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THERAPEUTIC EFFECTS OF VYAGHRI JEERAKA AVALEHA IN RESPIRATORY ALLERGIC DISORDERS: A COMPENDIUM REVIEW

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ABSTRACT: Respiratory Allergic Disorders (RADs), including asthma and allergic rhinitis, are increasingly prevalent, especially among children, and significantly affect quality of life. The limitations of conventional therapies in ensuring long-term relief have prompted the search for alternative remedies. Ayurveda attributes RADs to vitiation of Vata and Kapha doshas and considers impaired immunity due to Ama formation as a key pathological factor. Vyaghri JeerakaAvaleha, an Ayurvedic polyherbal formulation comprising *Solanum surattense* (Vyaghri), *Cuminum cyminum* (Jeeraka), *Emblica officinalis* (Amalaki), and Madhu (Honey), offers a multifaceted approach to the management of RADs. This review compiles pharmacological and Ayurvedic evidence highlighting the formulation's anti-asthmatic, bronchodilatory, antitussive, anti-inflammatory, and immunomodulatory effects. Vyaghri exhibits bronchodilatory and anti-histaminic properties, while Jeeraka and Amalaki contribute to immune modulation and digestive stimulation, potentially addressing gut dysbiosis often linked with allergies. Madhu enhances bioavailability and contributes anti-inflammatory benefits. Together, these ingredients synergistically work through Rasayana (rejuvenation), Deepana (appetizing), Pachana (digestive), and Vata-Kapha-hara actions to alleviate symptoms and reduce recurrence of RADs. This integrative review supports the potential of Vyaghri JeerakaAvaleha as an effective and sustainable alternative therapy for respiratory allergies by addressing their root cause through immune modulation and systemic detoxification.

INTRODUCTION: Respiratory Allergic Disorders (RADs), including asthma, chronic rhinosinusitis and allergic rhinitis, constitute the most common allergies worldwide and major public health problem for morbidity and impact on quality of life. These diseases are caused by an impaired immune function. High recurrence rates, the steadily rising incidence rates of these diseases are increasing attention of the health workers and researchers.

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Respiratory allergies in children are a growing health concern worldwide, affecting the quality of life including sleep, indoor and outdoor activities, school attendance, and overall well-being of young individuals. The prevalence of respiratory allergies among children in India continues to rise, particularly in urban and industrialized regions.

Recent data suggest that approximately 15–20% of children in urban areas suffer from allergic rhinitis [1], while childhood asthma affects around 7.9% of the paediatric population [2]. Available conventional managements like pharmacotherapy, immune-therapy, decongestants *etc*. are not sufficient to prevent the recurrence as they demand a persistence adherence to these treatments apart from the serious complications.

Also, these medicines lack long-term sustained effect. So, there is an increased need for some alternative remedies providing not just a symptomatic relief but also preventing the recurrence.

According to Ayurveda, respiratory allergies constitute *swas* and *pratishyaya* which are the disease entity of the *pranavahasrotas* (respiratory system). Ayurveda offers a natural approach to addressing these issues by focusing on strengthening the immune system and preventing recurrent infections. Understanding Ayurveda's perspective on the prevention and treatment of respiratory conditions helps build a strong foundation for the immune system. *Vyaghri jeerakaavaleha* is an Ayurvedic formulation mentioned in *Bharat Bhaishajya Ratnakara* for the management of *tamakaswas* [3]. It is supposed that *Vyaghri JeerakaAvaleha* can be a potential drug for the management of Respiratory allergic disorders-allergic asthma and allergic rhinitis. The study is done to explore the probable mode of action of *Vyaghri JeerakaAvaleha* on various respiratory allergic disorders.

MATERIALS AND METHODS: A literature search was undertaken to identify and map out relevant and pertinent articles related to the medicinal properties of different ingredients of *vyaghrijeerakaavaleha*, Review of different ayurveda literatures as a primary source of data along with the literature review as secondary data from reputed journal papers and other e-resources documenting the concept of anti asthmatic, antiinflammatory, immunomodulatory, bronchodilatory effect of *Vyaghri (Solanum surattense), Jeeraka (Cuminum cyminum) and Amalaki (Emblica officinalis)* were done.

