International Research Journal of Ayurveda & Yoga
Vol. 6 (4),90-98, April,2023
ISSN: 2581-785X: https://irjay.com/
DOI: **10.47223/IRJAY.2023.6414**

Pharmacological action and Properties of *Swasahara Mahakashaya* in *Swasa Roga*: A Review.

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Article Info

Article history:
Received on: 12-03-2023
Accepted on: 25-04-2023
Available online: 30-04-2023

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ABSTRACT:

Swasa (Dyspnoea) is a *Yapya vyadi* (incurable but manageable) with *Sthana Sanshraya* (stage of localization) and *Adhisthana* (seat) as *Pranavaha Srotas* (respiratory channel). In modern medicine, it broadly involves lungs and heart as main site of pathology. They generally involve infective, allergic, genetic, occupational aetiology. So, the drug or group of drugs which act directly on *Pranvaha Srotas*, or on the disease will help in alleviation of disease. Charak mentioned these drugs as *Swasahara Mahakashaya*, a group of ten drugs which have direct action on the disease. This review will focus on establishing the action of these drugs on various conditions resulting in Dyspnoea as a prominent symptom. It will explore various causes of dyspnoea and factors responsible for dyspnoea, along with ayurvedic properties as well as pharmacological action of various active components of each individual drug on cellular level.

Keyword: *Swasa*, *Swasahara Mahakashaya*, Dyspnoea

INTRODUCTION

Swasa roga (dyspnoea) is a breathing disorder with five different presentations mentioned according to disease severity and its curability.[1] It is independent disease on its own but also presents itself as symptoms and complications of various other disease. The term *Swasa*, means physiological breathing or the natural process of inhalation and exhalation. Any derangement or pathology in this natural process results in *Swasa Roga.*[2] It can be compared with Dyspnoea in modern science, which can be described as a sensation of breathlessness.[3] Depending on duration, it can be acute, if patient report worsening breathlessness in two weeks and chronic where complain of breathlessness is reported for more than two weeks.[3] *Swasa roga* manifest as *Maha Swasa*, *Urddha Swasa*, *Chinna Swasa*, *Tamaka Swasa*, *Kshudra Swasa.*[1] The first three manifestation of the disease are incurable and are life threatening manifestation of dyspnoea while *Tamaka Swasa* is a *Yapya Vyadhi* (incurable but manageable) and can be corelated with chronic dyspnoea with presentation of paroxysmal acute attack on exposure to trigger factors. *Kshudra Swasa*

can be corelated with dyspnoea originated due to metabolic cause like anaemia or malnutrition.[1]

Dyspnoea is broadly divided into three categories i.e., Dyspnoea of cardiac origin, pulmonary origin, and metabolic origin. Dyspnoea of cardiac origin includes acute causes like acute coronary syndrome, acute cardiogenic pulmonary oedema, acute valvular heart disease or arrhythmia while chronic cardiac dyspnoea may be caused due to chronic heart failure or myocardial infarction.[3]Dyspnoea of pulmonary origin can be broadly divided either in upper respiratory like Inhaled foreign body, Anaphylaxis, Epiglottitis, hematoma or lower respiratory disease like Acute bronchitis, Asthma, Acute exacerbation of bronchiectasis, Acute exacerbation of chronic obstructive pulmonary disease (COPD).[3]The respiratory disease can also be classified as obstructive and restrictive disorders.[3] Obstructive disorders can be classified as Asthma and Chronic Obstructive Pulmonary Disorder (COPD) including Chronic Bronchitis and Emphysema, while the restrictive disorder includes Interstitial lung disease like Pulmonary fibrosis, Sarcoidosis, or Cystic fibrosis.[3] It can also be differentiated according to abnormality in chest wall or pulmonary structure as the cause of dyspnoea can be due to chest wall abnormality like in obesity or reduced muscle strength like in myasthenia gravis, and, increased elastic recoil in pulmonary fibrosis or reduced elastic recoil in emphysema.[4] Dyspnoea of metabolic origin includes uraemia, lactic acidosis, diabetic ketoacidosis, psychogenic hyperventilation, severe anaemia, cirrhosis, ascites, or obesity.[3]Thus, this establishes that for a single drug or combination of drugs to work against dyspnoea they must either singularly work on one of the pathology or have a cumulative effect on all major causes of dyspnoea. According to Charak, the major cause for *Swasa Roga* is aggravation of *Vata-Kapha Doshas* through various vitiating factor specific to *Vata* and *Kapha Doshas.* The aggravated *Doshas* gain *Pratiloma Gati* (opposite direction to their natural flow) and finds its *Sthanasanshraya* (stage of localization) in *Uraha Pradesh* (Chest/Thorax) while affecting *Pranavaha, Udakavaha* (Pathway for fluid circulation), *Annavaha Srotas* (digestive tract).[1]For effective treatment of *Swasa roga,* the properties of the medicine should be antagonist to *Vata* or *Kapha Dosha.*[1]

