

THE ROLE OF EKAL DRAVYA IN THE MANAGEMENT OF RESPIRATORY DISEASES
– A REVIEW¹*Dr. Pooja B. Chikhondhe, Dr. Vipul Kanani² and Dr. Sapna Upadhyay³2nd Year PG Scholar¹, Professor & HOD² and Associate Professor³
^{1,2,3}Rognidan Avum Vikruti Vigyana Department, RTAM, Akola.

*Corresponding Author: Dr. Pooja B. Chikhondhe

2nd Year PG Scholar, Rognidan Avum Vikruti Vigyana Department, RTAM, Akola.

Article Received on 25/03/2024

Article Revised on 15/04/2024

Article Accepted on 05/05/2024

ABSTRACT

Introduction: Now a days Respiratory diseases highly spreading in the society. Respiratory diseases are leading cause of death. About sixty five million people suffer from COPD and three million die from it each year, making it third leading cause of death world wide. In present situation respiratory and cardiac diseases cause death very quickly. Main causes of respiratory diseases are adverse climate conditions and intolerable air pollution, excessive exposure to smoke and other toxic material and presence of fungal, viral and bacterial infection. Diseases like COPD, Bronchial asthma, COVID-19, Emphysema etc. increasing day by day. To overcome the global burden and maintain the health of healthy person various treatment modalities has been mentioned by various Acharyas in Ayurved. Using single herbal medicine instead of poly-herbal preparation is preferred by many physicians as the drug-to-drug interaction of poly-herbal products is not exactly known which is easily understandable in single drug use, easily available, cost effective and reduces load on biodiversity. AIM: To study Ekal Dravya Chikitsa used in the management of Pranavaha srotas vyadhi. **Objective:** Review of Vasa, Puskarmula, Bharangi, Gojivha, Banapsa, Somalata etc. dravyas acting on pranavaha srotas vyadhis according to Ayurvedic and Modern medical science perspective. **Material & Methods:** Bruhatrayees with their commentaries and other relevant texts of Ayurveda and allied subjects. Compilation of various form of Ekal Dravya used in pranavaha srotas vyadhis. **Conclusion:** The herbs used in Pranavaha Srotodushti vikara have shown interesting results not only in various target specific biological activities like bronchodilation, mast cell stabilization, anti-anaphylactic, anti-inflammatory, anti-spasmodic, anti-allergic, immune-modulator, but also in inhibition of leukotrienes, lipoxxygenase, cyclo-oxygenase, platelet activating, phosphodiesterase and cytokine mediators. The drugs like Punarnava, Gokshura which are also have been mentioned in the treatment of Shwasa, Kasa etc., though didn't have any direct effect, they reduce the congestion in the lungs due to their diuretic effect which gives the symptomatic relief in congestion.

KEYWORDS: Pranavaha srotas, respiratory system, Ekal Dravya Chikitsa.

INTRODUCTION

PRANAVAHA SROTAS

Srotas is a unique consideration in Ayurvedic sharir. Srotas are the body channels through which there is transport of responding nutrients. Charaka claims that purusha is made up of srotas only. Modern biomedicine has given importance to organs, whereas ayurveda considers organs as moolasthanas of srotas. The vitiation, depletion and maintenance of body structures are made possible by these srotas only. Charaka & Sushruta both compendium have explained srotas in detail. Pranavaha, annavaha & udakavaha srotas are for intake and purishavaha, swedavaha & mootravaha srotas are for excretion whereas seven dhatu srotas maintain body. There cannot be one to one correlation for concept of srotas in western biomedicine's viewpoint. Concept of srotas is distinctly different and cannot be understood by

conventional modern biology. According to R H. Singh concept of srotas is all inclusive of Membrane biology, receptor biology & the quantum field.^[1]

Prana is not only body element but also aatma guna.^[2] Chakrapani has clarified prana & apana as uchwasa & nishwasa.^[3] Charaka has quoted prerana & dharana of prana & apana as aatmaja bhava of Garbha.^[4] Owing to importance of process of respiration prana is considered as aatmaj bhava as well as aatma guna. Metabolism of prana element is carried out in pranavaha srotas.