TABLE 1: INGREDIENTS OF *VYAGHRI JEERAKAAVALEHA* [4]

S. no.	Name	Botanical Name	Family	Part Used	Quantity
1.	*Vyaghri/Kantakari*	*Solanum surattense* Burm.f.	Solanaceae	Panchanga (Whole plant)	1 Part
2.	*Jeeraka*	*Cuminum cyminum* Linn.	Umbelliferae	fruit	1 Part
3.	*Amalaki*	*Emblica officinalis* Gaertn.	Euphorbiaceae	fruit	1 Part
4.	*Madhu*	-	-	-	q.s.

TABLE 2: PHARMACODYNAMIC ATTRIBUTES OF INGREDIENT OF *VYAGHRI JEERAKAAVALEHA*

S. no.	Dravya	Rasa	Guna	Virya	Vipaka	Karma
1	*Vyaghri (Kantakari)*	*Tikta, Katu*	*Laghu, Ruksha, Tikshna*	*Ushna*	*Katu*	*KaphaVatashamaka, Jwarahara, Shwas-kasa hara, Pinasa, parshvapidahara* [5]
2	*Jeeraka*	*Katu*	*Laghu, Ruksha,*	*Ushna*	*Katu*	*Deepana, Pachana, jwaraghnam, kaphapaham, Vatanulomak* [6]
3	*Amalaki*	*Pancha rasa (lavanavarjita), amla pradhan*	*Guru, ruksha, sheeta*	*Sheeta*	*Madhura*	*Rasayan*[7]*, kaphapittahara* [8]*, sarvadoshaghna* [9]
4	*Madhu*	*Kashaya, Madhura,*	*Ruksha, Sukshma*	*Sheeta*	*Katu*	*Chhedana, Yogavahi* [10]*, Sukhshmamarganusari, Vatakaphagnam, Tridoshaprasaman, Shwasakasahara, Agnideepana* [11]

RESULTS:

***VYAGHRI* (*Solanum xanthocarpum/ surattense*):** *Solanum surattense* Burm.f. (Yellow Berried Night Shade, *Vyaghri* in Sanskrit; Family-Solanaceae) is a popular medicinal plant and is also mentioned as a *Kasahara* (antitussive) and *Swasahara* (anti asthmatic) drug in Ayurvedic literatures and *Nighantus*. It is reported to contain Flavonoids, Triterpenoids, Tannins, Saponins, solanocine. This plant is pharmacologically studied for Anti - asthmatic, Anti- bacterial, Antioxidant, Anti - malarial property.

Anti Histaminic and Anti Allergic Property: *Solanum surattense,* is otherwise known as *Solanum xanthocarpum* (SX). Gautam *et al.* (2008) evaluated the therapeutic effect of ethanolic extract of SX i.e. asthma relieving or antihistaminic, antiallergic property. Further, the ethanolic (95%) extract (SXEX) showed antihistaminic, mast cell stabilizing and decreased capillary permeability effect and hence possesses potential role in the treatment of asthma and allergic disorders [12].

Anti-asthmatic and Bronchodilatory Effect: In patients with mild to severe asthma, treatment with *Solanum xanthocarpum* increased pulmonary function to a significant extent. It was suggested that relief from the bronchial asthma symptoms produced by *Solanum xanthocarpum* Schrad and Wendl could be due to a bronchodilator effect, decreased bronchial mucosal edema, reduced secretions inside the lumen of the airway [13, 14]. In a pilot experiment on the clinical efficacy and safety of a single dose of *S. surattense*, in mild to moderate bronchial asthma resulted in relief from asthmatic symptoms after 1 h, and its effect lasted for about 6–8 h. The respiratory functions (FVC, FEV1, PEFR, and FEF25–75%) were also assessed using a spirometer before and 2 hours after oral administration of 300 mg powder of the whole plant *S. surattense*. Treatment with *S. surattense* significantly improved the various parameters of pulmonary function in asthmatic subjects [15].

