



EFFECT OF TRIPHALA GUGGUL IN THE MANAGEMENT OF KRANASRAVA (CSOM) - A REVIEW ARTICLE

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ABSTRACT

Around the world, chronic suppurative otitis media is a prevalent viral condition that mostly affects children. It is one of the most prevalent avoidable causes of deafness. Growing children may experience long-term negative impacts, including recurring sickness, low academic performance, delayed language development, and related psychosocial and cognitive development. Aural toileting is still one of the most fundamental and secure ways to produce dry ears in the conventional medical system since the management options are restricted. Medical and surgical methods frequently have negative side effects and are not always helpful. *Karnasrava*, a disorder with a similar genesis and clinical characteristics described in *Ayurveda*, is comparable. *Ayurveda* recommends a multimodal treatment to this issue, including the use of both oral drugs and a variety of local therapies. The therapeutic treatment are not any harmful and their side effects. For this issue, *Ayurveda* recommends a multimodal approach that includes the use of herbal remedies. As a drug, one option is *Triphala guggul*. *Karnasrava* and the function of *Triphala Guggul* in management have been examined in this article.

KEYWORDS –*Karnasrava*, *Karnapoorana*, *Triphala Guggul*, CSOM etc.

INTRODUCTION

Children A widespread infectious condition that affects people all over the world, chronic suppurative otitis media (CSOM) is one of the leading causes of avoidable hearing loss, particularly in young children in impoverished countries. Children who have the condition and its associated issues are at risk for delayed language and speech development, poor cognition, and subpar academic achievement.¹ It could affect early communication, language development, auditory processing, psychosocial and cognitive growth, as well as educational accomplishment and advancement in the long run. After an initial bout of acute otitis media

(AOM), recurring middle ear infections lead to chronic suppurative otitis media, which is defined as persistent discharge via a perforated tympanic membrane for more than two weeks. However, risk factors for its occurrence are not entirely obvious.² the therapeutic options are quite constrained and not without dangers and negative effects.³ in this region *Ayurveda* recommends use of herbal remedies and they cure disease and their symptoms. *Triphala guggul*.⁴ is also one of the best dugs of *karansarava* and their action is very good,

INCIDENCE RATE OF CSOM

The development of CSOM is frequently linked to low socioeconomic level, which leads to inadequate nutrition, overcrowding, and poor hygiene in conjunction with repeated upper respiratory tract infections.⁵ Contrary to otitis media with effusion, which is more prevalent in Western nations, six to eight chronically discharged ears are widespread in tropical nations, particularly South Asia. Globally, the prevalence of CSOM varies, however it ranges from 1% to 46%. The World Health Organization (WHO) estimates that 65–330 million people worldwide have discharging ears, with 60% experiencing severe hearing loss.⁶ The WHO reports that the Western Pacific region (2.5% to 43%), South East Asia (0.9% to 7.8%), Africa (0.4% to 4.2%), South and Central America (3%), and the Eastern Mediterranean (1.4%) have the greatest incidence rates.

KARNASRAVA

The words *Karna* and *Srava* combine to form the term *Karnasrava*. It refers to any kind of ear discharge, exudates, or leaking. *Sushruta* claims that *Shiroabhogata* (head damage) and *Jalakrida* (water immersion, swimming, etc.) and *Paka* of *Karna vidradhi* are the root causes of *Karnasrava*. *Karansrava* is of two *Mahabhuta pradhanta*, *Prithvi* and *Jala mahabhuta*, according to the *Panchmahabhutika* constitution. The medical name for ear discharge is otorrhoea.⁷ either as an illness or a symptom of other disorders, it exists. The most common reason is ear illness, although there are a few other possibilities as well, including eustachian tube dysfunction and URTI. Otomycosis, otitis externa, acute suppurative otitis media, chronic suppurative otitis media, and other illnesses can all lead to otorrhoea.⁸ White, yellowish, bleeding is unusual and becomes more prevalent with URTI. Otorrhoea might be intermittent, mucopurulent, and odorless.

