



Potential Herbs for Upper Respiratory Illness and their Current Utility

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ABSTRACT

Current health crisis need a holistic approach to counter. Ayurveda is one of the oldest system for health management. History reveals, India had managed pandemics through natural ways of treatment. Author has attempted a preliminary compilation of in vitro, in vivo and clinical studies related to commonly used Ayurveda herbs or formulations for upper respiratory ailments. Author suggest compiled remedies as a prophylactic, preventive or rehabilitative measure to counter upper respiratory tract symptoms of common origin during current health crisis.

Keywords: *Ayurveda, upper respiratory tract, Covid19, clinical studies, in vitro, in vivo, herbs, plants*

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INTRODUCTION

COVID-19 Disease is a pandemic originated in China and spread globally. Single strand RNA virus is responsible for Covid-19 isolated from different animal species having potential to cross species barriers and can cause acute to severe illness in humans [1]. Seven human CoVs(HCoVs) stains have been identified which can infect humans. These viruses are responsible for about 5% to 10% of acute respiratory infections [2]. Patients usually presents with symptoms of upper respiratory tract viral infections, including mild fever, cough (dry), sore throat, nasal congestion, malaise, headache, muscle pain. Loss of taste and/or smell, diarrhea has also recognized as presenting complains of Covid-19 [3]. Although extra-pulmonary symptoms are not certain, mostly originating from the gastrointestinal tract, hepatic and neurological disease.

Ayurveda has legacy of thousands of years and rich repertoire of single herbs, poly-herbal formulations, and herbo-minerals known to have potential action on respiratory tract infections. In this scenario of drug resistance for some acute and chronic infection as well as no specific treatment available for Covid-19, Ayurveda may emerge as a probable solution. Ayurveda prevents ageing increases longevity and offer resistance to disease by modulating the immune system [4]. In present review author has attempted to compile studies related to potential herbs, formulations which holds promising effects in upper respiratory tract infections and anti-inflammatory properties.

HERBS

Adhatoda vasika

Adhatoda vasika (Vasa) is a commonly available plant throughout India belonging to family Acanthaceae. It is under medicinal use since thousands years in traditional and folk medicine. Ethanolic extract of *Adhatoda vasica* known to have antitussive activity [5]. It is traditionally used for wound healing, skin disorder, upper respiratory disorders [6]. Ethyl acetate extract and methanolic extract of *Adhatoda vasica* inhibits the cough reflex [7]. Methanolic extract of *Adhatoda vasica* reduces the induced inflammation in hen's egg exhibiting anti-inflammatory effect [8]. In a randomized, double blind clinical trial of Kanjhang oral solution in non-complicated acute respiratory infections significant reduced the frequency of

coughing, efficacy of mucous discharge in the respiratory tract and degree of nasal congestion suggestive of antitussive and anti-inflammatory properties [9]. *Vasa avaleha* (a Ayurveda formulation predominantly having *Adhatoda vasica*) and granules showed mild to moderate improvement in the symptoms of bronchial asthma in a double blind clinical trial [10].

Inula racemosa (Pushkarmool)

Pushkarmool (*Inula racemosa*) belongs to family Asteraceae and found in south east Asia and Europe. Traditionally it is used to cure fever, swelling, anorexia, chest pain (*Parshwashool*) and breathlessness. Many polyherbal formulations therapeutically used for cardiovascular disorders, hepatic and spleen ailments have *Inula racemosa* as main ingredient [11]. Petroleum ether extract showed anti-asthmatic activity and significant antagonist effect on histamine induced contraction, and protection against mast cell degranulation in an *in vivo* study done in wistar rats. Anti histaminic activity of *Inula racemosa* was also recorded in the goat tracheal chain [12]. Details of studies are summarised in Table 1.

Glycyrrhiza glabra (Yashtimadhu)

Glycyrrhiza glabra is the member of family Fabaceae having more than 30 species in genus *glycyrrhiza* distributed all over the world. Commercially it is cultivated in northern part of India and Afghanistan [13]. *Glycyrrhiza glabra* is considered as a traditional drug for many minor to major ailments and acts as ulcer protective, purgative, demulcent, expectorant, antitussive and so on [14]. Ethanolic extract of *Glycyrrhiza glabra* showed antitussive effect and inhibits the cough reflex in albino mice [15]. Water extracted polymer of *Glycyrrhiza glabra* possess good antitussive activity due to presence of arabinogalactan in guinea pigs [16]. Crude extract of licorice compounds i.e. liquiritin apioside, liquiritin, liquiritigenin exhibits potent antitussive activity in male ICR mice [17]. Double blind randomized clinical trial on ASMATUS having *Glycyrrhiza glabra* reduced the frequency of cough and night awakening in 46 asthmatic patients [18].