Moolasthanas

Charakacharya considers hrudaya & mahasrotas as moolasthanas of pranavaha srotas & quotes its symptoms of vitiation as Atee shrushtam shwasanam (too long respiration), Atee badham shwasanam (restricted

respiration), Kupitam shwasanam (agitated respiration), alpalam shwasanam (shallow respiration), abheekshana shwasanam (increased respiration), Sashabda shwasanam (stretuous respiration), Sashoola shwasanam (painful respiration).^[5]

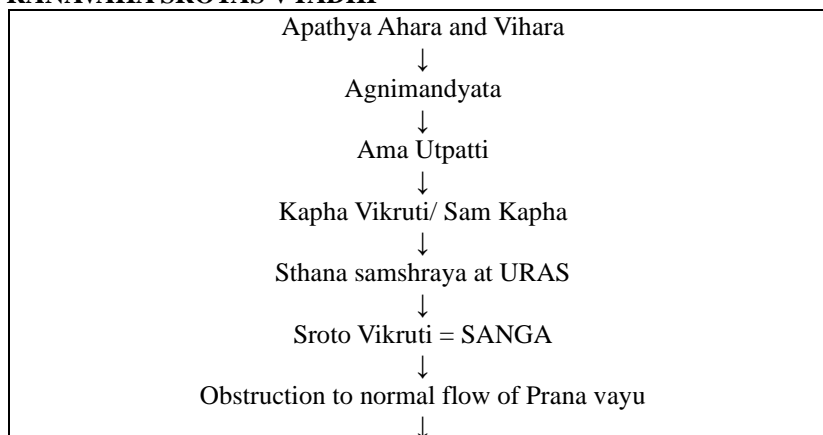
In opinion of Chakrapani, the word prana stands for the particular vayu type named Prana Vayu. Although dhamani itself is sthana for vayu; pranavaha srotas is particularly for prana vayu.^[6] In opinion of Gangadhara, term 'hrudaya' shall be understood as 'vaksha'^[7] i.e. whole cardiopulmonary apparatus occupying the whole chest. Mahasrotas is 'mahachhidram mahasaranam' i.e. alimentary canal.

In opinion of Sushrutacharya, Hrudaya and rasavahi dhamani are moolasthan of pranavaha srotas. Aakroshana (loud grooming), vinamana (thoracic cavity deformity), mohana (loss of consciousness), bhramana (illusion/giddiness), vepana (tremors), marana (death) are symptoms of pranavaha srotodushti according to sushruta Samhita^[8] as explored by dalhana.^[9] The 'rasavahi dhamani' is considered as moolasthana of pranavaha srotas. This itself implies that dhamani originating from hrudaya carry prana as well as rasa simultaneously. It refers to arterial tree only. It is said that "mulamiti prabhav sthanam" means that moolasthan of srotas are originating places for that particular body element. It is the blood in arteries arising from heart (left ventricle) are full of nutritious elements as well as oxygen.

DISEASES AFFLICTING PRANAVAHA SROTAS

Ayurvedic	Modern
1. Kasa	1. Inflammatory - (Lung Collapse; Bronchial Asthma; Emphysema etc.)
2. Shwasa	2. Infectious - (Covid – 19, SARS, Tuberculosis, Measles, Pertusis etc.)
3. Hikka	3. Interstitial - (Sarcoidosis, Idiopathic Pulmonary Fibrosis etc.)
4. Swarabheda	4. Environmental - (Asbestosis, Silicosis etc.)
5. Rajayakshma	5. Obstructive - (COPD, Bronchiectasis, Cystic Fibrosis etc.)
6. Urakshata	6. Respiratory insufficiency - (Atelactasis; Gas exchange etc.)
7. Parshwa Shula	7. Pulmonary (Vascular) - (Pulmonary embolism, Telangiectasia etc.)
	8. Pulmonary (Pleural) - (Pleural effusion, and Pneumothorax etc.)
	9. Neoplastic - (Hematomas, Adenomas and Papillomas etc.)
	10. Congenital - (Airway malformations, bronchial atresia etc.)

SAMPRAPTI OF PRANAVAHA SROTAS VYADHI



PREVALENC RATE

In 2019, chronic respiratory diseases were the third-leading cause of death, responsible for 4.0 million deaths with a prevalence of 454.6 million cases globally.^[10]

AIM

To study Ekal Dravya Chikitsa used in the management of Pranavaha srotas vyadhis.

OBJECTIVE

Review of Vasa, Puskarmula, Bharangi, Gojivha, Banapsa, Somalata, etc. dravyas acting on pranavaha srotas vyadhis according to Ayurvedic and Modern science perspective.