CHRONIC SUPPURATIVE OTTITIS MEDIA (C.S.O.M)

The middle ear is infected with chronic suppurative otitis media, which causes discharge issues. Acute otitis media that does not go away or heal leads to C.S.O.M. *Ayurveda* and contemporary science both concur that *Karnasrava* / C.S.O.M. results from any diseases of the nose and nasopharynx. Retraction may happen in the pars flaccida due to eustachian tube blockage, or it may cause a retraction pocket to form in the posterior-superior quadrant of the pars tensa, which can result in a cholesteatoma.⁹ The two kinds of chronic suppurative otitis media are benign/tubo tympanum (safe) and hazardous attico-antrum (unsafe).

The *Samanya chikitsa* (general course of therapy) for *Karna roga* has been described by *Sushruta*. *Snehapana*, *Rasayana*, retaining chastity, and forgoing head washes are all included in it. *Shirovirechana*, *Dhavan*, *Dhoopan*, *Parimarjana*, and *Avachuranan* are among the *vishesh chikitsas* (specific treatments).¹⁰

DRUG REVIEW

Amalaki, *Haritaki*, and *Bibhitaki* each make up one component of the *Triphala guggul*, while *Guggul* makes up the remaining five parts.

AMALAKI¹¹

Botanical Name

Emblica officinalis Gaertn.

Family

Euphorbiaceae

Regional Name

English: Emblic Myrobalan, Indian gooseberry **Hindi:** Amla, Avala, Avara, Awada **Sanskrit:** Dhatri, Amrtaphala, Amalaka, Jatiphalaras, Shriphala, Vayshya **Bengali:** Amla, Amaro, **Gujrati:** Ambala, Amala, **Punjabi:** Ambula, Amla, **Assamese:** Amlakhi, Amlakhu, **Kannada:** Nellikayi, Bela nelli, **Kashmiri:** Amli, Embali, **Malayalam:** Nellikka, **Marathi:** Anvala, Avalkathi, **Oriya:** Ainla, Anala, **Tamil:** Nellikai, nelli, **Telugu:** Usirika, **Urdu:** Amla, Amlaj.

Description

Specifically in central and southern India, Pakistan, Bangladesh, Ceylon, Malaya, southern China, and the Mascarene Islands, the Amla tree is a native of tropical south-east Asia. It is found throughout India. In India it is frequently grown in backyard gardens, and in Uttar Pradesh, at an elevation of 1,800 meters (5,000 feet), it is produced commercially. The plant is a small to medium-sized tree with spreading branches and a crooked trunk that may grow up to 18 meters tall. Yellowish-green flowers are in bloom. The fruit has a 1-to-2-inch diameter, is nearly spherical in shape, has a pale greenish yellow color, and is smooth and hard to the touch. Indian gooseberry is extremely fibrous and has a sour, bitter, and astringent flavor.

Phytoconstituents

The richest known source of vitamin 'C' is Amla Fruits. The fruit has tannins and ascorbic acid. It includes albumin, cellulose, tannic acid, gallic acid, and other minerals. It has an 81.2% moisture content, 0.5% proteins, 0.1% lipids, 14.1% carbs, 0.5% calcium, 0.2% phosphorus, 1.2 mg iron, and 0.2 mg nicotinic acid per 100 grams. A seed contains 16% of the stable oil. Embricanin A&B, Puniglucanin, Pedunculagin, and 2-keto-gluconolactone (Vitamin-C equivalents) are the main active components of amla. Hexahydroxy-diphenic acid, ellagic acid, and conjugates.

Ayurvedic Properties

Rasa: Amla, Katu, Tikta, Madhura, Kasaya, (Amla Pradhan)

Guna: Laghu, Ruksha, Sheeta

Virya: Sheeta,

Vipaka: Madhura

Dosakarma: Tridosahara, Pittasamaka

Karma: Rasayana, Caksusya, Netraroga, Kesavikara, Siroroga, Sarvadosahara, Vrsya ,

Part Used

Fruit & Seeds

HARITAKI¹²

Botanical Name

Terminalia chebula Retz

Family

Combretaceae

Regional Name

English: Myrobalan, Chebulic Myrobalan **Hindi:** Harad, Harar, **Sanskrit:** Abhaya, Pathya, Amrata, Vayastha, Haimavati, Siva **Assamese:** Shilikha, Hilikha **Bengali:** Haritaki, **Gujrati:** Hirdo, Himaja, **Kannada:** Anilekai, Adile **Kashmiri:** Halela, **Malayalam :** Katukka, **Marathi:** Hirda, Harda, Harede, **Oriya:** Harida, **Punjabi:** Hada, Harar, **Tamil :** Kadukkai, karkiya **Telugu:** Karakapa, Karakchetu. **Urdu:** Halela, Kayastha, Siva, Pathya,

