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Review Article

REVIEW ON THE THERAPEUTIC EFFICACY OF AN AYURVEDIC COMPOUND DRUG IN CHRONIC TONSILLITIS IN CHILDREN

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ABSTRACT

Tonsillitis refers to inflammation of the pharyngeal tonsils.It's most common in children aged 3 to 7, who have larger tonsils than adults and older children. Chronic tonsillitis may be a complication of acute tonsillitis. It mostly affects children and young adults. Kumarabharana Rasa is a compound drug comprising of Bhasmas (calx) of Swarna, Rajata, Pravala and Choorna of Yastimadhu, Amalaki, Ashwagandha, Shunti, Pippali, Haritaki and Vacha.In this endeavor, author highlights the therapeutic efficacy of the various constituents of Kumarabharana Rasa which aids for its efficacy in relieving the signs and symptoms of chronic tonsillitis.

Keywords: Tonsillitis, Chronic Tonsillitis, Kumarabharana Rasa, Immunity, Immunomodulation

INTRODUCTION

Tonsils and adenoids are. the body's first line of defence at the oro-pharyngeal gateway. They "sample" bacteria and viruses that enter the body through the mouth or nose at the risk of their own infection. But at times, they become more of a liability than an asset and may even trigger airway obstruction or repeated bacterial infections[1]. Hence, timely treatment is most essential[2].Tonsillitis refers to inflammation of the pharyngeal tonsils (glands at the back of the throat, visible through the mouth). It's most common in children aged 3 to 7, who have larger tonsils than adults and older children[3]. However, it is estimated that 15% of all visits to family doctors are because of chronic tonsillitis[3].Chronic tonsillitis may be a complication of acute tonsillitis. Pathologically, micro abscesses walled off by fibrous tissue have been seen in the lymphoid follicles of the tonsils. It mostly affects children and young adults[4].

Kumarabharana Rasa

It is a compound drug comprising of Bhasmas (calx) of Swarna (Gold), Rajata (Silver), Pravala (coral) and Choorna of Yastimadhu (Glycyrrhiza glabra Linn.), Amalaki (Emblica officinalis Linn.), Ashwagandha (Withania somnifera Linn.), Shunti (Zingiber officinale Roxb.), Pippali (Piper longum Linn.), Haritaki (Terminalia chebula Retz.), Vacha (Acorus calamus Linn.) and all these drugs given one Bhavana with Swarasa (extract juice) of Guduchi (Tinospora cordifolia Willd.), Brahmi (Bacopa monnieri Linn.) and Tulsi (Ocimum tenuiflorum Linn.) separately. Several studies were undertaken on different ingredients of Kumarabharana Rasa. In this endeavor, author would highlight the therapeutic efficacy of the various constituents of this compound preparation. Coming to the detailing of various ingredients;

Yastimadhu (Glycyrrhiza glabra Linn.)

Glycyrrhiza glabra Linn.belongs to Fabaceae family and has been used since ancient times as a medicinal herb. It has been referred in Indian traditional medicine some 3,000 years ago. Licorice (Glycyrrhiza glabra) is also known as "sweet root". The word "Glycyrrhiza" is made from two Greek words: Glykys, meaning "sweet" and Rhiza, meaning "root"[5]. Licorice can be found growing in the Americas, Europe, Asia and Australia. It tends to grow best in areas that are dry, sunny, hot climates that receive a relatively low annual rainfall of around 500mm-650mm. While the climate may be hot and dry, the plant prefers to grow in areas with adequate soil moisture[6].Licorice is composed of triterpene saponins, flavonoids, polysaccharides, pectins, simple sugars, amino acids, mineral salts, and various other substances. Glycyrrhizin (glycyrrhizic acid), triterpenoidal saponin; accounts for the sweet taste of licorice root. Other Flavanoids viz. glabridin, glabrene, isoliquiritigenin, formononetin were also reported from Glycyrrhiza glabra[7-8]. Licorice has been reported to have antioxidant[9], antiulcer[10], hepatoprotective[11],

anti-asthmatic[12], anti-inflammatory[13], antiviral[14], anti-diabetic[15] and anticancer activities[16].