MATERIAL

Bruhatrayee with their commentaries and other relevant texts of Ayurveda and allied subjects.

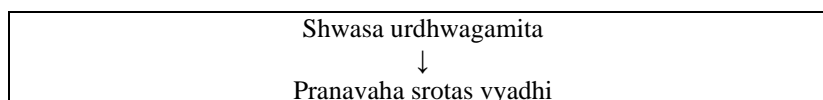
Bhavaprakash Nighantu and Bapalal Vaidya Nighantu, online data and research portals.

METHODS

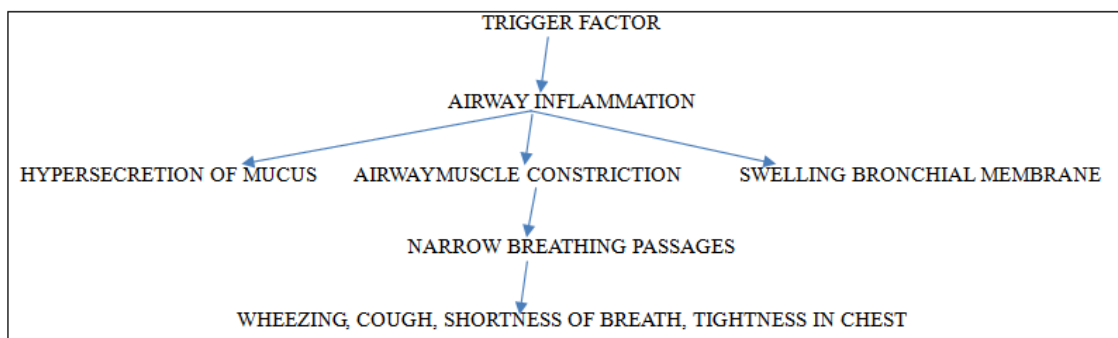
Compilation of information with respect to word Ekal from all available resources.

Conceptual review of Ekal Dravya Chikitsa.

Compilation of various form of Ekal Dravya used in Pranavaha srotas vyadhis.



PATHOGENESIS OF RESPIRATORY DISEASES



SAMPRAPTI GHATAKAS OF PRANAVAHA SROTAS VYADHI

1.	Dosha	Kapha and Vata (kapha dominant) Vata (prana, udana, samana) Kapha (avalambaka and kledaka)
2.	Dushya	Rasadhatu
3.	Srotas	Pranavaha srotas Udakavaha srotas Annavaaha srotas Rasavaaha srotas
4.	Udbhava sthana	Pittasthana (Charaka Samhita) Amashaya (Ashtang Hrudaya)
5.	Adhisthana	Uraha, Puppusa (Kaphasthana)
6.	Sroto dushti lakshana	Sanga, Vimargagamana, Atipravrutti
7.	Ama	Rasagata (Mandagnijanya ama)
8.	Agni	Jatharagni (Vishama)
9.	Vyadhi	Amashayottha
10.	Swabhava	Ashukari
11.	Vyadhi marga	Abhyantara marga

EKAL DRAVYA CHIKITSA

Ayurveda is a science of life which depends on natural substances for management of any clinical conditions. This management is done by various substances, being used in different therapeutics form irrespective of its origin i.e. animal origin, plant origin, metallic origin. Achievement of balance in all body component i.e. dosha, dhatu and malas an ultimate goal of chikitsa which is being achieved by optimum quality of four factors: Bhishak (physician), Dravya (substance), Upasthata (attendant), Rogi (patient).^[11] Of these four components Dravya is the basic tool in the hands of physician without which treatment is impossible.

Dravya should comprises of following: Bahuta (it should be available in required amount), Yogyatwam (property to alleviate a disease), Anekvidhkalpana (can be made in different form) and Sampann (should be full of rasa, guna, veerya). As Ayurveda holistically depends on biodiversity for managing disease by natural product it is of prime importance to use minimal medicinal substances for a desired therapeutic effect so that the Dravya can be easily available for future managements.