Drugs Of *Swasahara Mahakashaya*

Swasahara Mahakashaya are group of ten drugs mentioned by Charak, which are specifically effective against *Swasa roga.* It includes *Shati, Pushkarmoola, Amlavetas, Ela, Hingu, Agaru, Surasa, Tamalki, Jeevanti, Chanda.*[5] General information about these ten drugs and their properties according to ayurveda are mentioned in Table 1 and 2 below while properties according to pathology of asthma is mentioned in Table 3.

Shati

Disease*:* Dyspnoea, Oedema, Analgesics.[6]

Action: Anti-inflammatory, Vasodilator, Anti- Spasmodic, Anti-asthmatic and Hypotensive properties, Analgesics, Hepatoprotective Activity.[7]

Phytochemical Composition: Rhizome contains sitosterol, glucosides, and 7-hydroxyhedychenone, cineole, terpinene, limonene, linalool, terpineol.[8]

Mode of Action: The rhizome possesses anti-inflammatory, vasodilator, anti-spasmodic, anti-asthmatic, and hypotensive properties. It mainly acts on mast cells and mediators secreted by mast cells like histamines, leukotrienes, bradykinin, proinflammatory cytokines, prostaglandins, etc.[8]

These mediators are responsible for constriction of airway smooth muscles along with hyperplasia and hypertrophy of airway, increasing vascular permeability by capillary dilatation which results in mucus build up. Thus, *Shati* acts as anti- spasmodic by relieving the broncho-constriction.[8]

β-sitosterol exhibit an anti-inflammatory effect along with mast cell stabilizing effect thus it seizes the mast cell degranulation which results in secretion of histamines and prostaglandins, thus, works directly on the causative factor of Dyspnoea.[8]

It also has hepato-protective and Anti-cancer properties; thus, it may also work on dyspnoea induced by metabolic causes.[8]

Pushkarmoola

Disease*:* Hiccough, Cough, Dyspnoea, Cardiac ailments.[6]

Action*:* Anti-inflammatory, Anti-allergic, Analgesics, Beta-adrenergic receptor antagonist, Anti-hyperglycaemic.[7]

Phytochemical Composition: Isoalantolactone, Alantolactone, Dihydroisoalantotolactone, B- Sitosterol, sesquiterpene lactone- inunol, D- Mannitol, Dihydroinunolide, neo-Alantolactone, Alantodiene etc. [9]

Mode of Action:

In a study on *Pushkarmoola,* the anti-inflammatory action of *Pushkarmoola* was found to be comparable with the established anti-inflammatory drug, indomethacin. Thus, a dose dependent action was found which was almost comparable to indomethacin, which is the standard drug.[10]The phenolics and flavonoids also inhibit the cyclo-

oxygenase and lipo-oxygenase pathways.[10] Thus *Pushkarmoola,* acts against both the first phase inflammatory markers like histamines or serotonins and second phase inflammatory markers like bradykinin and prostaglandins.[10]*Pushkarmoola* action against allergens or atopy was determined by a study where it was established that it has dose dependent action against eosinophilia and leukocytosis.[11] Eosinophils are the major reason for airway hyperresponsiveness and epithelial shedding, thus, *Pushkarmoola* relieve the symptoms of AHR.[11]A study showed similar action to standardized mast cell stabilizer disodium cromoglycate, thus, *Pushkarmoola* prevents mast cell generated angiogenesis, mucosal hypersecretion, and bronchoconstriction.[11]Atopy is associated with increase in capillary permeability, this leads to microvascular leakage which causes plasma exudation and airway edema. In a study, *Pushkarmoola* reduces the vascular leakage by altering the vascular permeability, thus, preventing plasma exudation.[11]