Clerodendron serratum (Bharangi)

Clerodendrum serratum belongs to family Lamiaceae. This plant is native to East India distributed in lower Himalayas, Bihar, West Bengal, and Sri Lanka. It is diversely used for bodyache, ulcers, wounds, ophthalmia, rheumatism, asthma, bronchitis and tuberculosis in Ayurveda [19]. It is chiefly known for its action on respiratory system. *Clerodendrum serratum* has a potent antihistaminic action due to inhibition of inflammatory mediators like serotonin, histamine and prostaglandin through cyclo-oxygenase inhibition [20]. Icosahydrapicenic acid (IHPA) extracted from ethanolic extract inhibits the histamines in goat tracheal chain preparation [21]. In patients of bronchial asthma (*Tamak shwasa*), *Clerodendrum serratum* root extract (*Bharangi mool arka*) nebulization significantly reduced breathlessness, wheezing, difficulty in speech, cough, sputum production, chest tightness [22]. Details are summarised in table 1.

Piper longum (Pippali).

Piper longum belongs to family Piperaceae and habitat mainly to tropical and subtropical regions [23]. It possesses hepato-protective, anti inflammatory, antioxidant, analgesic, anti microbial, and antiplatelet activity [24]. Different extracts of *Piper longum* (*Pippali*) showed potent antitussive activity and significantly suppressed the cough reflex in chemically induced cough in guinea pigs [25]. *Piper longum* also possess anti histaminic properties and activity against H₁ receptor antagonist [26]. Clinical trial on *Pippali Rasayana* (a Ayurvedic formulation having piper long as a main constituent) recorded the reduction in cough, wheezing, sputum, dyspnoea on exertion, and nocturnal dyspnoea [27]

FORMULATIONS

Sitopaladi churna is a commonly used formulation for upper respiratory ailment in ayurveda. It contains *Sitopala* (sugar), *Vamasarocana* (*Bambusa arundinaceae* Retz.), fruit of *Pippali* (*Piper longum* Linn.), Seeds of *Ela* (*Amomum subulatum* Roxb.) and *Tvak* (bark of *Cinnamomum zeylanicum* Blume.). It significantly protects the mast cell degranulation in wistar albino rats [28] and inhibits the milk induced leukocytosis showing anti allergic activity [29]. It also exhibit antitussive property probably mediated by opioid system and GABA-ergic system [30]. In the patients of uncomplicated bronchitis *Vyaghri haritaki*, a formulation having *Kantakari* (*Solanum surratense*) and *Haritaki* (*Terminalia chebula*) as main ingredient showed mild to moderate relief in productive cough, dyspnoea, nasal congestion respectively [31]. In a clinical trial done on 23 patients of childhood bronchial asthma supports that *Swas Kasa Chintamani Rasa* (a Ayurvedic herbs-mineral preparation) has significant effect in symptom relief in childhood bronchial asthma [32] Table 2.