Amalaki (Emblica officinalis Linn.)

Emblica officinalis (Amla) is a deciduous tree belongs to family Euphorbiaceae[17]. It also present on the hill slopes up to 2000 meters. It is commercially cultivated in the state of Uttar Pradesh in India. It is also grown in Tamil Nadu, Rajasthan and Madhya Pradesh.

Compounds isolated from EO were gallic acid, ellagic acid, 1-O-galloyl-beta-D-glucose,3,6-di-O-galloyl-Dglucose, chebulinic acid, quercetin, chebulagic acid, corilagin, 1,6-di-O - galloyl beta D glucose, 3 Ethylgallic acid (3 ethoxy 4,5 dihydroxy benzoic acid) and isostrictiniin[32]. Phyllanthus emblica also contains flavonoids, kaempferol 3 O alpha L (6" methyl) rhamnopyranoside and kaempferol 3 O alpha L (6"ethyl) rhamnopyranoside[33]. A new acylated apigenin glucoside (apigenin 7 O (6" butyryl beta glucopyranoside) was isolated from the methanolic extract of the leaves of Phyllanthus emblica together with the known compounds; gallic acid, methyl gallate, 1,2,3,4,6-penta-O-galloylglucose and luteolin-4'-Oneohesperiodoside were also reported[34]. It has been reported to have antioxidant[18-20], anticancer[21-25], immunomodulatory[26], antimicrobial and antimutagenecity[27], hepatoprotective[28], cardioprotective[29], antipyretic and analgesic[30] and antidiabetic properties[31].

Ashwagandha (Withania somnifera Linn.)

Ashwagandha or withania somnifera is an ayurvedic herbs that has been used for centuries in India as an adaptogenic herbal remedy to improve overall health, vitality and longevity. This plant grows widely in all dried parts and subtropical India, South Africa, Pakistan, Afghanistan, Egypt, Morocco, Jordan, Sri Lanka (In India mostly found in Madhya Pradesh, Uttar Pradesh, Punjab, Gujarat, Rajasthan). The main constituents of ashwagandha are alkaloids and steroidal lactones. Withanine, somniferine, somnine, somniferinine, withananine, pseudo-withanine tropane, pseudo-tropine, choline, anaferine, anahydrine, isopelletierine are chemical constituents present in it. The leaves contain steroidal lactone, which are commonly called as "Withanolides". Withaferine. A has been receiving good deal of attention because of its antibiotic and anti-tumor activity[35].It has been reported to have Immunomodulation[36], Anti-Aging[37], Chronic Stress[38], Cardiovascular Protection[39], Hypothyroidism[40], Anxiety and Depression[41].

Shunti (Zingiber officinale Roxb.)

Ginger (Zingiber officinale Linn) is a creeping perennial on a thick tuberous rhizome, which spreads underground. Ginger is a rich source of volatile oil. Zingiberol, zingiberene, phellandrene and linalool are important constituents of the oil. They account for the aroma of the drug. The pungency of the ginger is due to gingerols and shogoals. Investigations have shown gingerol and shogoals to be mutagenic[42]. In addition, ginger contains a special group of compounds called diarylheptanoids including gingerenone[43]. This has been proved to be hypolipidemic[44], anti-emetic[45], chemo-protective[46], anti-viral[47], antimotion and antinauseant[48], anti-inflammatory[49], and anti-ulcerogenic[50].

Pippali (Piper longum Linn.)

per longum Linn. popularly known as Pippali belonging to the family Piperacea, an important medicinal plant is used in traditional medicine in Asia and Pacific islands especially in Indian medicine[51]. The primary constituents in Piper longum are piperine, piplartine and piper longumine. Piperine constitutes 4-5% of the essential oil derived from the catkins. Additional active chemicals include several piperidine alkaloids, dihydro stigmasterol, sesamin, terpenines and isobuyldeca-trans-2-trans-4-dienamide[52]. The drug has showed Antifungal[53], Antimicrobial[54], Antidiabetic[55], Antioxidant[56], Analgesic[57], Immunomodulatory[58], Anti-cancer[59], Anti-depressant[60], Antiulcer[61] and Hepatoprotective activities[62].