Amlavetas

Disease*:* Hiccough, Cough, Dyspnoea, Spleen diseases, Liver diseases, Cardiac ailments, Dysuria, Urinary calculi.[6]

Action: Anti-Oxidant Activity, Cardio-Protective, Anti-Diabetic, Anti-Hyperglycaemia.[7]

Phytochemical Composition: Phenolics (catechin), Flavonoids (quercetin), Ascorbic Acid, *β*-carotene, thiamine, riboflavin.[12]

Mode of Action:

Oxidative stress is responsible for disease severity by amplifying the inflammatory response, and reducing responsiveness to corticosteroids. In a study, free radical scavenging capacity of G. Pedunculata was established.[12] *Amlavetas* has an Anti-Diabetic action by working against the two main pathology of diabetes i.e., insulin deficiency as well as insulin resistance. It enhances the cellular uptake of glucose as well glycogenolysis. This insulin secretion enhancement is due to Garcinol which enhances the GLUT2 and GLUT4 expression.[13] Diabetes also commonly leads to lipid abnormalities like hyper triglyceridemia and hypercholesterolemia which are major cause for cardio-vascular disease. Insulin work by hydrolyzing triglycerides by lipoprotein lipase thus arresting the mobilization of free fatty acids but in condition of diabetes hydrolyzing enzyme does not function appropriately leading to hypertriglyceridemia. Thus, *Amlavetas* with its insulin like properties causes reduced level of triglycerides and cholesterol, thus, preventing cardiac disease.[13]*Amlavetas* also has Nephroprotective action, as DM causes destruction of tiny blood vessels in kidney, causing impaired renal function and disturbed renal function markers. *Amlavetas* was found to directly reduce raised markers, thus, establishing its reno-protective action.[13]

In the same study, *Amlavetas* was also found to reduce the raised transaminase enzyme like ALT, ALP, AST which are marker of hepatic dysfunction. Thus, this establishes Hepato-protective action of *Amlavetas.*[13]Diabetes may lead to necrotic degenerative changes in in glomeruli of kidney through inflammatory infiltrates, necrotic changes in hepatocytes, similar damage to myocytes in heart and islets cells of pancreas.[13]

Ela

Disease*:* Pain abdomen, Flatulence, Haemorrhoids, Cardiac ailments, Cough, Dyspnoea, Hiccough, Emaciation, Thirst, Vomiting, Loss of appetite.[6]

Action*:* Anti-Inflammatory, Anti-Oxidant, Anti-Spasmodic, Anti-Microbial, Cardioprotective, Analgesics, Anti-hypercholesterolemic, Anti-Cancer, Nephroprotective, Chemoprotective, Hepatoprotective.[7]

Phytochemical Composition: terpinene, stigmasterol, geranyl acetate, geraniol, β-pinene, citronellol, borneol, bisabolene, phytol, β-sitostenone, nerolidol, linalol, cineol, limonene, and α-terpineol.[14]

Mode of Action:

In a study, it was established that Cardamom acts against the expression of TH_2 cells and aggregation of macrophages preventing release of nitric oxide and cytokines which results in reduction of inflammation and hypertrophy and hyperplasia of goblet cells. Apart from this, Cardamom also prevents the airway hyperresponsiveness which results in sudden spasm. It acts on muscarinic receptors by blocking them through a dose dependent manner by inhibiting acetylcholine, which is responsible for stimulating muscarinic receptors resulting in bronchoconstriction. Thus, Cardamom blocks acetylcholine and in turn muscarinic receptors resulting in relieving the spasm. Flavonoids are the main component responsible for broncho-dilatory function of Cardamom by having similar action as Calcium channel blockers.[14] It further has Anti-Oxidant properties due to flavonoids, thus, relieving harmful action of free oxygen radicals on bronchial tree and even hepatocytes and myocytes, as Cardamom has Cardioprotective and Hepatoprotective action also.[14]

Hingu

Disease*:* Indigestion, Colic, Intestinal growth, Abdominal disorders, Worms, Relieves constipation, Cardiac ailments,

Dyspnoea, Cough, Bladder Pain Fever, Cold, Worms, Sexual debility.[6]