The basic text of Ayurveda gives us hint of using appropriate substance for particular health condition which have been clearly mentioned in Charaka Mahakashaya; Agrya Dravya etc. in Charaka Samhita and in Sushrut Gana form. These are the best example of Ekal Dravya Chikitsa where single drug is used for any therapeutic management. There are many clinical conditions where single dosha is involved in pathogenesis and also there are clinical condition caused due to multiple doshas. To break the multifaceted pathogenesis involved in any disease one need formulations containing many herbs. But on the other hand where single dosha are involved, single drug should be given priority if found to be equally beneficial. But many a times it is not possible to break the pathogenesis in certain conditions alone by single drug, in these condition it is being used with some other drug known as Anupan or Sahapan or processed with other substance to be highly potent enough to work at its optimum level. Anupan is specific vehicle or medium for taking Ayurvedic medicines and herbal remedies. Generally, these vehicles are in liquid form. The common adjuvant used in ayurveda include- water, honey, milk, buttermilk,

curd, cow urine, ghee, herbal decoctions, swarasa (juice) etc.

A single substances has been evidenced to be used in various diseases in variety of formulations either with different anupan or in processed form. After a complete review of Sushrut Samhita, it has been found that Ekal Dravya has been in total 7 basis concept

Various forms of Ekal Dravya concept

- 1) Single substance
- 2) Single substance with anupan or sahpan (adjuvant)
- 3) Single substance with siddha dughdha (processed milk)

- 4) Single substance with siddha ghrita (processed ghee)
- 5) Single substance with siddha taila (processed oil)
- 6) Single substance bhavita with some other substance
- 7) Single substance with siddha mutra (processed urine)

Although there is abundant description given in the classics regarding the drugs acting on Pranavaha srotas vyadhis in the form of Agrya Dravya, Mahakashaya etc. and number of researches also done on this drugs. But the Classification/ compilation of dravyas done in fourth chapter i.e. Chhedanadi Varga by Acharya Priyavat Sharma also having great importance in Respiratory diseases.

Table: Ayurvedic medicinal plants which acts on vyadhis of Pranavaha Srotas.^[12]

Sr. No.	Name	Botanical/ latin name	Rasa	Guna	Veerya	Vipak	Karma
Chhedana (shleshmahara)							
1.	Bibhitaka	Terminalia bellirica	Kashaya	Ruksha, laghu	Ushna	Madhura	Bronchodilator, antispasmodic, anti-inflammatory, antibacterial, antifungal, antiviral, immunomodulatory,
2.	Vasa	Adhatoda vasica	Tikta, kashaya	Ruksha, laghu	Sheeta	Katu	Bronchodilator, anti-allergic, expectorant, antitussive, antispasmodic, antiseptic, antihelmintic, antiasthmatic, antiulcer, antitubercular
3.	Talisha	Abies webbiana	Tikta, Madhura	Laghu, tikshna	Ushna	Katu	Expectorant, antispasmodic, antitussive, antitumor, bronchodilator, antibacterial, analgesics, antiinflammatory, antipyretic
4.	Lavanga	Syzygium aromaticum	Tikta, katu	Laghu, snigdha	Sheeta	Katu	Antibacteria, antifungal, antiviral, anticancerous, analgesics, antiinflammatory, analgesics
5.	Twaka	Cinnamomum zeylanicum	Katu, tikta, Madhura	Laghu, ruksha, Tikshna	Ushna	Katu	Antiseptic, immunomodulatory, anti-inflammatory, carminatives, antibacterial, antiviral, antifungal
6.	Yashtimadhu	Glycyrrhiza glabra	Madhura	Guru, snigdha	Sheeta	Madhura	Anti-inflammatory, anti-pyretic, anti-oxidant, immune-regulatory, anti-microbial, anti-viral, anti-bacterial, anti-fungal, anti-histaminic, broncho-dilator, expectorant
7.	Gojivha	Onosma bracteatum	Madhura, tikta	Laghu, snigdha	Sheeta	Madhura	Antibacterial, analgesics, immunomodulatory, anti-allergic, anti-inflammatory, anti-asthmatic, anti-fungal, anti-cancerous
8.	Rumi mastagi	Pistacia lentiscus	Madhura, kashaya	Laghu, ruksha	Ushna	Madhura	Antimicrobial, antifungal, antihelmintic, antioxidant, carminative, anti-inflammatory, muscle relaxant, analgesics, bronchodilator, anticancer, antiviral
9.	Bola	Commiphora myrrha	Tikta, katu, Kashaya	Ruksha, laghu	Ushna	Katu	Anti-septic, antihelmintic, carminative, expectorant