Haritaki (Terminalia chebula Retz.)

Terminalia chebula is a flowering evergreen tree of the family Combretaceae. It has several common names such as black myrobalan, ink tree, or chebulic myrobalan (English), haritaki (Sanskrit and Bengali), harad (Hindi), harada (Marathi and Gujrati) Karkchettu (Telgu) and Kadukkaya (Tamil). In Tibet, T. chebula is called as the “King of Medicine[68].Researchers have isolated a number of glycosides from Haritaki, including the triterpenes arjunglucoside I, arjungenin, and the chebulosides I and II.

Other constituents include a coumarin conjugated with gallic acids called chebulin, as well as other phenolic compounds including ellagic acid, 2,4-chebulyl-β-D-glucopyranose, chebulinic acid, gallic acid, ethyl gallate, punicalagin, terflavin A, terchebin, luteolin, and tannic acid[63-64].Chebulic acid is a phenolic acid compound isolated from the ripe fruits[65-66].Luteic acid can be isolated from the bark[67]. It has reported to possess antibacterial[69], antifungal[70], Antiamoebic and immunomodulatory[71],Antiplasmodial[72], Molluscicidal[73], Anthemintic[74], Antiviral[75], Antimutagenic and anticarcinogenic[76], Antioxidant[77], Antidiabetic and retino protective[78], Antianaphylactic and adaptogenic[79], Antinociceptive[80], Antiulcerogenic[81], Anti-arthritic[82], Wound healing[83], Cytoprotective and antiaging[84], Radioprotective[85], Cardioprotective[86], Hepatoprotective[87], Chemomopreventive[88], Hypolipidemic and hypocholesterolemic[89] and Anti-spermatogenic activities[90].

Vacha (Acorus calamus Linn.)

Vacha (Acorus calamus Linn.), an indigenous drug of India belongs to family Acoraceae. It is delineated under various therapeutical groups like ‘Lekhaneeya’, ‘Triptighna’, ‘Arshoghna dashemani’ etc., by Acharya Charaka[91]., ‘Pippalyadi’, ‘Vachadi’ etc., ganas by Acharya Sushruta[92] and‘ Mustadi’, ‘Vatsakadi’ etc., gana by Vagbhata[93]. β-Asarone (isoasarone) is usually the major constituent. α-Asarone, elemicine, cis-isoelemicine, cis and trans isoeugenol and their methyl ethers, camphene, P-cymene, β-gurjunene, α-selinene, β-cadinene, camphor, terpinen-4-ol, α-terpineol and α-calacorene, acorone, acorenone, acoragermacrone, 2-deca-4,7-dienol,shyobunones, isohyobunones, calamusenone, linalool and pre-isocalamendiol are also present[94].

The drug has been studied for its Atiulcer and cytoprotective activity[95], Antispasmodic activity[96], Analgesic activity[95], Anti-inflammatory activity[97-98], Anticonvulsant activity[99] and Antibacterial activities[100].

Guduchi (Tinospora cordifolia Willd.)

Tinospora cordifolia (Willd.)Hook.f. and Thoms. (Guduchi) is a large, glabrous, deciduous climbing shrub belonging to the family Menispermaceae.[101-103]It is distributed throughout the

tropical Indian subcontinent and China, ascending to an altitude of 300 m. It is distributed throughout tropical Indian subcontinent and China, ascending to an altitude of 300 m.

The active adaptogenic constituents are diterpene compounds, polyphenols, and polysaccharides, including arabinogalactan polysaccharide (TSP)[115]. The plant has shown to possess anti-inflammatory, antiarthritic, antiosteoporotic[104-105], antiallergic[106], hepatoprotective[107], antihyperglycemic[108], immunomodulatory[109], diuretic[110], cardioprotective[111], antileprotic[112], gastroprotective and antiulcer[113] and antifertility activities[114].

Brahmi (Bacopa monnieri Linn.)