Action*:* Muscle Relaxant, Anti-Inflammatory, Anti-Diabetic, Anti-Hyperlipidemic, Anti-Oxidant, Anti-Carcinogenic, Nephroprotective, Hepatoprotective, Anti-Spasmodic.[7]

Phytochemical Composition: Umbelliferone, Asaresino-tannol, Malic acid, Resorcin, Pyrocatachuic acid, Umbellic acid, Sec butyl propanyl disulphide, Terpenes, Vanillin, Resene, Ferulic acid.[15]

Mode of Action:

Hingu was investigated for its effect on smooth muscles of bronchial tree and it was found that it acts as muscarinic receptor blocker thus resulting in relaxation of smooth muscle cells and alleviating bronchospasm.[16] It also has inhibitory effect on Histamine receptors; thus, its action will specifically benefit in bronchial asthma. [16]

Hingu was found to be effective against reducing blood urea nitrogen and serum creatinine thus, indicating nephroprotective behavior.[15] Renal disease is one of the etiological factors for dyspnoea or they may result in various respiratory conditions.

Presence of Phenolics**,** ferulic acid, vanillin is the reason for both Anti-Oxidant and Anti-carcinogenic effect of *Hingu.*[17] Nitric oxide is the main entity responsible for causing oxidative stress, flavonoids and sesquiterepenes present in *Hingu* are effective in removing NO from cells, thus establishing Anti-Oxidant activity of *Hingu.*[18]

Hingu was found to exhibit nerve stimulating effect by its action of axonal regeneration, remyelination and reduction in lymphocyte infiltration. It was found to have a positive effect on nerve conduction velocity and compound action potential. Thus, it can have an excellent effect on disease involving weakness of thoracic wall or dyspnoea due to disease like myasthenia gravis.[18]α-pinene, diallyl-disulfide, ferulic acid, luteolin are responsible for Anti-bacterial and Anti-Viral action of *Hingu*[17] While α-terpineol, azulene, diallyl-sulfide, ferulic-acid, umbelliferone are specifically responsible for Anti-Bacterial action.[17]

It also has Anti-Diabetic and Anti-Hyperlipidemic action, thus, it prevents the cardiogenic dyspnoea along with dyspnoea resulting as a complication from diabetes.[18]

Agaru

Disease*:* Ulcers, Edema, Osteoarthritis, Rheumatoid arthritis, Loss of appetite, Cardiac weakness, Blood disorders, Dyspnoea, Cough, Hiccough, Fever with chills, Skin diseases, Worms.[6]

Action*:* Anti-Inflammatory, Analgesics, Membrane stabilizing Action, Anti-Histaminic action, Anti-Microbial, Hepatoprotective.[7]

Phytochemical Composition: benzylacetone, anisic acid, β-agarofuran, baimuxinic acid, p-methoxybenzylacetone, dehydrobaimuxinol, isobaimuxinol, agarol and agarospirol, baimuxinal.[19]

Mode of Action:

Agaru shows dose dependent Anti-Inflammatory and Analgesics action which is almost comparable to diclofenac. It has prostaglandin inhibiting activity leading to anti-inflammatory action of *Agaru*. This action is better visible in low dose, as higher dose may lead to ulceration as a common side-effect. [20]

Agaru was found to express membrane stabilizing action by inhibiting lyses of membrane induced by hypo-tonicity of cells. Membrane stabilization of lysosomal cells prevents the release of active constituents such as proteases thus preventing extra cellular spilling of inflammatory components. Further, proteases are also responsible for loss of elastin in alveolar wall which results in reduced expiratory flow rate and may also lead to collapse of lungs, thus, *Agaru* could be a brilliant drug for obstructive disorders like emphysema. [21]

The oil of *Agaru* was specifically found to be effective in inhibiting synthesis of prostaglandin at last stage of inflammation. It may also be effective against histamine and serotonin. It acts directly on mast cells and cause inhibitory action for histamine and immediate hypersensitivity reaction.[21]

Similarly, *Agaru* also has an Anti-Oxidant action but it is only limited to low dose, as a high dose results in pro-oxidant activity.[19]

It also has Anti-Diabetic and Hepatoprotective action which might be due to Anti-Oxidant properties of *Agaru.*[19]

As a precautionary measure, dose of *Agaru* should always be highly optimized and monitored as a high dose might aggravate the inflammatory symptoms along with having pro-oxidant action.[19]