10.	Ushaka	Dorema ammoniacum	Tikta, katu	Ruksha, laghu	Ushna	Katu	Expectorant, analgesic, carminative, anti-microbial, vasodilator, anti-inflammatory
11.	Lobana	Styrax benzoin dryand	Madhura, tikta	Ruksha, laghu, Tikshna	Ushna	Madhura	Irritating Expectorant, carminative, antiseptic
12.	Silhaka	Liquidamber orientalis	Tikta, katu, Madhura	Snigdha, laghu	Ushna	Katu	Antibacterial, antifungal, immunosuppressant, anti-inflammatory, antiviral, expectorant, antiseptic
13.	Banafsa	Viola odorata	Katu, tikta	Laghu, snigdh	Ushna	Katu	Expectorant, antioxidant, antibacterial, anti-pyretic
14.	Khubkala	Sisymbrium irio	Katu	Snigdha, guru, picchila	Ushna	Katu	Anti-inflammatory, anti-fungal, anti-bacterial, anti-pyretic, bronchodilator, expectorant, mast cell stabilizer, analgesic
15.	Todari	Lepidium iberis	Katu, tikta	Guru, pichhila	Ushna	Katu	Antiasthmatic, anticarcinogenic, anti-inflammatory, bronchodilator, antifungal, antibacterial
16.	Khatmi	Althoea officinalis	Madhura	Snigdha, pichhila, guru	Sheeta	Madhura	Antimicrobial, anti-inflammatory, immunomodulatory, demulcent, soothing, antitussive
17.	Jufa	Hyssopus officinalis	Tikta, katu	Laghu, ruksha, tikshna	Ushna	Katu	Antibacterial, antifungal, antiviral, antihelmintic, airway remodelling, anti-inflammatory, analgesic, anti-protazol
Kasahara							
18.	Pippali	Piper longum	Katu	Laghu, snigdha, tikshna	Anushn asheeta	Madhura	Anti-inflammatory, analgesic, anti-oxidant, anti-microbial, anti-stress, anti-depressant, immuno modulator, anti-fungal, expectorant, anti-tussive, carminative
19.	Kantakari	Solanum surattense	Tikta, katu	Laghu, ruksha, tikshna	Ushna	Katu	Anti-bacterial, anti-oxidant, anti-depressant, anxiolytic, anti-tussive, anti-histaminic, expectorant, bronchodilator, anti-inflammatory
20.	Bruhati	Solanum indicum	Katu, tikta	Laghu, ruksha, tikshna	Ushna	Katu	Anti-inflammatory, carminative, analgesic, expectorant
21.	Karkatshrungi	Pistacia integerrima	Kashaya, tikta	Laghu, ruksha	Ushna	Katu	Anti-microbial, anti-fungal, anti-viral, anti-parasite, mucolytic, bronchodilator, expectorant, decongestant, immune booster
22.	Kasamard	Cassia occidentalis	Tikta, Madhura	Ruksha, laghu, tikshna	Ushna	Katu	Anti-allergic, antimicrobial, anti-pyretic, muscle relaxant, anti-carcinogenic, anti-inflammatory
23.	Agatsya	Sesbania grandiflora	Tikta	Ruksha, laghu	Sheeta	Katu	Immunomodulatory, anti-viral, anti-inflammatory, antihelmintic, anti-bacterial
Shwasahara							
24.	Shati	Hedychium spicatum	Katu, tikta, Kashaya	Laghu, tikshna	Ushna	Katu	Anti-tussive, expectorant, broncho-dilator, analgesic,

