



Review Article

CRITICAL REVIEW OF HERBS ACTING ON PRANAVAHA SROTOVIKAR

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ABSTRACT

The human body contains several channels through which the *Doshas*, *Dhatus* and *Malas* travel which are called as *Srotamsi*. There are thirteen *Abhyantra srotamsi*, each of which relates to specific organs, and are increased and vitiated by specific factors. Among thirteen *Abhyantra srotas* *Pranavaha* is one. Its main function is to provide the medium, through which Prana flows, which is governed by *Vata*. General causes of vitiation of *Pranavaha Srotas* include suppression of natural urges; seasonal, environmental, lifestyle and dietary patterns that are *Ruksha*, *Sita* in nature; exertion and exercise while hungry etc. they produce different symptoms like *Kasa*, *Svasa*, *Hikka* etc. Though *Brihatrayeekaras* have mentioned wide range of herbs for treatment of *Pranavaha Sroto Vikaras*, *Charaka* has mentioned around 30 drugs in 3 categories related to *Pranavaha srotas* i.e. *Kasahara*, *Svasahara* and *Hikkahara Dasaimanis* while *Susrutha* and *Vagbhata* has mentioned *Svasa* and *Kasahara dravyas* in *Ganas* like *Surasadi* and *Vidarigandhadi ganas*. Apart from these a lot of drugs are mentioned in their respective treatments. Among these the drugs like *Sati*, *Puskaramoola*, *Abhaya*, *Trikatu*, *Brihati*, *Kantakari*, *Tamalaki*, *Tulasi* are very frequently mentioned for the treatment of different *Pranavaha Sroto vikaras*. In the present paper research activities carried out around the world on different herbs used in the *Pranavaha sroto vikaras* are reviewed which will provide a scientific rationale of using them in Ayurveda.

KEY WORDS: *Pranavaha srotas*, *Svasa*, *Kasa*, *Kantakari*, *Brihati*, *Haritaki*, *Ela*.

INTRODUCTION

Srotamsi: The Channels of the Body

The body contains several channels through which the *Doshas*, *Dhatus* and *Malas* travel called *Srotamsi*^[1] i.e. *Srotas* are channels or pores, present throughout the visible body as well as at the "invisible" or subtle level of the cells. It is through these channels that nutrients and other substances are transported throughout the body thereby nourishing the body^[2]. When the supply of appropriate nutrients through these channels is unobstructed, health is maintained; when there is excess, deficiency, or blockage in these channels result in the origin of different diseases.

A *Srotas* is either *Bahya* (external channel) or *Abhyantra* (internal channel). The *Bahya srotamsi* include the two nostrils, the two ears, the two eyes, the mouth, the urethra and the rectum. Females have two additional *Bahya srotamsi*: the

two lactiferous glands of the breasts (*Stanyavaha srotamsi*), and the cervix (*Artavaha srota*)^[3].

There are thirteen *Abhyantra srotamsi*, each of which relates to specific organs, and are increased and vitiated by specific factors. Of these *Pranavaha* is one of the important *Srotas*^[4].

Pranavaha Shrotas

Hridaya and *Maha srotas* are considered as *Mulastana* for *Pranavaha srotas*. Here the term *Hridaya* includes chest or whole cardiac region which also plays a major role in normal flow of *Prana vayu*. *Pranavaha Srotas* is correlated to respiratory system due to similarity in its function^[5].

General causes of vitiation of *Pranavaha srotas* include suppression of natural urges like thirst, hunger and other urges; seasonal, environmental, lifestyle and dietary patterns that

are *Ruksha*, *Sita* in nature; exertion and exercise while hungry etc^[6], they produce different symptoms like *Kasa*, *Svasa*, *Hikka* etc.