Surasa

Disease*:* Constipation, Worms, Cardiac diseases, Earache, Loss of appetite, Blood diseases, Dyspnoea, Cough, Dysuria, Fever.[6]

Action*:* Anti-Inflammatory, Immunomodulatory, Cardioprotective, Anti-Oxidant, Anti-Microbial, Chemoprotective, Anti-Histaminic, Mast cell stabilizing activity.[7]

Phytochemical Composition: Eugenol, Euginal/ Eugenic

acid, Urosolic acid, Linalool, Limatrol, Sitosterol.[22]

Mode of Action:

Linolenic acid and fixed oils are the cause of Anti-Inflammatory action of *Surasa* through its action against arachidonic acid, PGE2 and leukotriene induced oedema.[22] *Surasa* has the capacity to block lipoxygenase and cyclooxygenase pathways.[22]

The seed oil of *Surasa* modulates both cell-mediated and humoral immune response and GABA pathways to mediate the immunomodulatory action.[22]

Surasa has a preventive action on long term cerebral hypoperfusion and transient cerebral ischemia. It has hypotensive action due to vasodilation of periphery.[22] Fatty acids like linolenic acids and linoleic acids inhibit formation of series 2 PGE through production of series 1 and 3 prostaglandins. Its long-term use also provides protection against myocardial necrosis.[22]

Flavonoids like orientin and vicenin are responsible for membrane protection through reduction in lipid peroxidation. Phenolic components have the property of scavenging reactive free radicals.[22]

High content of linolenic acids in oil of *Surasa* is responsible for Anti-Microbial action.[22]

The seed oil has a chemo-preventive and anti-proliferative action.[22]

It has Anti-Histaminic and Anti-Anaphylactic action due to its mast cell stabilization effect which prevents disintegration of mast cell membrane and infiltration of inflammatory contents of mast cell in airways.[22]

It also has inhibitory action on lipid peroxidation due to hypercholesterolemia, thus it has protective action on liver and aortic tissues due to high cholesterol.[22]

Tamalki

Disease*:* Skin diseases, Jaundice, Injury, Edema, Hyper acidity), Blood diseases, Dyspnoea, Cough, Loss of appetite, Thirst, Hiccough, Urinary diseases including diabetes, Chronic fever, Poison effect.[6]

Action*:* Anti-Viral, Anti-Oxidants, Immuno-modulatory, Anti-Fungal, Anti-Hyperuricemia, Anti-Bacterial, Cardioprotective, Anti-Inflammatory.[7]

Phytochemical Composition: alkaloids, terpenoids, polyphenols, tannins, saponins, flavonoids, Nirtetralin A and B, Corilagin, Rutin, Gallic acid.[23]

Mode of Action:

Tamalki was found to enhance the activity of different components of immune system like natural killer (NK) cells stimulation, tumour necrosis factor-α and decreases T-helper 2 cell activity and interleukin (IL)-10 secretion. Thus, this establishes action of *Tamalki* on both cellular and humoral immunity.[24]

It is found to be effective in TB, as it enhances the cell immunity via its positive action on activity of IFN-γ. IFN-γ is responsible for promotion of activation of macrophages, natural immune response, antigen promoting cells and overall humoral response against TB. Generally, there is defect in secretion of IFN-γ prevalent in TB which causes depression in T-helper 1 response. *Tamalki* enhances the activity of IFN-γ and reduce the secretion of IL-10, which in turn have negative effect of CD4+ T lymphocyte.[24]

Phenols, flavonoids, gallic acid in *Tamalki* are responsible for the Anti-Oxidant activity. Tea of *Tamalki* is responsible for raised Anti-Oxidant markers like ascorbic acid, gallic acid in blood.[25]

Tamalki also has positive effect on heart, as it was found to reduce the level of cardiac biomarker, and reducing the process of cardiac peroxidation.[25]

It causes reduction in serum uric acid by enhanced uric acid clearance through inhibition of xanthine oxidase and uricosuric action. Thus, it also shoes nephroprotective effect along with hepatoprotective properties.[25]

It also has bactericidal effect by its action against the irreparable and irreversible cell collapse due to completely transforming the bacterial cell morphology.[25]