							antihistaminic, anti-inflammatory, antispasmodic
25.	Karchura	Curcuma zedoaria	Katu, tikta	Laghu, tikshna	Ushna	Katu	Anti-microbial, anti-cancer, anti-inflammatory, anti-allergic, analgesics, anti-inflammatory, anti-microbial, anti-fungal, anti-ulcer, anti-viral, anti-pyretic
26.	Pushkarmula	Inula racemose	Tikta, katu	Laghu, tikshna	Ushna	Katu	Expectorant, anti-inflammatory, anti-spasmodic, analgesic, anti-septic
27.	Bharangi	Clerodendrum serratum	Tikta, katu	Laghu, ruksha	Ushna	Katu	Anti-asthmatic, anti-allergic, anti-inflammatory, anti-cancer, anti-histaminics, anti-bacterial, anti-fungal, anti-viral, mast cell stabilizer, analgesics, anti-pyretics
28.	Dugdika	Euphorbia thymifolia	Katu, tikta, madhura	Guru, ruksha, tikshna	Ushna	Katu	Bronchodilator, smooth muscle relaxant, mast cell stabilizer, anti-allergic, anti-inflammatory, anti-helminthic, anti-bacterial, anti-fungal
29.	Soma	Ephedra gerardiana	Kashaya	Laghu, ruksha	Ushna	Katu	Bronchodilator, anti-asthmatics, smooth muscle relaxant, anti-inflammatory, decongestant, anti-tumor
Kanthy							
30.	Malayavacha	Alpinia galanga	Katu	Laghu, tikshna, ruksha	Ushna	Katu	Immunomodulatory, anti-inflammatory, anti-allergic, anti-bacterial, anti-fungal, anti-viral, anti-cancerous, analgesics
31.	Hansapadi	Adiantum lunulatum	Kashaya	Guru	Sheeta	Madhura	Anti-viral, anti-microbial, anti-inflammatory, analgesic, anti-fungal, anti-asthmatic, ulcer healing
Shleshmaputihara							
32.	Sarala	Pinus roxburghii	Katu, tikta, Madhura	Laghu, tikshna, snigdha	Ushna	Katu	Anti-allergic, anti-bacterial, anti-fungal, analgesics, antiseptic, expectorant, anti-hemithic,
33.	Tailaparna	Eucalyptus globulus	Katu, tikta, Kashaya	Laghu, snigdha	Ushna	Katu	Antibacterial, anti-inflammatory, anti-asthmatic, anti-viral, anti-fungal, analgesics.

RASAPANCHAK OF ABOVE EKAL DRAVYA ACTING ON PRANAVAHA SROTAS VYADHI

USHNA VEERYA	25
SHEETA VEERYA	07
ANUSHNASHEETA VEERYA	01
KATU VIPAKI	25
MADHURA VIPAKI	08
RASA	
MADHURA	02
KATU	03
TIKTA	01
KASHAYA	03
TIKTA, KASHAYA	02
TIKTA, MADHURA	04
TIKTA, KATU	10
KATU, TIKTA, MADHURA	04

KATU, TIKTA, KASHAYA	03
MADHURA, KASHAYA	01
GUNA	
GURU	01
LAGHU, SNIGDH	05
LAGHU, RUKSHA	09
GURU, SNIGDH	01
GURU, PICHHILA	01
LAGHU, TIKSHNA	04
LAGHU, SNIGDHA, TIKSHNA	02
LAGHU, RUKSHA, TIKSHNA	07
GURU, RUKSHA, TIKSHNA	01
GURU, SNIGDHA, PICHHILA	02

DISCUSSION

In recent era Respiratory diseases highly spreading in the society and become the leading cause of death. Although there are several treatment modalities available in modern medical science but they have their certain limitations and adverse effects on health during course of treatment. Example, according to modern science treatment modalities for Respiratory diseases includes uses of Antibiotic drugs, Antihistamine drugs, Beta agonists drugs and Corticosteroid drugs etc. During course of treatment prolonged use of Antibiotics promotes antibiotics resistance while use of Antihistaminic agents like promethazine causes adverse effects like blurred vision, dry mouth, constipation and urine retention. Similarly use of drugs like Beta agonists also cause adverse effects like Tachyarrhythmias, paroxysmal supraventricular tachycardia, tremors, headache, muscle cramps, insomnia, anxiety and nervousness. In severe cases of respiratory illness use of Corticosteroid drugs are frequently seen in modern practice but they also cause severe types of complications like immunosuppression, myopathy, osteoporosis, hypertension, hypokalemic alkalosis, hyperglycemia, growth retardation, depression etc. While considering ayurvedic treatment aspect there are several herbal drugs available which are not only capable to treat pranavaha srotas vyadhi (respiratory diseases) but also help to strengthen the respiratory system by providing boost to immunity system without any severe adverse effects on health. In ayurveda there are various herbal drugs like Bibhitak, vasa, talisha, lavanga, twak, yasthimadhu, pushkarmula, gojivha, rumi mastagi, banafsa, loban, silhak, pippali, bol, ushaka, khubakala, todari, khatmi, jufa, kantaakari, bruhati, karkatshringi, kasamard, agatsya, shati, karchura, bharangi, dugdhika, soma, malayavacha, hansapadi, saral, and tailparna are capable to treat pranavaha srotas vyadhis as a Ekal Dravya Chikitsa by using their attributes like Rasa, Guna, Veerya and Vipak.