Brihatrayeekaras have mentioned wide range of herbs for treatment of *Pranavaha sroto vikaras*. *Charaka* has mentioned around 30 drugs in 3 categories related to *Pranavaha srotas* i.e. *Kasahara*, *Svasahara* and *Hikkahara Dasaimanis* while *Susrutha* and *Vagbhata* has mentioned *Svasa* and *Kasahara dravyas* in *Ganas* like *Surasadi* and *Vidarigandhadi ganas*. Apart from these a lot of drugs are mentioned in their respective treatments in *Chikitsastana*. Among these the drugs like *Sati*, *Puskaramoola*, *Abhaya*, *Trikatu*, *Brihati*, *Kantakari*, *Tulasi*, *Ela* etc are very frequently mentioned for the treatment of different *Pranavaha sroto vikaras* like *Swasa* and *kasa chikitsa*.

In the present paper the research on few plants which are mentioned by *Charaka* in *Shadvirechana satariyashaya* for the treatment of *Pranavaha sroto vikaras* like *hikka*, *swasa* and *kasa* have been reviewed.

1. KANTAKARI (*Solanum Xanthocarpum* Schrad & Wendl):

It has *Katu*, *Tikta rasa*, *Laghu*, *Ruksha*, *Sara gunas*, *Usna virya*, *Katu vipaka*. It has *Kapha Vatashamaka* properties (Fig. 1). This was considered as best in the treatment of *Kasa* and *Svasa vikaras* by Ayurvedic Acharyas^[7]. It was mentioned under *hikka nigravana* and *kasahara mahakashayas* by *Charaka*.

Anti asthmatic property: Glycoalkaloid and fatty acid fractions of the *Solanum xanthocarpum* extract cause liberation of histamine from chopped lung tissue. The effect of the drug on bronchial asthma may be attributed to the depletion of histamine from bronchial and lung-tissue. The expectorant action is due to inorganic nitrate content^[8].

Another study was conducted to investigate the clinical efficacy and safety of a single dose of the *Solanum xanthocarpum* and *Solanum trilobatum* in mild to moderate bronchial asthma, treatment with either *S. xanthocarpum* or *S. trilobatum* significantly improved the various parameters of pulmonary function in asthmatic subjects. The effect was less when compared to that of deriphylline or salbutamol.^[9]

Mast cell stabilization activity: *Kantakari* showed that ethanol extract of *Solanum xanthocarpum* (SX) shown a significant antihistaminic activity in histamine induced contraction in goat tracheal chain preparation. The significant inhibition of histamine induced contractions produced by ethanol extract of SX flower on isolated goat tracheal chain preparation indicates that the SX flower has antihistaminic (H1-receptor antagonist) action. While screening all three extracts of flowers of SX, results were indicative that only ethanolic extract of SX at a dose of 50 and 100 mg / kg reduced milk induced eosinophilia of statistical significance. SX at a dose of (50-100 mg/kg, i.p) showed significant mast cell stabilization as compared to standard drug Disodium chromoglycate (DSCG). It was suggested that relief from the symptoms of bronchial asthma produced by SX may be due to: (a) a bronchodilator effect, (b) reduction in the bronchial mucosal edema, and/or (c) reduction in the secretions within the airway lumen^[10].

Clinical study: In clinical trial of Bronchial asthma on 44 patients, decoction of *Kantakari* in doses of 60-200ml daily with honey was given for a period of 15-20 days on an average. Out of 21 cases of *Sleshma pradhana Tamaka svasa*, 70-75% shown complete or significant response and out of 23 cases of *Vata pradhana Tamaksvasa* 30% showed complete response and in more than 50% cases significant reduction in intensity of dyspnoea and cough was observed^[11].

Antiallergy Activity: Apigenin is present in *Solanum xanthocarpum* shown anti-allergic effect on ovalbumin (OVA)-induced asthma model mice. OVA-induced mice showed allergic airway reactions and included an increase in number of eosinophils in bronchoalveolar lavage (BALI fluid, an increase in inflammatory cell infiltration into lung around blood vessels and airways, airway luminal narrowing, and development of airway hyper-responsiveness (ABB). Administration of apigenin before last airway OVA resulted in a significant inhibition of all asthmatic reactions^[12].