Description

It is found throughout India, central and Southern India, Nepal, Sri Lanka, Bangladesh, Bhutan, Myanmar, Cambodia, Laos, Vietnam, Indonesia, Malaysia, Pakistan, and Thailand are just a few of the countries in South East Asia where haritaki may be found. Yunnan in southwest China and Nantou on Taiwan. It occurs particularly in Northern India, Madhya Pradesh, and Sub-Himalayan routes that travel from Ravi in the east to West Bengal and Assam, climbing to an elevation of 1,500 meters in the Himalayas. Fruits are yellowish-brown, ovoid, 20–35 mm long, 13–25 mm broad, wrinkled and ribbed longitudinally, and have an astringent flavor. The pericarp is fibrous, 3–4 mm thick, and does not cling to the seed.

Phytoconstituents

The fruits include tannins (gallic acid, chebulagic acid, punicalagin, chebulanin, ellagic acid, neochebulinic acid, chebulinic acid, 1,6-di-o-galloyl-D-glucose, casuarinin, 3,4,6-tri-o-galloyl-D-glucose, and terchebulin; 32–34% respectively). In addition, there are modest amounts of polyphenols such as corilagin, galloyl glucose, punicalagin, terflavin A, and maslinic acid, as well as amino acids, betasitosterol, resin, flavanol, glycosides, terpenoids, and other phenolic compounds. Its content chebulinic acid disintegrates into tannic and gallic acids on boiling in water.

Ayurvedic Properties

Rasa: Madhura, Amla, Katu, Tikta, Kashaya (Kasaya Pradhana)

Guna: Laghu, Rukhsa

Vipaka: Madhura

Virya: Ushna,

Dosakarma: Tridosahara, Vatashamaka

Karma: Chaksusya, Dipana, Hrdaya, Medhya, Rasayana, Anulomana, Pathya, Netraroga, Netrabhisyanda, Mukharoga, Siroroga, Nasaroga.

VIBHITAKI¹³**Botanical Name**

Terminalia belerica

Family

Combretaceae

Regional Name

English : Beleric Myrobalan, Beddanut **Hindi :** Bahera, Phinas **Sanskrit :** Vibhita, karshaphala, kalidrum, bhutvas, Akash, **Punjabi :** Bahera, **Assamese :** Balelaz, **Bengali :** Bohari, Baheda, **Gujrati:** Bahedan, Beda, **Kannada :** Tare kai, Tode **Kashmiri :** Babelo, Balali, **Malayalam :** Tannikka, **Marathi :** Baheda, Dhatinga **Oriya :** Baheda, **Tamil :** Thanrikkai, Tanri, Tokhandi, **Telugu :** Thanikkaya, Balla, Taddi **Urdu :** Bahera,

Description

It grows in abundance in Madhya Pradesh, Uttar Pradesh, Punjab, and Maharashtra in India. In Southeast Asia, *Baheda* is a huge deciduous tree that may reach a height of 30 meters. The height of the tree is. *Baheda* is made up of the pericarp of dried fruits that mature in November. Fruit varies in thickness from 3-5 mm and has an astringent flavor. It is roughly spherical to ovoid in shape, measures 2.5-4.0 cm in diameter, and has a fresh-ripe look that is somewhat silvery or with a whitish shining pubescent surface.

Phytoconstituents

Tannic acid, glycosides, and gallic acid are the primary chemical components. It includes sitosterol, fatty acids, protein, oxalic acid, tannin, palmitic acid, oleic acid, linoleic acid, galactose, glucose, and ethyl gallate. It also contains gallic acid, ellagic acid, chebulagic acid, galloyl glucose, and gallic acid.

Ayurvedic Properties

Rasa: Kasaya,

Guna: Laghu, Ruksha,

Vipaka: Madhura,

Virya: Ushna,

Dosakarma: Kaphahara , Tridoshaghna

Karma: Chaksusya, Kesya, Kaphapittajit, Bhedaka, Krminasana, Kashahara.

Part Used

Fruit

GUGGUL¹⁴

Botanical Name

Commiphora mukul

Family

Burseraceae.