Bacopa monnieri (water hyssop, brahmi, thyme-leafed gratiola, water hyssop) is a perennial, creeping herb whose habitat includes wet soil, shallow water, and marshes[116]. The herb can be found at elevations from sea level to altitudes of 4,400 feet, and is easily cultivated if adequate water is available. Flowers and fruit appear in summer and the entire plant is used medicinally[117].

Bacopa monnieri has many chemical constituents including alkaloids (brahmine and herpestine), saponins (d-mannitol and hersaponin, acid A, and monnierin), flavonoids (luteolin and apigenin). It also contains significant amounts of betulic acid, stigmasterol, beta-sitosterol, and bacopasaponins (bacosides A, bacosides B, bacopaside II, bacopaside I, bacopaside X, bacopasaponin C, bacopaside N2). The minor components include bacopasaponin F, bacopasaponin E, bacopaside N1, bacopaside III, bacopaside IV, and bacopaside V)[118]. It is reported to have enhance memory[119],cognitive function[120],antifertility action[121],immunostimulatory[122].

Tulsi (Ocimum tenuiflorum Linn.)

Ocimum tenuiflorum, also known as Ocimum sanctum, Holy basil, or tulasī, is an aromatic plant in the family Lamiaceae which is native throughout the Eastern World tropics and widespread as a cultivated plant[123].The leaves contain an essential oil, which contains eugenol, eugenal, carvacrol, methylchavicol, limatrol and caryophylline. The seeds contain oil composed of fatty acids and sitosterol. The roots contain sitosterol and three triterpenes A, B, and C. The leaves also contain ursolic acid and n-triacontanol. Eugenol, its methyl ether, nerol, caryophyllene, terpinen 4-decylaldehyde, selinene, pinenes, camphene and a-pinene have been identified in essential oil. Additionally, it also contains rosmarinic acid, thymol, linalool and methyl chavicol and citral etc[124]. The drug has been proved as Anti-Fatigue[125],Adaptogenic[126], Anti-Microbial[127],Anti-Convulsant[128],Anti-Diabetic[129],Radioprotective[130],Anti-Inflammatory[131],Cardioprotective[132], Immunomodulatory[133], Hepatoprotective[134], Anti-Carcinogenic[135] and Analgesic activities[136].

Gold bhasma

In Ayurveda, the gold is used in the form of purified metallic fine powder (probably as nano-particles) or red colloidal solution where both are prepared by elaborate treatments including using herbal extracts and even with other metals[137]. Swarna (gold) bhasma has been utilized as a therapeutic agent in the traditional Indian Ayurvedic medicine for several clinical disorders including bronchial asthma, rheumatoid arthritis, diabetes mellitus, and nervous system diseases[138-143].The pharmaceutical procedures of preparation of Swarna Bhasma are based on procurement of best quality of Swarna, its process of Shodhana (purification/potentiation) and Marana (incineration/calcinations) which are very specified in terms of procedure, equipment used, media (intermediary herbal juices, decoction), heating pattern and its frequency. In modern medicine, gold nanoparticles find significant applications in drug delivery as they are capable of encapsulating active drugs and targeting[144]. Gold bhasma is shown to possess Free-radical Scavenging Activity[145],Anti Cataleptic, Anti-anxiety and Anti-depressant Activity[146],Antioxidant[147], Augmentation of Non-specific Immunity[148] and Analgesic activities[149].

Silver Bhasma

In ayurveda, ash of silver, also known as Raupya Bhasma, is used to treat many disease conditions like pain, neuralgias, inflammation, anxiety, convulsions, memory loss etc since years[150-151].Nanosize of silver particle is probably responsible for improving the penetration of silver in brain; hence, ash of silver has been used in past for the treatment of various pain and neurological conditions[152-154].Rajata possesses aphrodisiac, anti-ageing, scraping and immunomodulator properties. It also increases potentiality, and intellect.