Table 1: Herbs used in treatment of upper respiratory tract infections

Herb Name	Study Name	Study Model	Preparation	Dose	Results	Reference
<i>Vasa</i> (<i>Adhatoda vasica</i>)	<i>In Vivo</i>	Male Haffkine Guinea Pigs Male Norwegian Rabbits Cough induced by aerosol and mechanically	Ethanollic Extract	5, 10, 20mg/kg Intravenous	Antitussive activity was recorded on all doses.	[5]
				5mg/kg(i.v.)	Slightly reduced the coughing.	
				20mg/kg(i.v.)	completely inhibited the mechanically induced coughing.	
	<i>In Vivo</i>	Albino mice of either sex Cough induced by SO ₂ (Sulphar dioxide)	Ethanollic extract	200mg/kg (p.o.)	43.02% inhibition of cough	[7]
	<i>In Vivo</i>	Swiss Albino Mice of Either Sex	Ethyl Acetate extract AV	500mg/kg	81% inhibition of cough reflex at 120min	[8]
Methanollic Extract AV			500mg/kg	80% inhibition of cough reflex at 120min		
	<i>In Vivo</i>	Fertile Hen's Egg	MeOH Extract AV	25µg/pellet	15% reduction in inflammation	[33]
50µg/pellet				26.67% reduction in inflammation		
100µg/pellet				64.10% reduction in inflammation		
200µg/pellet				70% reduction in inflammation		
	Randomized controlled double blind Clinical Trial	Patients of non complicated acute respiratory infections	Kanjhang® oral solution (extract of <i>Echinacea purpurea</i> , <i>Adhatoda vasica</i> , <i>Eleutherococcus senticosus</i>)	30ml(15-25mg/ml) thrice in a day for 6 days	Significant reduction in the frequency of coughing, efficacy of mucous discharge in the respiratory tract and degree of nasal congestion	[9]
	Open label randomized clinical study	66 patients of Tamak Shwasa	Vasa Avaleha and Vasa Avaleha Granules	Group A Vasa Avaleha	25.93% Moderate improvement, 66.67% mild improvement	[10]
Group B Vasa Avaleha Granules 6gm with lukewarm twice a day				32.26% Moderate improvement 64.52% mild improvement		
Pushkarmul (<i>Inula racemosa</i>)	<i>In Vivo</i>	Wistar Rats	Petroleum ether extract	4mg/mL 10mg/mL	Significant antagonist effect on histamine induced contraction, protection against mast cell degranulation shows anti-asthmatic activity.	[12]

	<i>In Vitro</i>	Goat Tracheal Chain Contraction produced by histamines	Petroleum Ether Extract	4mg/ml 10mg/ml	55.41±3.04 Significant antagonistic effect on histamine induced contraction 48.87±1.36 Exert significant and reduces the contraction	[12]
<i>Yashtimadhu (Glycyrrhiza glabra)</i>	<i>In Vivo</i>	Albino mice of either sex Cough induced by SO ₂	Ethanollic Extract	200mg/kg	Significant anti tussive effect recorded 41.17% cough reflex inhibited.	[34]
	<i>In Vivo</i>	Guinea pigs Cough induced by citric acid	Water Extracted Polymer	50mg/kg b.w.	GG contains arabinogalactan which posses good anti tussive property without having any toxic agent	[16]
	<i>In Vivo</i>	Male ICR Mice Cough Induced by ammonia liquor	Crude extract of licorice	50mg/kg per oral	Licorice compounds liquiritin apioside, liquiritin, liquiritingenin exhibits potent antitussive activity. Reduces the cough by 30-78%	[17]
	Double Blind Randomized Clinical Trial	46 patients with intermittent asthma	ASMATUS having GG	5ml 3 times in a day for 5days	Significantly reduced the frequency of cough and night awakening due to cough	[18]
<i>Bharangi (Clerodendrum serratum)</i>	<i>In Vivo</i>	Mice	Alcoholic extract of <i>C. serratum</i> roots	100 & 200mg/kg (i.p.)	Potent antihistaminic activity reported. Probable action was through inhibition of inflammatory mediators like serotonin, histamine and prostaglandin due to COX inhibition.	[20]
	<i>In Vitro</i>	Goat tracheal tissue was obtained immediately after sacrificing the animal	Ethanollic extract of <i>C. serratum</i> roots	10µg/ml	Icosahydrapenic acid (IHPA) extracted from ethanollic extract inhibits the contraction produced histamines in goat tracheal chain preparation.	[21]