Further, the clinical efficacy of *S. surattense* and *S. trilobatum* in in bronchial asthma was studied. For clinical efficacy, a dose of 300 mg for 3 days was administered orally in mild to moderate bronchial asthma. *S. surattense* and *S. trilobatum* produced a progressive improvement in the ventilatory function of asthmatic individuals over 3 days. The scores for rhonchi, cough, breathlessness, and sputum decreased with these drug treatments. The improvement in PEFR and the reduction in other symptom scores clearly indicate a bronchodilator effect and a decrease in edema and secretions in the airway lumen. These clinical trials proved the anti-asthmatic potential, which is important for the management of asthma [16]. Another experiment was performed by Divya *et al.* (2013) where anti-asthmatic activity of the polyherbal ayurvedic drug was observed in *in-vitro* and in-vivo conditions. This trial on 60 patients of bronchial asthma resulted in significant improvement in pulmonary expiratory flow rate (PEFR), forced vital capacity (FVC), and forced expiratory volume (FEV), indicating that constant improvement was observed throughout the follow-up with no recurrence of bronchial constriction [17].

Anti-Inflammatory Activity: Stigmasterol, carpesterol and diosgenin in *Solanum xanthocarpum* showed Antiinflammation Effect [18, 19]. Lupeol in *Solanum xanthocarpum* Schrad. & Wendl. also acted as multi-target agent with immense anti-inflammatory potential, targeting key molecular pathways, which involved nuclear factor kappa B (NFkB), cFLIP, Fas, Kras, phosphatidylinositol-3-kinase (P13)/Akt and Wnt/β catenin in a variety of cells. Lupeol at its effective therapeutic doses exhibited no toxicity to normal cells and tissues. Hence, it may serve as a therapeutic agent for treatment of inflammation [20]. The anti-inflammatory effects of ethanolic leaf extracts was investigated using Sprague-Dawley rats (140–160 g) in a carrageenan-induced paw edema model. The extract (50–400 mg/kg, p.o.) significantly inhibited paw swelling at doses of 100, 200, and 300 mg/kg, with edema inhibition percentages of 31.57%, 46.31%, and 45.26%, respectively, at 3 hours. These results were highly significant ($p < 0.01$) compared to the control [21].

***JEERAKA* (*Cuminum cyminum* Linn.):** *Cuminum cyminum* Linn. (Cumin, *Shveta-jeeraka* in Sanskrit; Family-Umbellifera) is containing of alkaloid, coumarin, flavonoid, resin, saponin, tannin, protein, steroid. Pharmacological studies revealed that it exerted antimicrobial, anti-inflammatory, antioxidant, analgesic, bronchodilator effects.

Effect on Allergic Rhinitis: A study investigated the effect of oral administration of *Cuminum cyminum* L. (cumin) seeds aqueous extract (CAE) in ovalbumin (OVA)-induced allergic rhinitis. The oral administration of CAE (25 mg/kg) reduced the sneezing frequency of OVA-induced allergic rhinitis mice model. The serum immunoglobulin E and IL-4 levels were also reduced, and the oral administration of CAE also reduced the production of T-helper type-2 (Th2) cytokines (IL-4, IL-5, IL-10, and IL-13) in the splenocytes of the model mice. Additionally, a significant increase in the ratio of Th1 to Th2 cells was observed in the CAE-administered group. Findings suggest that the administration of CAE improves T cell balance, the dominant state of Th2, and alleviates allergic rhinitis symptoms [22].

Antitussive Activity: The aqueous extract of cumin was reported to show antitussive effect and exhibited relaxant effect on guinea pig isolated tracheal chain by its stimulatory effect on beta-adrenoreceptors and/or histamine H1 receptors [23, 24].