Regional Name

English: Indian Bdellium, **Hindi:** Guggul, Guggal, **Sanskrit:** Pura, Mahisaksa, Kausika, Palankasa, Devadhoopn, Jatau, Kumbholikhlak **Punjabi:** Guggal, **Gujrati:** Gugal, Guggal, Gugar, **Assamese:** Guggul, **Bengali:** Guggula, Mukul **Kannada:** Kantha gana, Guggala, Mahishakshaguggulu, Guggulugida, Guggulu, Guggal, **Kashmiri:** Guggul Dhoop, Kanth Gan, **Malayalam:** Gulgulu, Guggulu, **Marathi:** Guggul, Mahishaksh, **Oriya :** Guggulu, **Tamil:** Mahisaksi Guggalu, **Telugu:** Makishakshiguggulu, Guggipannu.

Urdu: Muqil,

Description

Guggulu is sold all throughout the world, from Arabic nations to India. It is mostly present in Gujarat and Rajasthan in India, with smaller populations in Madhya Pradesh, Maharashtra, and Karnataka. It may be found in the dry, rocky regions of Baluchistan, Sind, Mysore, Khandesh, Berar, and Rajputana. It is occasionally inserted into hedges. A tiny, 1.2–1.8 m tall perennial tree or shrub, guggul is a perennial plant. Exudate is gathered either by cutting incisions in the bark during the winter or by having it fall from the bark spontaneously during the summer. Drug is present as vermicular or stalactitic fragments of a light yellow or brown mass, forms a milky emulsion in boiling water, and rapidly burns when new. It also has an acrid, aromatic, bitter, and astringent flavor when fresh.

Phytoconstituents

Chemical constituents of guggul are Essential oil, gum, resin, steroids. It contains -Volatile oils, pinene, eugenol, furanosesquiterpenes, triterpenes, myrrhic acid and guggulsterones.

Ayurvedic Properties

Rasa: Tikta, Kashaya, Katu

Guna: Laghu, Sara, Visada,

Vipaka: Katu,

Virya: Ushna,

Dosakarma: Tridosahara

Karma: Balya, Rasayana, Varnya, Medohara Jantughna, Krmighna, Karnaroga, Galaganda Gandamala, Granthi Pidika, Krimi.

Part Used

Exudate (Niryas)

TRIPHALA GUGGUL

Rasa – Tikta, Katu Amla, Kashay, Madhur

Veerya – Ushna

Vipaka – Madhur

Karma- Tridoshamaka

MODE OF ACTION OF TRIPHALA GUGGUL

A study found that *Triphala Guggul* is a Guggul-based formulation beneficial in C.S.O.M., and acute arthritis. Its activity is attributed to its anti-inflammatory activity. *Amalaki* has *Sheeta*, and *Ruksha* properties which reduce *Pitta* and *Kapha doshas*. *Bhibitaki* is slightly *ushna* and pacifies *Kapha* and *Pitta doshas*. *Haritaki* has *Kashaya*, *Ruksha* properties and pacifies *Vata dosha*. All these three drugs together are *Katu*, *Tikta*, *Kashaya*, and *Madhur*; here potency of all three drugs is mentioned in terms of properties and combination.

PHARMACOLOGICAL PROPERTIES OF TRIPHALA GUGGUL

ANTI-INFLAMMATORY PROPERTIES

In one study, oral treatment of *Commiphora wightii* (Arn) Bhandaris stem bark, aq. resin, and methanolic extract shown anti-inflammatory action by shortening the duration of the carrageenan-induced paw oedema by 5 hours¹⁵. Guggulu's anti-inflammatory and antiarthritic properties have been supported by several investigations¹⁶. Crystalline steroid from petroleum ether extract inhibited the complete development of the

main lesions in adjuvant arthritis and increased the severity of subsequent lesions in comparison to the untreated control group¹⁷ in inflammation caused by Freund's adjuvant. The anti-inflammatory effects and effectiveness of guggulosomes made from guggul by bath sonication, trituration, and other procedures were superior to those of ibuprofen. Additionally, both worked in concert¹⁸.