Pravala bhasma

Pravala (Coral) is the calcareous skeleton of the minute marine organism. The skeleton is in the form of minute irregular deposits, called spicules which contain mainly calcium carbonate, the skeleton of coral is believed to possess a special affinity for iron which combines with a calcium organic complex to give colour pigments. Pravala is widely indicated in the form of bhasma for several ailments Timira, Yakshma, Kasa etc. And for Rasayana purpose also[155].It is used in treatment of eye disorders, pthisis, chronic respiratory diseases, cough, cold, bleeding disorders such as nasal bleeding, bleeding hemorrhoids etc, excessive sweating, night sweating, toxic conditions etc.It improves digestive power, vision power, immunity and skin complexion[156].

Method of Preparation of Kumarabharana Rasa

Fine powder of Vacha (10 parts), Pippali(10 parts), Shunthi (20 parts), Ashwagandha (40 parts), Amalaki (50 parts), Haritaki (10 parts)and Yastimadhu (50 parts)along with bhasmas of Swarna (1 part), Rajata (2.5 parts)and Pravala (5 parts)should be taken and one bhavana (impregnation) with each of Guduchi swarasa, Brahmi swarasa and Tulsi swarasa is to be given and tablets of 500mg can be prepared.

Mode of action of Kumarabharana Rasa

Chronic tonsillitis is due to exposure towards various infections, so we need to improve the immunity of the children. Amalaki, Ashwagandha, Pippali, Haritaki, Guduchi, Brahmi, Tulsi, Swarna bhasma and Rajata bhasma possess immunomodulatory property. Bhasmas of Swarna, Rajata and Pravala possess rejuvinative action which helps to improve the immunity[157-159].Honey, the adjuvant used in here play a potential role drug delivery system due to its immunomodulatory effect[160]. In chronic tonsillitis, the digestive capacity will be impaired and as a result there will be obstruction to the channels which is manifested as difficulty in swallowing, mouth breathing, choking spells at night etc[161-162].Swarna, Pravala, Shunti and Pippali is having digestive stimulant action[163-166].Amalaki and Guduchi are having

nourishing and rejuvinative property[167].Among the three drugs used for bhavana (impregnation), Guduchi and Brahmi possess rejuvinative property[168].

Yastimadhu, Amalaki, Pippali, Haritaki and Swarna bhasma possess antioxidant property.Amalaki, Haritaki, Vacha, Tussi and Swarna bhasma possess antibacterial property.Amalaki possess antipyretic property. Yastimadhu, Sunthi, Vacha, Guduchi and Tulsi possess anti-inflammatory property. The ingredients of this compound drug are of either bitter/pungent/astringent in taste and of hot in potency (the pharmacokinetic principles) and thereby reduces the suffering in patients with chronic tonsillitis. Also the anti-inflammatory, antioxidant, immunomodulatory, antibacterial, antipyretic, scraping, digestive stimulant, carminative, nourishing and rejuvinative effects aids in the better prognosis of this disease.

CONCLUSION

The detailed pharmacological studies is to be conducted on individual ingredients of this compound preparation. Also clinical trials with larger samples is to be done to assess the efficacy of Kumarabharana Rasa in chronic tonsillitis in children.Eventhough during the course of the review of the compound preparation, individual drugs showed efficacy on reducing the signs and symptoms of chronic tonsillitis, further detailed studies is needed to prove the same.

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Table1: Ingredients of Kumarabharana Rasa

Sl.No.	Sanskrit Name	Botanical Name	Form	Proportion
1.	**Swarna**	-	Bhasma	1 part
2.	**Rajata**	-	Bhasma	2.5 parts
3.	**Pravala**	-	Bhasma	5 parts
4.	**Ashwagandha**	*Withania somnifera*	Churna	40 parts
5.	**Amalaki**	*Emblica officinalis*	Churna	50 parts
6.	**Shunthi**	*Zingiber officinalis*	Churna	20 parts
7.	**Pippali**	*Piper longum*	Churna	10 parts
8.	**Haritaki**	*Terminalia chebula*	Churna	10 parts
9.	**Vacha**	*Acorus calamus*	Churna	10 parts
10.	**Yashtimadhu**	*Glycyrrhiza glabra*	Churna	50 parts

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