumin) Yavani (carom) Karavi (black cum-

					in)
Peenasa (Chronic Rhinitis)	Pippali (Long pepper) Maricha (Black pepper)	Sunthi (dry ginger powder)			

These 9 spices are indicated as diet & medicine for different respiratory tract diseases. Majority of spices are having *katu rasa, snigdha-laghu guna & ushna virya*. According to Charak samhita the drugs which

are useful in diseases of *Pranavaha srotas* should possess *ushna, vatanuloman & kaphavatahara* properties [27].

Table 3: Botanical name and properties of classical Spices used in respiratory diseases.

Spices	Botanical name/ Family	Rasa (Taste)	Guna (Quality)	Virya (Potency)	Vipaka
1. Sunthi (Dry ginger powder)	Zingiber Officinale Stamineal	Katu	Snigdha	Ushna	Madhura
2. Pippali (Long peeper)	Piper Longum Linn. Piperaceae	Katu	Snigdha	Ushna	Madhura
1. Maricha (Black pepper)	Piper nigrum Linn. Piperaceae	Kau	Laghu	Ushna	Katu
2. Hingu	Ferula Asafoetida umbelliferae	Katu	Laghu, Snigdha, Tikshna	Ushna	Katu
3. Ajaji (Cumin seeds)	Cuminum Cyminum Linn. Umbelliferae	Katu	Tikshna Ruksha Laghu	Ushna	Katu
4. Twak (Dalchini)	Cinnamomum Zeylanica Lauraceae	Katu Tikta Madhura	Laghu Ruksha Tikshana	Ushna	Katu
5. Dhanyaka (Coriander)	Coriandrum Sativum	Katu Tikta	Snigdha	Ushna	Madhura
6. Yavani (Carom seeds)	Trachyspermum ammi Umbelliferae	Katu Tikta	Laghu Tikshna Ruksha	Ushna	Katu
7. Ela (Elachi)	Elettaria Cardamomum Scitamineae	Katu Madhura	Laghu Ruksha	Sita	Katu

On critical analysis, it is observed that some of these spices have been well studied and proved to be having multi-Pharmacological action related to the prevention of disease related to the respiratory tract.

Maximum number of spices are reported for their Anti-Inflammatory (7) followed by Antioxidant (7), Anti-allergic (2), Bronchodilator (2) and Expectorant (1) activities. (Table 4)

Table 4: Classical spices reported for different pharmacological activities related to prevention of respiratory disease.

Activity	Spices	Total
Anti-Inflammatory	<i>Hingu</i> , <i>Ajaji</i> (Cumin seeds), <i>Sunthi</i> (Dry ginger powder), <i>Pippali</i> (Long pepper), <i>Maricha</i> (Black pepper), <i>Twak</i> (Dalchini), <i>Ela</i> (Elachi)	7
Antioxidant	<i>Hingu</i> , <i>Ajaji</i> (Cumini seeds), <i>Sunthi</i> (dry ginger powder), <i>Pippali</i> (Long pepper), <i>Maricha</i> (Black pepper), <i>Twak</i> (Dalchini), <i>Ela</i> (Elachi)	7
Anti-allergic	<i>Maricha</i> (Black peeper), <i>Twak</i> (Dalchini).	2
Bronchodilator	<i>Ajaji</i> (cumin seeds), <i>Ela</i> (Elachi).	2
Expectorant	<i>Sunthi</i> (Dry ginger powder)	1

Table 5: Anti-inflammatory activities of classical spices indicated in respiratory diseases.

Spices	Results
<i>Hingu</i>	Results indicate that the asafetida could be a potential source of anti-inflammatory and analgesic agents. These effects may be due to its effective constituents such as monoterpenes, flavonoids and phenolic components that have antioxidant properties and inhibit lipoxygenase activity [28].
<i>Ajaji</i> (Cumin seeds)	According to the literature, treatments supplemented with <i>C. cuminum</i> have a profound effect on several inflammatory biomarkers, such as adiponectin, high sensitivity C-reactive protein (hsCRP), and TNF α [29,30] Srinivasan (2018) [31] has also reported a detailed anti-inflammatory activity of <i>C. cuminum</i> .
<i>Sunthi</i> (Dry ginger powder)	The ginger extract significantly reduced the elevated expression of NF κ B and TNF- α in rats with liver cancer [32].
<i>Pippali</i> (Long pepper)	According to Stohr Piper extracts and piperine possess inhibitory activities on prostaglandin and leukotrienes COX-1 inhibitory effect and thus exhibit anti-inflammatory activity [33].
<i>Maricha</i> (Black pepper)	Piperine at doses of 10 and 15 mg/kg started producing an anti-inflammatory effect after 30 min, which lasted till 60 min, whereas hexane and ethanol extracts also produced a similar activity at a slightly low dose (10 mg/kg) but lasted for 120 min. [34].
<i>Twak</i> (Dalchini)	2-hydroxycinnamaldehyde isolated from <i>C. cassia</i> bark exhibited an inhibitory effect on the production of nitric oxide by inhibiting the activation of the nuclear factor kappa-light-chain-enhancer of activated B cells (NF- κ B), indicates that this substance can potentially be used as an anti-inflammatory agent [35].
<i>Ela</i> (Elachi)	The aqueous extracts of cardamom showed elevated expression of interleukins, suggesting their possible anti-inflammatory or immune-modulatory Action [36].

Table 6: Antioxidant's activity of classical spices indicated in respiratory diseases.