2. BRIHATI (*Solanum Anguivi* Lam):

It has *Katu*, *Tikta rasa*, *Laghu*, *Ruksha*, *Tikshna gunas*, *Usna virya*, *Katu Vipaka* (Fig. 2). It has *Kapha Vatashamaka*, *Pittavardhaka* properties^[13]. It was mentioned under *Hikka nigravana Mahakashaya* by *Charaka*.

Various preparations of whole plant of *Brihati* and *Kantakari* have been used in *Shvasa* and *Kasa* in ancient *Ayurvedic* literature. In the study, water decoction of *Brihati* and *Kantakari* were prepared to evaluate their efficacy in the patients of *Shvasa* (Bronchial asthma) and *Kasa* (cough). Results suggest that the effect of *Kantakari* decoction was better than *Brihati* decoction to reduce different clinical symptoms of asthmatic attacks like dyspnoea and cough. (Gupta et.al; 1999)^[14]

Herbal cough syrup containing eleven herbal ingredients including *Solanum indicum*, *Ocimum sanctum*, *Curcuma longa*, *Adhatoda vasica*, *Piper cubeba*, *Aloe barbadensis*, etc., showed efficacy in thinning of bronchial secretion in cases of acute bacterial trachibronchitis. (Jayaram et al; 1994)^[15]

3. PUSKARAMOOLA (*Inula Racemosa* Hook. f.)

It has *Katu*, *Tikta rasa*, *Laghu guna*, *usna virya katu Vipaka*. It has *Kaphavatajiti*^[16]. It is said as best drug for curing hiccup, dysphonia, cough and pain in the chest. It was mentioned under *Hikka nigrahana* and *Swasahara mahakashayas* by *Charaka*.

Anti histamine activity: *Puskaramoola*, petroleum ether (60-80%), ethanol (95%), water extract of air dried roots of *Inula racemosa* obtained by successive extraction. Petroleum ether extract (PEEIR) at a dose of 4 mg/ml and 10 mg/ml exert significant antagonistic effect ($p < 0.05$) on histamine induced contraction as compared to its ethanol and water extract.

Anti eosinophilic & Adaptogenic activity: Dose dependent contraction was observed in goat tracheal chain preparation. Significant control of milk-induced eosinophilia in mice was seen at a dose of 50 & 100mg/kg i.p. by petroleum ether extract (44.77 % & 54.36 % respectively) as compared control group (43.1±2.41). Same dose dependent inhibition of milk induced leukocytosis 59.53 % and 77.47% by petroleum ether extract supports the adaptogenic potential of drug.

Mast cell stabilizing activity: Clonidine induces mast cell degranulation in mice and clonidine-induced mast cell degranulation was inhibited by standard mast cell stabilizer disodium cromoglycate as 14±1.22 when compared with control group. Pretreatment with petroleum ether

extract at a dose of 100 mg/kg i.p significantly ($p < 0.05$) offered 74.68% of protection against mast cell degranulation when compared with control group. Altering significantly ($p < 0.05$) the capillary permeability as evident again from the optical density value by treatment group of petroleum ether extract at a highest dose of 100 mg/kg i.p as compared to control group. Results thus obtained substantiate the potential role of herb in immunologically, physiologically and biochemically heterogeneous disorder, asthma and related conditions^[17].

The ethanolic extract of roots of *Inula racemosa linn* on degranulation of rat peritoneal mast cell induced by compound 48/80 and Egg albumin was studied. The inhibitory effect of the extract was shows significant in immunologically induced degranulation of mast cells^[18].