Immunomodulatory Effect: Oral treatment with cumin exhibited immunomodulatory properties in normal and immune-suppressed animals by means of modulation of expression of T lymphocytes in a dose-dependent manner. Additionally, it stimulated the expression of T cells (CD4 and CD8) and Th1 cytokines in normal and cyclosporine-A induced immune-suppressed mice. The active compound of cumin opposed the depleted T lymphocytes, reduced the elevated corticosterone levels, decreased the size of the adrenal glands and increased the weight of spleen and thymus in restraint stress-induced immune-suppressed animals [25].

Drug Bioavailability Enhancing Activity: A significant pharmacokinetic interaction of some herbal products from cumin with anti-tubercular drugs has been established. An aqueous extract derived from cumin seeds exhibited a significant enhancement of rifampicin levels in rat plasma [26, 27].

The effect of cumin seeds on the digestive enzymes of the rat pancreas and intestinal mucosa was investigated as a result of both continuous dietary intake and single oral administration. Dietary (1.25%) cumin lowered the activity of pancreatic lipase, whereas the activities of pancreatic trypsin, chymotrypsin, and amylase were significantly enhanced by the same [28]. Single oral dose, of cumin exerted a lowering effect on pancreatic lipase, amylase, trypsin, and chymotrypsin. Among the terminal digestive enzymes, a small intestinal maltase activity was significantly higher in animals fed with cumin, whereas lactase and sucrose were unaffected [29].

It was also observed that dietary cumin had a significant stimulatory effect on bile flow rate, the extent of increase in bile volume being 25%, whereas its single oral dose did not have any effect on bile secretion rate [30]. Dietary intake of cumin had a profound influence on bile acid output (quantity secreted per unit time), bile acid secretion being as high as 70 per cent over the control. Similar significant increases in bile acid secretion were seen in the case of cumin when administered as a single oral dose. Since bile juice makes a significant contribution to the overall process of digestion and absorption, essentially by supplying bile acids required for micelle formation, it is expected that cumin, which has a digestive stimulant action, could do so by stimulating biliary secretion of bile acids. An increase in enzymatic (amylase, lipase, protease, and phytase) activities and antioxidant activity were achieved with saline and hot aqueous cumin extracts, as well as its oleoresin and essential oil [31].

***Amalaki* (*Emblica officinallis* Gaertn.):** *Emblica officinalis* Gaertn (Indian gooseberry, *Amalaki* in Sanskrit; Family: Phyllanthaceae) is mentioned as a *Rasayana* drug in Ayurveda classical texts [32]. According to the two main classic texts on Ayurveda *CharakaSamhita* and *Sushrut Samhita*, *Amalaki* is regarded as "the best among rejuvenative herbs, and "the best among the sour fruits." Fruits of *E. officinalis* have been used for thousands of years in traditional Indian medicine for the treatment of various diseases. So, it is one of the major components in many herbal formulations. The pharmacological studies revealed that *Amalaki* has antitussive, antioxidant, immunomodulatory and anti -inflammatory effect. *E. officinalis* exhibits favourable immunomodulation capacity. It is responsible for nonspecific stimulation of the activity and adequacy of granulocytes, macrophages, natural killer cells, and white blood cells and also for the generation of different effective molecules secreted by activated cells. Consumption of *amla* also enhanced spleen weight that is a secondary lymphoid organ carrying many phagocytes as well as T and B lymphocytes.

Antitussive Activity: *Emblica officinalis* (EO) was investigated for its antitussive activity in conscious cats by mechanical stimulation of the laryngopharyngeal and tracheobronchial mucous areas of airways. The antitussive activity of EO was more effective than the non-narcotic antitussive agent dropropizine but less effective than exhibited by the classical narcotic antitussive drug codeine. It is assumed that the dry extract of EO exhibit antitussive activity due to antiphlogistic, anti-spasmolytic and antioxidant effects, along with its effect on mucus secretion in the airways [33].