Ether extract of *Tamalki* were also found to have anti-spasmodic action thus, relieving the broncho-constriction induced dyspnoea.[25]

Jeevanti

Disease*:* Cardiac weakness, Bleeding diseases, Dysuria, Burning micturition, Cough, Dyspnoea, Edema, Constipation, Spermaturia, Fever, Emaciation, Tuberculosis[6]

Action*:* Anti-Inflammatory, Anti-Oxidant, Anti-Microbial [7]

Phytochemical Composition: 1-Dodecene, Methyl-10-undecenoate, Quercetin, 3-Tetradecene, Lupeol, Isopropyl Linoleate.[26]

Mode of Action:

It causes reduction in serum level of cytokines like IL2, IL6 and TNF- α synthesis. Histamines and serotonin are responsible for inflammatory first phase while TNF- α, cox-2 and prostaglandin are responsible for second phase of inflammation. Prostaglandin level are raised as a result of pro-inflammatory marker activation (nitric oxide synthase and cyclooxygenase-2), which are responsible for increased degree of swelling. L. reticulata results in

reduced level of pro-inflammatory markers like IL2, IL6, TNF- α, which leads to cox 2 and NO inhibition and ultimately inhibition of second phase inflammation due to prostaglandin inhibition. It further reduces leukocytes infiltration.[26]

Flavonoids are responsible for inhibition of pro-inflammatory markers and simultaneously reducing the level of arachidonic acid which inhibit neutrophil infiltration and its degranulation.[26]

Phenolic compound and flavonoids are responsible for Anti-Oxidant action of L. reticulata. It has better Anti-Oxidant effect than ascorbic acid. They have hydrogen peroxide scavenging property, resulting in its Anti-Oxidant potential.[26]

Sesquiterpenes, Monoterpenes, ketones and aromatic aldehydes are responsible for Anti-Microbial action of L. reticulata. It acts either by cytoplasmic membrane rupture or by inhibiting cytoplasmic enzymes of bacteria. They may also cause cytoplasmic granulation, thus neutralizing bacterial invasion. Anti-Microbial action is also caused by Lupeol and Phytol.[26]

Chanda

Disease*:* Cough, Hiccough, Cardiac weakness, Dyspnoea, Pain abdomen, Skin diseases, Fever, Anti-Poisonous.[6]

Action*:* Anti-Inflammatory, Anti-Oxidant, Anti-Microbial, Broncho-Dilator [7]

Phytochemical Composition: valeric acid, angelic acid, Angelicin, limonene, α-phellandrene, linalool, α-terpineol, cadinene, myrcene, fenchone, borneol, β-caryophyllene, bisabolol, angelica lactone, sesquiterpenes, pinene, p-cymene, terpinolene.

Mode of Action:

Chanda was found to have a prominent Anti-Proliferative and Anti-Tumour action through furanocoumarins, which establishes its action on depressing the growth of cancerous cells, thus, it may have a positive action on dyspnoea due to lung cancer.[27]

It also exhibits Hepato-Protective action through its action on lipid peroxidation process, thus, eliminating the oxidative stress on hepatocytes.[27]

It also causes inhibition of Acetylcholinesterase, thus it may exhibit brilliant results in dyspnoea resulting from disease like Myasthenia Gravis, as the disease has development of antibodies against the acetylcholine receptors which prevent proper transmission of acetylcholine signals.[27]

Chanda also possesses Anti-oxidant activity, thereby, causing free radical scavenging as they are the major component of various disease pathology.[27]

DISCUSSION

Swasa is described as *Pranahara Roga* by Charak and the severity of disease is easily observable by the incurable nature of three of the five types of *Swasa,* while *Tamaka Swasa* is described as *Yapya roga.*[1] Thus, this explains the need for a separate grouping of drugs which are specifically used for treatment of *Swasa Roga*. *Swasahara Mahakashaya* is formed by group of ten drugs which directly aids the treatment of *Swasa roga* separately or cumulatively.[5]

Dyspnoea is a general term used to define the feeling of breathlessness, which may be caused by various systemic disorders that may directly affect respiratory system or which may involve organs like heart, liver, kidney, as they are the vitals organ for basic metabolism carried out in body.[3] Thus, it can be termed as primary or *Svatantra Vyadhi* (independent disease), if the pathology is in respiratory system or secondary or *Partantra Vyadhi* (dependent disease), if the pathology is due to other systemic disorders. Respiratory cause can either directly involve the bronchial tree like in asthma or emphysema or it can involve the bony, muscular, or nervine structure like in myasthenia gravis or kyphosis-scoliosis.[3]