Spices	Results
<i>Hindu</i>	The antioxidant activity of the aerial parts of <i>Ferula asafetida</i> was determined by employing various in vitro assay systems. IC50 for DPPH radical-scavenging activity was 380 \pm 12 mg ml-1. The peroxidation inhibition (antioxidant activity) of the extracts exhibited values from 82% (at 24 hrs) and 88% (at 72 hrs) [37].
<i>Ajaji</i> (Cumini seeds)	Dietary <i>N. sativa</i> seeds inhibited the oxidative stress caused by oxidized corn oil in rats (Al-Othman et al., 2006) Have reported that cumin extract contains 23.02 \pm 0.045 mg GAE/g extract and 19 \pm 0.132 mg QE/g extract for total phenolic and total flavonoids, respectively [38].
<i>Sunthi</i> (Dry ginger powder)	The antioxidant activity of <i>Zinger officinale</i> Was evaluated in an in-vitro study by 2, 2'-Diphenyl-1-picrylhydrazyl (DPPH) Radical Scavenging Method which suggested that ginger is associated with antioxidant properties [39].
<i>Pippali</i> (Long)	<i>P. longum</i> exhibits promising antioxidant potential against free radical-induced oxidative damage. Petro-

pepper)	leum ether extract of the root and piperine from roots of <i>P. longum</i> Linn. decrease lipid peroxide levels and maintain Glutathione content, demonstrating antioxidant activity [40].
<i>Maricha</i> (Black pepper)	The ethanol extracts of the plants <i>P. nigrum</i> fruits possess good antioxidant activity that might help prevent or slow the progress of various oxidative stress-related diseases [41].
<i>Twak</i> (Dalchini)	The aqueous and alcoholic extract (1: 1) of cinnamon potentially significantly inhibits fatty acid oxidation and lipid peroxidation in vitro [42]. Different flavonoids isolated from cinnamon have free-radical-scavenging activities and antioxidant properties [43].
<i>Ela</i> (Elachi)	The aqueous extracts of cardamom showed elevated expression of interleukins, suggesting their possible anti-inflammatory or immune-modulatory action [44].

Table 7: Anti-allergic activities of classical spices indicated in respiratory diseases.

Spices	Results
<i>Maricha</i> (Black pepper)	Piper Nigrum fruit extract has a positive effect on regulating the allergic responses by suppressing the inflammatory cells' accumulation, ameliorating nasal histopathology, and inhibiting the NFκBp65 and STAT3 signalling activation as well as inflammatory-related cytokines [45].
<i>Twak</i> (Dalchini)	Cinnamaldehyde (CA) modifies the activity of mast cells by suppressing the release of mediators associated with allergic inflammation via HDC (histidine decarboxylase) inhibition, our results suggest that it could be a potent nutraceutical that can be utilized as a safe anti-allergic agent. [46]

Table 8: Bronchodilator's activity of classical spices indicated in respiratory diseases.

Spices	Results
<i>Ajaji</i> (Cumin seeds)	The relaxant effects of the macerated and aqueous extracts of <i>Cuminum cyminum</i> (0.25, 0.5, 0.75 and 1.0 g%) was investigated on the tracheal chains of guinea pig in comparison with saline and theophylline (0.25, 0.5, 0.75, and 1.0 mM) In Group 1 experiments (contracted by KCl) only the last two concentrations of theophylline and the highest concentration of macerated extract showed significant relaxant effect compared to that of saline ($p < 0.001$ and $p < 0.05$ for theophylline and macerated extract respectively). The effects of the last two concentrations of theophylline in this group were significantly greater than those of the macerated and aqueous extracts ($p < 0.001$). However, in Group 2 experiments (contracted by methacholine) both the extracts and theophylline showed a concentration-dependent relaxant effect compared to that of saline ($p < 0.05$ to $p < 0.001$). The effects of the two last concentrations of both extracts were significantly lower than those of theophylline in Group 2 experiments ($p < 0.05$ to $p < 0.001$). In Group 3 (non-incubated, contracted by methacholine) the extracts of <i>Cuminum cyminum</i> did not show any relaxant effect of tracheal chains. The relaxant effects of macerated and aqueous extracts in Groups 1 and 3 were significantly lower than those of Group 2 ($p < 0.05$ to $p < 0.001$) [47].
<i>Ela</i> (Elachi)	Crude extract of cardamom was found to contain alkaloids, flavonoids, saponins, sterols and tannins. The flavonoids are well known for their bronchodilator activity. The presence of Such class of compounds in cardamom is likely to contribute to its airway relaxing action [48]. Crude extract of cardamom caused relaxation of both carbachol (1 μM) and high K ⁺ (80 mM)-induced contractions, like that caused by verapamil, suggesting its Ca ⁺⁺ channel blockade action. These results indicate that cardamom exhibits the Bronchodilator effect, mediated through the Ca ⁺⁺ antagonist mechanism [49].

Expectorants

Expectorants are drugs believed to increase bronchial secretions or reduce their viscosity, facilitating its removal by coughing [50]. The water-extracted poly-

saccharides of ginger could decrease the time of coughing, which was induced through citric acid in guinea pigs [51].

CONCLUSION

In the present review observation results in the use of different spices in prevention as well as management of diseases of the respiratory system. These spices are mentioned in classical texts of Ayurveda and have the potential to prevent or reduce the risk of developing certain respiratory diseases. Based on many experimental studies & clinical studies it can be suggested that intake of these spices as dietary & medicine might help to prevent many respiratory diseases through different mechanisms. The observed results also give an insight in planning further scientific studies about the efficacy of spices in respiratory diseases.

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