ANTI-MICROBIAL PROPERTIES

Research on *Commiphora wightii* (Arn.) Bhandari's volatile oil revealed that it was very efficient against *Rhizoperthadominica*. Additionally, against multidrug-resistant *Klebsiella pneumoniae*¹⁹, its ethanolic extract had the greatest antibacterial activity at 5 mg/ml. A component of the methanolic extract known as 5(1-methyl,1-aminoethyl)-5-methyl-2-octanone has been shown in several tests to have considerable antibacterial action against Guggul gum. modest activity against Gram-negative bacteria and Gram-positive bacteria²⁰. Guggul contains alpha pinene, which has antifungal and antimicrobial properties²¹. Eugenol (mono terpenoid) is an anti-microbial and antioxidant agent²². Additionally, mansumbinoic acid has antibacterial and anti-inflammatory properties²³. Strong antimicrobial action is exhibited by alpha terpineol²⁴.

ANTIOXIDANT EFFECT

A significant generator of ROS are all live cells in organisms. A worsening of AR symptoms can also be brought on by other external causes of oxidative stress. For instance, (1 urban pollutants exacerbate nasal inflammation and AR-related symptoms, and 2) pollen grains that contain endogenous decreased NADPH oxidase (NADPH) damage airway epithelial cells and cause granulocyte recruitment (Boldogh et al., 2005). But our bodies have sophisticated antioxidant defence mechanisms, such as glutathione-S-transferase (GST), superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPx), as well as non-enzymatic mechanisms involving glutathione, ascorbate, urate, bilirubin, lipoic acid, transferrin, and albumin, to prevent being overwhelmed by and accumulating. Oxidative stress indicators including NO, MDA, and nitrite/nitrate become exhausted as a result of the imbalance between ROS generation and endogenous antioxidant defence (Birben et al., 2012; Ayala et al., 2014; Nadif et al., 2014).²⁵

IMMUNOMODULATOR PROPERTIES

Our bodies must maintain a healthy balance between immunosuppression and immuno-stimulation to continue functioning physiologically. Helper and regulatory T cells are the primary sites of immunological imbalance in both autoimmune and inflammatory disorders (Dejaco et al., 2006; Noack and Miossec, 2014). Numerous immune cells are particularly prone to activation and aberration in both the sensitization and response stages in AR, which is classified as a type I hypersensitivity disease (Kiboneka and Kibuule, 2019). In a number of allergy disorders, Th2 cell responses predominate or the Th1/Th2 ratio is reduced (Romagnani, 2004). Th1 responses often produce IL-2, IFN-gamma, IgG2a, IgG2b, and IgG3, whereas Th2 responses typically produce IL-3, IL-4, IL-5, IL-13, and IgG1 (Gelfand, 2004; Galli et al., 2008).²⁶

DISCUSSION

In ancient *Ayurvedic* scriptures, three illnesses are listed with comparable treatment options. The primary pathology of CSOM is infectious, hence *Ayurveda* provides the therapy that may address this specific issue. *Acharya Charaka* made it very clear that the focus of the treatment should be on wound care. The same way that wounds are cared for by cleaning, avoiding infections, and shielding them from outside influences so that proper healing can occur, CSOM likewise need this kind of maintenance to keep ears healthy and clear of infections.²⁷ to handle *Karnasrava*, *Acharya Shushruta* described the first *Shiro-Virechana* technique. Due to the Eustachian tube's connection to the nasopharynx, infections frequently spread from the nasal cavity to the middle ear. As a result, by treating the nasal cavity and preserving the patency of the eustachian tube, *Ayurveda* also has a method for treating *Karnasrava* and other ear infections.²⁸ Other procedures, such as *Karnapoorana*, *Dhoopan*, *Prakshalana*, etc., are mostly focused on urinating, cleaning, and maintaining the absence of infectious germs in the auditory cavity. The numerous herbs can calm all three *Doshas*, especially *Vata*, which is the primary contributing element to *Karnasrava*.²⁹

Additionally, research on the various medications listed has shown that they especially have antibacterial efficacy against microorganisms that are often isolated from ear discharge in CSOM patients. They keep the middle ear healthy and dry by preventing the growth of these diseases through their antibacterial action.³⁰