Drug Activity in Obstructive Pathology

Majority of pathology affecting bronchial tree or alveoli involve infective or inflammatory pathology.[4] Disease like Asthma and COPD have obstructive pathology.[4] Asthma involves contractile hypersensitivity of airways towards foreign stimuli like dust or smoke. Similarly, COPD also involve obstruction of airways due to activation of macrophages and neutrophils against irritant which results in release of proteases which breaks down elastin which causes collapse of airway due to high pressure during expiration, further, the nicotine accumulation results in partial paralysis of cilia which hinders mucus clearance thus further obstructing the airways.[4] Thus, in case of obstructive dyspnoea the selected drug should have anti-microbial, anti-inflammatory, anti-histaminic, anti-spasmodic, anti-oxidant, anti-tussive properties. Among the ten *Swasahara Mahakashaya*, *Shati, Pushkarmoola, Hingu and Ela* have broncho-dilator effect along with anti-inflammatory, analgesics, and Anti-Histaminic effect. Thus, they stabilize mast cells and prevent secretion of inflammatory markers which are main reason for bronchospasm and epithelial shedding which results in airway hyperresponsiveness. Similarly, *Hingu* also has

muscle relaxant action by blocking muscarinic receptors and along with *Agaru* it also possesses Anti-Histaminic and Anti-Microbial action. According to ayurveda point of view, majority of drugs are *Laghu, Teekshna, Ruksha* except for *Hingu* and *Jeevanti*, thus, they may cause *Soshan* of the excessive mucus and relieving the *Srotas Uplepa* (obstruction in channels).

Drug Activity in Restrictive Pathology

Restrictive Dyspnoea is broadly divided in two categories i.e., intrinsic or pulmonary parenchyma and extrinsic or extra pulmonary.[28]While intrinsic restrictive disease directly involves lung parenchyma, extrinsic on the other hand involve neuromuscular causes, obesity or thoracic cage abnormality.[28] Similar to asthma and COPD, Intrinsic disease usually have infective and inflammatory pathology, thus, as established before, the drugs of *Swasahara Mahakashaya* are effective in countering both infective and inflammatory pathology. Along with this, many drugs also have Chemoprotective and Immunomodulatory action, thus, they may help in reversing or restricting the progress of the parenchymal damage done in restrictive disorders.

Extrinsic disease can be grouped into pathologies resulting from reduced muscle tone of respiratory muscles like myopathies or pathology due to deformed rib cage like in kyphoscoliosis and finally space occupation like in pleural effusions. Various drugs like *Chanda* have direct effect in disease like Myasthenia Gravis by inhibiting Acetylcholinesterase.

Drug Activity in Secondary Dyspnoea

In conditions where dyspnoea is secondary to pathology of organs other than lungs the selected drug should be able to have therapeutic effect on the primary cause or organ. Dyspnoea can be of cardiac origin, renal origin and hepatic origin and the drugs like *Shati, Tamalki, Sursa, Ela* and *Hingu* are cardioprotective, nephroprotective and hepatoprotective action. They counter the damage by free radicals and prevent the necrotic changes in hepatocytes, renal vessels, and myocytes.

Oxidative stress is the major contributor for inflammatory response and attracting macrophages and neutrophils to the affected organ. Most of the drugs of *Swasahara Mahakashaya* possesses Anti-Oxidant properties to counter the damage of oxidative stress which prevent the effective uptake of apoptotic cells by macrophages for organ repair. Thus, anti-oxidative properties of these drugs results in proper organ repair.Further, drugs like *Pushkarmoola, Ela, Hingu, Sursa, Amlavetas* counter either the hyperglycaemia or works against raised lipid profile in blood. Thus, they act against complication related to diabetes like diabetic ketoacidosis which may result in secondary dyspnoea. They also lower the lipid or cholesterol level in blood, thus, preventing atherosclerotic changes in vessels and preventing disease of cardiac origin which may lead to dyspnoea.