Antiallergic effect: In an investigation alcoholic extract of root of *Inula racemosa*, was studied for its antiallergic effect in experimental models of type I hypersensitivity, viz. egg albumin induced passive cutaneous anaphylaxis (PCA) and mast cell degranulation in albino rats. *Inula racemosa* (i.p. as well as p.o.) showed significant protection against egg albumin induced PCA. Protection against compound 48/80 induced mast cell degranulation by alcoholic extract of *Inula racemosa* (single dose) was similar to that of disodium cromoglycate. The seven days drug treatment schedule showed greater protection than disodium cromoglycate intraperitoneally. The results suggest that *Inula racemosa* possesses potent antiallergic properties in rats^[19].

4. SATI (*Hedychium Spicatum* Buch.- Ham. ex Smith)

It has *Katu*, *Tikta*, *Kashaya rasa*, *Laghu*, *tikshna gunas*, *usna virya katu Vipaka*. It has *Kaphavataghna* properties^[20] (Fig. 3). It was mentioned under *hikka nigrahana* and *Swasahara mahakashayas* by *Charaka*.

Anti asthmatic activity: The powdered rhizome of *H. spicatum*, given 10 g in divided doses to 25 patients with recurrent paroxysmal attacks of dysopnea (bronchial asthma) for 4 weeks, completely relieved dysopnea, cough and restlessness in all the patients. The ronchi completely disappeared in 36 % of the patients. The mean respiration rate was reduced by 25 %

and the vital capacity was increased by 20 %. The mean absolute eosinophil count also declined by 55.6 %.

In another study 16 patients of bronchial asthma were given 1 g of powder thrice daily for 21 days, with plain water. The chief complaints like breathlessness, cough, chest heaviness, loss of appetite, uneasiness during exercise and sleeplessness etc were relieved with varying degree of relief in all the patients. [21]

Pulmonary Eosinophilia: In the clinical study, 15 patients of tropical pulmonary eosinophilia were treated with the powder of *H. spicatum* in the dose of 6 g b.i.d. After 4 weeks of treatment, the eosinophil count was reduced by 60.54 %.

A study conducted on children suffering from tropical pulmonary eosinophilia *H. spicatum* was found to give relief in signs and the symptoms and reduce the blood eosinophil level in dose of 70 mg/kg of body weight. Though most of the symptoms were relieved within one to three weeks period, radiological findings and lymphadenopathy were normalized after a considerably prolonged period. [21]

H. spicatum rhizome has been reported to contain sitosterol and its glucosides, furanoid diterpene-hedychenone and 7-hydroxyhedychenone, and essential oils like cineole, terpinene, limonene, phellandrene, p-cymene, linalool and terpenol as major constituents. β -sitosterol has been reported to exhibit an anti-inflammatory effect by inhibiting nuclear factor-kB phosphorylation and vascular adhesion molecule-1 and intracellular adhesion molecule-1 expression in TNF- α -stimulated human aortic endothelial cells analgesic action in rats and antihistaminic, anti-allergic and mast cell stabilizing properties in mice. Essential oils like cineole and terpinene were found to have analgesic and anti-inflammatory properties in animal models. It is possible that the extracts of *H. spicatum* rhizome might have the above properties by virtue of the presence of the above-mentioned chemical constituents, and they may be responsible for the expression of various pharmacological effects useful in asthma and other respiratory disorders.

Graded doses (100, 200 and 400 mg/kg) of both aqueous and ethanolic extracts of *H.*

spicatum dried rhizome when administered orally, once daily, to GPs for 7 days, indicated dose-dependent protection against histamine-induced bronchospasm in terms of increase in PCD time from 39.2 to 75.1% ($P < 0.05$ to $P < 0.001$) and 25.8 to 65.1% ($P < 0.1$ to $P < 0.001$), respectively, while CPM showed an increase by 71.3% ($P < 0.001$). The result indicated comparable effects of both the extracts with CPM, a known H₁ blocker [22].