Immunomodulatory and Antioxidant Properties: A significant reduction in erythrocyte hemolysis induced by hydrogen peroxide was

observed using *amla* extract (P<0.05) shows significant protective potential against lipid peroxidation [34]. Arsenic induced oxidative stress and apoptosis significantly protected by co-treatment with *amla* due to its strong antioxidant potential [35]. There was significant dose dependent increase in haemagglutination antibody titre, sheep red blood cells induced delayed type of hypersensitivity reaction, macrophage migration index, respiratory burst activity of the peritoneal macrophages, total leukocyte count, percentage lymphocyte distribution, serum globulin and relative lymphoid organ weight in *Emblica* treated mice indicating its ability to stimulate humoral as well as cell mediated immunity along with macrophage phagocyte [36]. The antioxidant and immune-modulatory properties of *Amla* was investigated using chromium (VI) as an immunosuppressive agent. It was found that *amla* consumption significantly inhibited Chromium (Cr)-induced free radical production and restored the antioxidant status back to control level. Further *amla* inhibited apoptosis and DNA fragmentation induced by Cr and also inhibited lymphocyte production [37].

Amla showed protective effect against apoptosis of lymphocytes, oxidative damage, and decrease in cell viability in mice caused due to arsenic [38]. Sharma *et al.* (2009) also noticed that addition of amla extract to the diets of mice before and after intoxication with arsenic led to a reduction in oxidative stress in liver. This shielding effect of amla was attributed to its phytochemical constituents that allow maximum conjugation with free radicals thus, decreasing their number and extent of cellular damage [39].

Amla was also found to be very effective in decreasing cyclophosphamide-caused inhibition of humoral immunity in mice. It was shown that in normal animals, antioxidative enzyme amount returned to normal level even in case of cyclophosphamide toxication after supplementation of amla extract in their diet [40]. One study showed that *Triphala* (*Amalaki*, *Emblica officinalis*, one of the ingredients) alleviated bronchial hyper-reactivity through immunomodulation and anti-oxidative pathways in OVA-induced asthma models in murines. Further, some of the airway hypersensitivity endpoints using a whole-body plethysmograph, such as improvement of the pulmonary Penh value, have revealed that *Triphala* is superior to classical treatments such as the corticosteroid budesonide [41].

Madhu/ Honey:

Anti Asthmatic Activity: Combining honey and *Nigella sativa* (NS) showed significant improvement in all pulmonary functions, including forced expiratory volume (FEV1) (P <0.001), forced vital capacity (FVC) (P = 0.002), and peak expiratory flow rate (PEFR) (P <0 .001), both in moderate and severe, uncontrolled persistent asthma compared with baseline. Asthma control test scores also significantly (P <0.001) improved in patients using combinations of honey and NS compared with baseline. Patients with a less severe grade of asthma showed a significant positive response in clinical parameters upon using honey. Another study showed that using celery seeds and honey was associated with clinical improvement of both lung functions, FEV1 (P <0.001) and FVC (P <0.001), and respiratory parameters compared with baseline [42].

Immunomodulatory Effect: A significant 22-amino acid fragment included in honey bee venom, mast cell degranulating peptide (MCDP) has significant immunological and pharmacological and anti-inflammatory properties, especially at low doses, it also has a significant impact on mast cell degranulation and histamine release [43].

Anti-Inflammatory Effect: Recent research in late 2019 showed that in-vitro treatment of the lipopolysaccharide (LPS)-stimulate macrophages with stingless bee honey inhibited the TNF-α parameter by 23.0% and IL-6 secretion was reduced by 43.9%. Stingless bee honey also significantly reduced interferon secretion with inhibition of up to 88.8% (14) [44]. The findings of this study aligned with previous in-vivo research where stingless bee honey decreased the circulating levels of C-reactive protein (CRP), TNF-α, IL-1β, IL-6, IL-8 and monocyte chemoattractant protein-1 (MCP-1). It also diminished NF-κB and p38 mitogen-activated protein kinase (MAPK) signaling in different tissues of LPS-induced rats. Simultaneously, stingless bee honey boosted antioxidant defenses and showed a capability to reduce inflammation [45].