	Open label single center prospective clinical study	30 Patients of Tamak Shwasa (Acute Exacerbation Bronchial asthma)	Bharangi Mool Arka Nebulizer	Nebulization with 5ml three times in a day	Significant reductions were seen in breathlessness, wheezing, difficulty in speech, cough, sputum production, chest tightness.	[22]
<i>Pippali</i> (<i>Piper longum</i>)	<i>In vivo</i>	Guinea pigs Cough was induced by the inhalation of citric acid aerosol	Water Extract of <i>Piper nigrum</i> fruits	50mg/kg (b.w.) (p.o.)	69.4% Suppression of cough exhibit highest antitussive activity due to presence of both pectic polysaccharide and piperine.	[25]
			EtOH Precipitated one	50mg/kg (b.w.) (p.o.)	50.2% suppression of cough Moderate antitussive activity.	
			EtOH Soluble Fraction	50mg/kg (b.w.) (p.o.)	38.1% Suppression of cough shows least activity due to lowest piperine content.	
	<i>In vitro</i>	Guinea pig ileum Contraction was induced by using 10µg/mL of Histamine	Extract of fruits of piper longum	100µg/mL	Significantly inhibits the contraction in which shows H ₁ receptor antagonist activity and anti asthmatic properties.	[26]
	Clinical Trial	32 Patients of different respiratory disorders	<i>Pippali Rasayana</i>	2.5gm/day for 45days	Cough, Wheezing, Sputum, Dyspnoea on exertion reduced, Nocturnal Dyspnoea.	[27]

Table 2 Formulations used in treatment of upper respiratory tract infections

Drug Name	Study Name	Study Model	Preparation	Dose	Results	References
Sitopaladi Churna (combination of Sitopala (sugar), <i>Vamasarocana</i> (<i>Bambusa arundinaceae</i> Retz.), fruits of Pippali (<i>Piper longum</i> Linn.), Seeds of Ela (<i>Amomum subulatum</i> Roxb.) and Tvak (bark of <i>Cinnamomum Zeylanicum</i> Blume.)	<i>In Vivo</i>	Wistar Albino Rats Allergy induced by compound 48/80 rats were sensitized with s.c. injection of the compound	Methanolic Extract	150mg/kg 300mg/kg (p.o.) For 14days	65-74% protection of mast cell degranulation	[28]
	<i>In Vivo</i>	Albino rats Leukocytosis induced by milk in a dose of 4ml/kg	<i>Sitopaladi Churna</i>	36mg/0.5ml (p.o.) 180mg/0.5ml (p.o.)	Statistically not significant Inhibits the milk induced leukocytosis by 59.57%	[29]

				360mg/0.5ml (p.o.)	Reduces the milk induced leukocytosis by 65.95%	
	<i>In Vivo</i>	Guinea Pigs Chemically cough induced by Citric acid aerosols	<i>Sitopaladi Churna</i>	2.5mg/kg (b.w.) (p.o.) in saline	Cough reduced by 94.28% this antitussive activity probably mediated by Opioid System and GABA-ergic system.	[30]
<i>Vyaghriharitaki Avaleha</i>	Clinical Trial	Total 66 Patients suffering from uncomplicated bronchitis	<i>Vyaghriharitaki Avaleha</i>	10gm twice a day with lukewarm water before meal for 12wk	11.48% patients shows marked improvement in the symptoms, 55.74% moderate improvement, 24.59% mild response while 8.20% no significant change. 68.9%, 83.3%, 97.6% relief in productive cough, dyspnoea, nasal congestion respectively.	[31]
<i>Swas Kasa Chintamani Rasa</i>	Clinical Trial	Total 23 patients having symptoms cough, fever, breathlessness, running nose, wheezing	<i>Swas Kasa Chintamani Rasa</i>	4 mg/kg/dose Twice in a day in powdered form mixed with Garlic: Ginger: Honey (GGH) [in 1:2:4 ratio] for 45 days.	Findings of this study suggest that SKCR has significant effect in the childhood bronchial asthma though having the history of steroids and bronchodilators	[32]
<i>Indukantha Ghrita</i>	Clinical Trial	48 Patients of upper respiratory tract infections	<i>Indukantha Ghrita</i>	300mg/kg body weight /day for 28days	79.2% relief in fever, 60.45% relief in cough, 25% in runny nose, 60.4% in sore throat, 10.4% in shortness of breath. Results obtained from the study suggest that it is immune modifier and maintains the homeostasis of immune function in patients of URTI.	[35]

CONCLUSION

Ayurveda is an evidence based medical system. In current health situation, utilising such knowledge for home based preventive approach may have a significant support to health care system. Multiple drugs including *Glycyrrhiza glabra* (Yashtimadhu), *Piper longum* (Pippali) and *Withania somnifera* (Ashwagandha) are under clinical trials for COVID-19 disease. Author suggest above remedies as a prophylactic, preventive or rehabilitative measure to counter upper respiratory tract symptoms of common origin.

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CONFLICT OF INTEREST

None

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