5. HARITAKI (*Terminalia Chebula* Retz.)

It has *Madhura, Amla, Katu, Tikta, Kashaya rasas, Laghu, Ruksha gunas, Usna virya, Madhura Vipaka* and *Tridoshashamaka* properties [23] (Fig. 4). It was mentioned under *Hikka nigrhana Mahakashaya*.

Antitussive activity: It was found that the extract of *Terminalia chebula* possesses antitussive activity against sulphur dioxide gas evoked cough in mice. It is supposed that several pharmacological properties (mainly anti-inflammatory, antioxidant, spasmolytic, antibacterial, and antiphlegmatic) may contribute in antitussive efficacy of *Terminalia chebula*. These pharmacological properties of extract of *Terminalia chebula* may validate the popular use of this herb in cough related to numerous respiratory diseases [24].

6. PIPPALI (*Piper Longum* Linn)

It has *Madhura, Katu, Tikta rasas, Laghu, Snigdha gunas, Anusna virya Madhura Vipaka* and *Tridoshahara* properties [25] (Fig. 5). It was mentioned under *Hikka nigrhana* and *Kasahara Mahakashayas* by *Charaka*

Antiasthmatic activity: Different studies have been carried out to validate of Ayurveda for antiasthmatic activity of piper longum. An extract of the fruits in milk reduced passive cutaneous anaphylaxis in rats and protected guinea pigs against antigen-induced bronchospasm [26].

7. TULASI (*Ocimum Sanctum* Linn.)

It has *Katu, Tikta, Kashaya rasa, Laghu, Ruksha, Tikshna gunas, Usna virya, katu Vipaka*. It has *KaphaVatahara, Pittavardhaka* properties [27] (Fig. 6). It was mentioned under *Swasahara mahakashayas* by *Charaka*

Anti asthmatic activity: A 50% hydro alcoholic extract and the volatile oil extracted from fresh leaves were evaluated against histamine and Ach

induced pre-convulsive dyspnoea in pigs. Both the extract and the oil exhibited a significant dose-dependent anti-asthmatic activity, with the percentage protection shown by 200 mg/kg of ethanol extract of fresh leaves equivalent to 0.5 ml of volatile oil. The volatile constituents of the fresh leaves were thought to be the main factor responsible for the activity²⁸.

8. AMALAKI (*Emblica Officinalis* Linn.)

It has *Madhura, Amla, Katu, Tikta, Kashaya rasas, Laghu, Ruksha gunas, Sita virya madhura Vipaka* and *Tridoshashamaka* especially *Pittashamaka* property^[29] (Fig. 7). It was mentioned under *Kasahara Mahakashaya* by *Charaka*

Antibacterial property: In a study, an attempt has been made to study the protective role of *Amla* in vivo in a mouse model of respiratory tract infection (RTI) via intranasal instillation. An attempt was made to assess the antibacterial property of *Amla* against *K. pneumoniae* ATCC 43816 in vitro as well as in vivo using RTI model in mice. Decline in growth was observed when nutrient broth was supplemented with *Amla* powder suspension. The possible reason for this effect can be attributed to the presence of flavonoids in *Amla*. Flavonoids are the phenolic structures and their antimicrobial activity is probably due to their ability to form complex with extracellular and soluble proteins, or with bacterial cell walls which disrupts the microbial membranes.

In this study increase in serum TNF- α level was observed in control animals whereas a decrease was seen in *Amla* fed mice. This indicated that *Amla* feeding protects against *K. pneumoniae* mediated respiratory tract infection by keeping a check on the induction of proinflammatory cytokine like TNF- α ^[30].

Antitussive activity: EO was tested for its antitussive activity in conscious cats by mechanical stimulation of the laryngopharyngeal and tracheobronchial mucous areas of airways. Antitussive activity of EO was more effective than the non-narcotic antitussive agent dropropizine but less effective than shown by the classical narcotic antitussive drug codeine. It is supposed that the dry extract of EO exhibit the antitussive activity not only due to antiphlogistic, antispasmodic and antioxidant efficacy effects,

but also to its effect on mucus secretion in the airways^[31].