Drugs like Bibhitaki, Talisha, twaka, rumi mastagi etc are possesses Ushna veerya which helps to pacify the Kapha and Vata dosha and drugs like hansapadi, agatsya, khatmi etc are possesses Sheeta veerya which helps to pacify Pitta dosha. Similarly drugs like Vasa, lavanga, gojivha, hansapadi etc are mostly Katu, Tikta and

Kashaya rasa pradhana which is very helpful in liquification of Kapha and also helpful in elimination of Vata dosha obstruction. According to modern science this drugs also possesses the pharmacological activities like Bronchodilator, mast cell stabilizer, immunomodulator, anti-inflammatory, antiseptic, antimicrobial, antiviral, antifungal, carminative, anti-cancer, anti-histaminic etc. which again helpful to treat Respiratory system.

CONCLUSION

- 1) From the above literature review we conclude that the classification of drugs which are acting on vyadhi's of pranavaha srotas made by Acharya Priyavat Sharma in his Dravyaguna Vigyana text book under fourth chapter Chhedanadi Varga under sub-headings like Shleshmahar, Kasahara, Shwasahaara, Kantya and Shleshmaputihara having great importance.
- 2) The drugs like Gojivha, Banafsa, Jufa, Khubakala, Rumi mastagi, Khatmi, Ushaka, Lobana, Silhak, Bola etc are well known drugs of Unani system of medicine but also having great importance in Ayurveda. In day to day practice use of such drugs increases with special reference to Respiratory diseases.
- 3) This is a humble effort to enlighten the knowledge about this above listed drugs like Gojivha, Banafsa, Somalata, etc as they are immaterial and unobservant in Ayurveda under the management of Pranavaha Srotas Vyadhis.

REFERENCES

1. Ram harsh singh, Exploring Quantum Logic in Ayurveda with special reference to Srotovijnana of Ayurveda, ayu-, (october-december) 2009; 30(4): 360-368.
2. Charak Samhita, Acharya Charak, Edited by Ravidatta Tripathi, Chaukhmba sanskrit pratisthan Delhi-2013, Ch. Sha. 1/70 page no. 687.
3. Yadavaji, Trikam, Acharya (Ed.). (1997). Sushruta Samhita (6th ed.). Varanasi, India: Chaukhmbha Orientalia, Nibandha Sangraha Commentary. Page-294 Verse-70.
4. Charak Samhita, Acharya Charak, Edited by Ravidatta Tripathi, Chaukhmba sanskrit pratisthan Delhi-2013, Ch. Sha 3/10 page. No. 719.

5. Charak Samhita, Acharya Charak, Edited by Ravidatta Tripathi, Chaukhmba sanskrit pratisthan Delhi-2013, Ch. Vi.5/8 page no. 587.
6. Charak Samhita, Acharya Charak, Edited by Ravidatta Tripathi, Chaukhmba sanskrit pratisthan Delhi-2013, Chakrapani on Ch.Vi.5/8.
7. Charak Samhita, Acharya Charak, Edited by Ravidatta Tripathi, Chaukhmba sanskrit pratisthan Delhi-2013, Gangadhara on Ch.Vi.5/8.
8. Sushruta samhita, Maharshi-Sushruta, edited by Kaviraja Ambikadatta Shastri, Chaukhamba Sanskrit sansthana, Varanasi 2017, Su.Sha. 9/12 page no. 96
9. Yadavaji, T., Acharya (Ed.). (1997). Sushruta Samhita (6th ed.). Varanasi India: Chaukhambha Orientalia, Nibandha Sangraha Commentary. Page-386. Verse-12 (Dalhana)
10. <https://www.healthdata.org>>library
11. Agnivesh: Charaka Samhita: revised by Charaka and Drudhbala; Vaidyamanorama hindi commentary by Acharya Vidyadhar Shukla and Prof. Ravi Dutta Tripathi, Chaukhamba Sanskrit Pratisthan Delhi; revised addition 2012, sutrasthana chapter 9, verse 5.
12. Prof. P. V. Sharma, Dravyaguna Vigyana Vol. II (Vegetable Drugs), Chaukhambha Bharati Academy, Varanasi, chapter 4, page-239-311.