CONCLUSION

Thus, from above discussion it can be concluded that the all ten drugs mentioned in *Swasahara Mahakashaya* are effective in various conditions causing *Swasa* or dyspnoea either cumulatively or separately. There are various studies done on individual drugs and their action on various systemic pathologies, and these studies establishes effect of these drugs on the respiratory system directly or on various organs like heart, liver and kidney which are directly responsible for basic metabolism and maintaining homeostasis of body.

Acknowledgment- Nil

Conflicts Of Interest- Nil

Source of finance & support – Nil

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REFRENCE

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How to cite this article: Sharma P, Pandey Y.K, Kaushik A "Pharmacological action and Properties of *Swasahara Mahakashaya* in *Swasa Roga:* A Review" IRJAY. [online]2023;6(4);90-98.
Available from: https://irjay.com
DOI link- https://doi.org/**10.47223/IRJAY.2023.6414**

TABLE NO 1: General Information of *Swasahara Mahakashaya* [7]

S.No.	Sanskrit Name	Latin Name	Family	Part Used
1.	***Shati***	*Hedychium spicatum*	Zingiberaceae	Rhizome
2.	***Pushkarmoola***	*Innula Racemose*	Asteraceae	Root
3.	***Ela***	*Elettaria Cardamomum*	Zingiberaceae	Seed
4.	***Amlavetas***	*Garcinia pedunculata*	Guttiferae	Fruit
5.	***Surasa***	*Ocimum sanctum*	Lamiaceae	Leaf, Root, Seed
6.	***Hingu***	*Ferula narthrex*	Umbelliferae	Resin
7.	***Agaru***	*Aquilaria agallocha*	Thymelaeaceae	Heartwood
8.	***Jeevanti***	*Leptadednia reticulata*	Asclepidaceae	Roots
9.	***Tamalki***	*Phyllanthus niruri*	Euphorbiaceae	Whole Plant
10.	***Chanda***	*Angelica archangelia*	Zingiberaceae	Rhizome

TABLE NO 2: Ayurvedic Properties of *Swasahara Mahakashaya* [6]

S.No.	Sanskrit Name	***Rasa***	***Vipaka***	***Virya***	***Guna***
1.	***Shati***	*Katu Tikta Kashaya*	*Katu*	*Ushna*	*Lagu, Tikshna*
2.	***Pushkarmoola***	*Tikta, Katu*	*Katu*	*Ushna*	*Tikshna, Laghu*
3.	***Amlavetas***	*Amla*	*Amla*	*Ushna*	*Lagu Tikshna Ruksha*
4.	***Ela***	*Katu, Madhura*	*Madhura*	*Sheeta*	*Laghu, Ruksha*
5.	***Hingu***	*Katu*	*Katu*	*Ushna*	*Laghu Tikshna Snigdha*
6.	***Agaru***	*Katu Tikta*	*Katu*	*Ushna*	*Tikshna, Ruksha*
7.	***Surasa***	*Katu Tikta*	*Katu*	*Ushna*	*Laghu, Ruksha*
8.	***Tamalki***	*Kashaya, Tikta, Madhura*	*Madhura*	*Sheeta*	*Laghu, Ruksha*
9.	***Jeevanti***	*Madhura*	*Madhura*	*Sheeta*	*Laghu, Snigdha*
10.	***Chanda***	*Tikta ,Katu*	*Katu*	*Ushna*	*Laghu, Tikshna*

TABLE NO 3: Pharmacological Action of *Swasahara Mahakashaya*

S. No.	Properties	Drugs
	Broncho- Dilator	*Shati, Pushkarmoola, Ela, Hingu, Chanda*
	Anti- Histaminic Action	*Shati, Pushkarmoola, Ela, Sursa, Jeevanti, Agaru, Hingu*
	Anti- Inflammatory	*Shati, Pushkarmoola, Ela, Sursa, Jeevanti, Tamalki, Agaru*
	Anti- Microbial	*Hingu, Sursa, Jeevanti, Agaru, Tamalki*
	Immuno- Modulatory	*Surasa, Tamalki*
	Anti-Oxidant Activity	*Sursa, Tamalki, Jeevanti, Amlavetas, Ela, Hingu*
	Cardioprotective	*Amlavetas, Tamalki, Surasa, Ela*
	Nephroprotective	*Amlavetas, Hingu*
	Hepatoprotective	*Shati, Amlavetas*