9. HINGU (*Ferula assa-foetida* Linn)

It has *Katu rasa, Laghu, Sara, Snigdha, Tikshna guna, Usna virya Katu Vipaka*. It has *KaphaVataprasamana pitta Vardhaka* properties^[32] (Fig. 8). It was mentioned under *Swasahara mahakashaya* by *Charaka*

Muscle relaxant activity: In a study, the relaxant effects of the asafoetida on tracheal smooth muscle of guinea pigs and its possible mechanism(s) was investigated which showed a potent relaxant effect for the asafoetida extract on tracheal smooth muscle which is due to muscarinic receptor blockade and also due to the partial inhibitory property of the herb on the histamine (H1) receptor. Hence the therapeutic effect described for asafoetida on asthma disease may be due to its relaxant effect causing bronchodilation and can be used as a relieving drug for the treatment of asthma^[33].

10. ELA (*Elettaria Cardamomum* (Linn.) Maton)

It has *Madhura, Katu rasas, Laghu guna, Sita virya Madhura Vipaka* and *Tridoshashamaka* property^[34] (Fig. 9). It was mentioned under *Swasahara mahakashaya* by *Charaka*.

Bronchodilatory effect: In view of the well known medicinal use in asthma, the cardamom was tested for its possible bronchodilatory effect in anaesthetized rats, where it inhibited the carbachol-evoked bronchospasm, like that caused by salbutamol, a standard bronchodilator (Barnes, 2006). The cardamom extract was then studied in isolated tracheal tissues, to elucidate the possible mode of bronchodilator action, where crude extract of cardamom caused relaxation of both carbachol and K⁺-induced contractions, like verapamil, a Ca⁺⁺ antagonist (Fleckenstein, 1977) used as positive control. The inhibitory effect of crude extract of cardamom against the two spasmogens, indicates non-specific tracheo-relaxant effect, mediated through Ca⁺⁺channel blocker-like mechanism (Gilani et al., 2010). Ca⁺⁺ antagonists are known to be effective in asthma (Ann Twiss et al., 2002) and the presence of such activity, as observed in this study may explain the medicinal use of cardamom in such disorder of airways hyperactivity.

The results of a phytochemical analysis showed that cardamom contains alkaloids, flavonoids, saponins, sterols and tannins. The flavonoids are well known for their bronchodilatory activity (Ghayur et al., 2007) and the presence of such class of compounds in cardamom is likely to contribute in its airways relaxing action. However, the contribution of other constituents cannot be ignored.

In conclusion, cardamom exhibits bronchodilatory effect, mediated through Ca ++ antagonist mechanism, which provides pharmacological basis for its application in the disorder of hyperactive status of respiratory system, known as asthma^[35].

CONCLUSION

By the above works we can conclude that herbs act in different mechanisms to perform their activity. Some drugs act by bronchodilator activity, some by anti histamine activity, some by antitussive properties some by mast cell stabilizing activity, antibacterial/viral properties etc. The drugs like *Punarnava*, *Gokshura* which are also have been mentioned in the treatment of *Svasa*, *Kasa* etc., though didn't have any direct effect but due to their diuretic effect they reduce the congestion in the lungs which will give the symptomatic relief in congestive conditions in lung tissue.

Thus the above results of these studies confirm the traditional claim for the usefulness of these herbs in *Pranavaha sroto vikaras*.

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PHOTOGRAPHS



Figure no.1 *Kantakari*



Figure no.2 *Brihati*



Figure no. 3 *Sati*



Figure no. 4 *Haritaki*



Figure no. 5 *Pippali*



Figure no. 6 *Tulasi*



Figure no. 7 *Amalaki*



Figure no. 8 *Hingu*



Figure no. 9 *Ela*