Effect on Respiratory Disorders: The antibacterial properties of the honey may be attributed to its phenolic components [46]. Researches have investigated the possible uses of Tualang and Kelulut honeys in pulmonology [47]. These varieties of honey are intriguing for treating bronchitis, asthma, and respiratory tract infections due to their antibacterial and anti-inflammatory qualities [48]. Further, their mucolytic and cough-suppressant qualities may alleviate symptoms of respiratory disorders. Studies report that inhalation of honey reduced the inflammation of the lower airways in a rabbit model of ovalbumin-induced chronic asthma [49]. Another study documented that the ingestion of honey in high doses (1 g/kg body weight daily for four weeks) showed improvement in the overall symptoms of allergic rhinitis even one month after the end of treatment [50].

Gelam honey administration *via* oral gavage in mice and aerosolised Gelam honey in rabbits reduced airway inflammation by reducing the inflammatory cell [51]. Gelam honey alleviated the histopathological changes in a mouse model of allergic asthma. Treatment with aerosolized Gelam honey reduced the number of airway inflammatory cells present in bronchoalveolar lavage fluid and inhibited goblet cell hyperplasia in a rabbit model of ovalbumin-induced chronic asthma.

DISCUSSION: Respiratory allergic disorders are very common morbidity in children leading to headaches, fatigue, limit day to day activities, interferes with sleep and therefore leads to school absenteeism and poor school performance. Conventional management including antibiotics, antipyretic, anti-inflammatory, antihistamines, bronchodilators, mast cell stabilizers, decongestants, and corticosteroids are not promising in preventing the recurrences. Ayurveda explains the pathology of respiratory allergies as immune dysfunction which is due to formation and accumulation of *Ama* (undigested intermediate product) and *Kapha dosha*. As per Ayurveda, the drugs which are *Vata-kapha-hara, swasa-kasa-pratisyaya hara, rasayana* and *Deepana- pachana* property are supposed to be effective in alleviating the symptoms of RADs. Ayurveda has potent drugs possessing immunomodulatory, anti-allergic, anti-inflammatory, bioavailability enhancing which can break the pathology of allergic respiratory disorders at various levels of pathology. The ingredients of *Vyaghri jeerakaavaleha* has similar properties which can effectively break the pathology of RADs.

Ayurveda emphasizes on potentiating and correcting the immune system in children as the immune system goes wrong in cases of respiratory allergies. RADs can be comparable to *vata kapha dosha* predominant disorders of the respiratory system and the drugs having *vata kapha hara, swaskasa hara* properties are beneficial in RADs.

The drug *Vyaghri (Solanum surattense*), itself is *ushnaveerya* and posseses *swas-kasa-peenasa* and *parshwapidahara* (anti-asthmatic, anti-tussive, effective in chronic rhinitis and chest pain) property *(Bhavprakash*). The antihistaminic, anti-allergic, anti-asthmatic bronchodilatory and anti-inflammatory property of *Vyaghri* very well explain its effect on RADs. *Amalaki* and *Jeeraka* possess immunomodulatory activity which is very crucial in the management of RADs as correction of immune system is most important in allergic disorders. The immunomodulatory effect can help in preventing the recurrences and may lead to sustained effect. Changes in microbiome contribute to severity of allergic asthma [52], the *deepana* and *pachana* properties of *jeeraka* and *madhu* is beneficial in correcting the gut dysbiosis (*Ama dosha*). Further, *Jeeraka* possesses bioavailability enhancing property which help in increasing the potential of the drug. *Madhu* possesses *vata-kaphahara* property which is one of the pathological factors in RADs management. Also, *madhu* is anti-asthmatic and has potential effect on respiratory system disorders. It is immunomodulatory and anti-inflammatory.

CONCLUSION: Present review reveals that the ingredients of *Vyaghri jeerakaavaleha* possess anti-asthmatic, anti-histaminic, antitussive, immuno-modulatory and anti-inflammatory bioavailability enhancing properties which are crucial in the management of respiratory allergic disorders. The *vata-kapha-hara, swas-kasa-hara, rasayana, deepana-pachana* properties of *vyaghri jeerakaavaleha* collectively break the pathology of respiratory allergies at various levels and therefore it can be assumed that the drug *vyaghri jeerakaavaleha* is a potent drug for the

management of Respiratory allergies providing sustained effect.

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