One of the most crucial sense organs in the human body is the *Karna*. It is one of the *Gyanendriya* in *Ayurveda*, and its roles include hearing and preserving the body's equilibrium. The same aetiology and pathologies are involved in the occurrence of *Karnasrava* and C.S.O.M, according to both contemporary and traditional science. *Vata Kapha* (provocative in nature), the etiological component of *Karnasrava*, vitiates other doshas.³¹ These vitiated *doshas* build up in the middle ear (*Sthansamsraya*). On the other hand, if we observe *Aagantuja nidana*, such as water entering the ear may take with its microorganisms, moist environment, scratching the ear generates abrasions which may get infected, and head injury results in *Achayapurvaka dosha prakopa*.³²

CONCLUSION

In conclusion, we can attest that *Ayurveda* has a practical strategy, reliable techniques, and a rich supply of herbal medicines that may be used to treat CSOM and reduce the need for different surgical operations. Based on the similarities between the etiological causes, symptoms, complications, prognosis, and treatment options, the tubo-tympanic form of chronic suppurative otitis media can relate to *Karnasrava*. *Samanya Chikitsa*, which includes *Rasayana*, *Ghritapana*, *Bramcharya Palan*, and *Yog Aasana*, and *Vishesh Chikitsa*, which includes *Shirovirechan Nasya*, *Dhupana*, *Karnapoorana*, *Parmarjana*, *Dhavana*, and *Avachurana*, as well as oral medication therapy, are used to treat *Karnasrava*. *Triphala Guggul's* probable effects in *Karnasrava* include lowering *Kleda* and *Drava* as well as *Vranaghna*, *Puyaghna*, *Samshaman*, and *Ropan*. *Triphala guggul* may be helpful in *Karnasrava* / C.S.O.M. due to its anti-inflammatory, anti-bacterial, antiseptic, and rejuvenating characteristics. Recent in vitro and clinical research should be used to revalidate the drug's efficacy and safety.

CONFLICT OF INTEREST -NIL**SOURCE OF SUPPORT -NONE****REFERENCES**

1. Sushruta, Sushruta Samhita, Ayurveda Tattva Sandipika- hindi commentary by Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2003, volume II, chikitsasthanch. 21, shloka 39-40, page 101
2. Agnivesha, Charak Samhita, Vaidyamanorama- hindi commentary by Shukla V &Triphathi RD, Chaukhamba Sanskrit Pratishthan, Varanasi, reprint 2011, volume II, Chikitsa sthanch. 26, verse 214
3. Sharngadhara, Sharngadhara Samhita, Jiwandprada- Hindi commentary by Shailaja Srivastava, Chaukhambha orientalia, Varanasi, 1996; Uttarakhand, Chapter 8, Nasya vidhi, verse 11-19, page no. 400-402
4. Sushruta, Sushruta Samhita, Ayurveda Tattva Sandipika- hindi commentary by Ambikadutta Shastri, Chaukhamba Sanskrit Sansthan, Varanasi, 2003, volume II, chikitsasthanch. 21, shloka 42-53, page 101-102
5. Acuin J. Chronic suppurative otitis media; burden of illness and management options. World Health Organization, Geneva, Switzerland. https://www.who.int/pbd/publications/Chronicsuppurativeotitis_media.pdf; 2004. p. 2-83.
6. Kenna MA. Treatment of chronic suppurative otitis media. Otolaryngol Clin North Am 1994; 27(3): 457-472.
7. Anonymous, Yogaratnakara, Vidyotini- Hindi commentary by Lakshmiapati Shashtri, Chaukhamba Prakashan, Varanasi, 1993; Karnarogachikitsa, verses 1, page no. 316
8. Chakrapani dutta, Chakradutta, Tattvachandrika- Sanskrit commentary by Siwdassen, Chaukhambha orientalia, Varanasi, 1993, Karnarogachikitsa, verses 37, page no. 643
9. Tanmoy Deb, Debabrata Ray. A Study of the Bacteriological Profile of Chronic Suppurative Otitis Media in Agartala. Indian J Otolaryngol Head Neck Surg 2012; 64(4): 326–329.
10. Biradar YS, Jagatap S, Khandelwal KR, Singhani SS. Exploring of Antimicrobial Activity of Triphala Mashi— an Ayurvedic Formulation. eCAM 2008;5(1)107–113 doi:10.1093/ecam/nem002
11. <https://www.aimilpharmaceuticals.com/amlaki>
12. <https://www.aimilpharmaceuticals.com/haritaki>
13. <https://www.aimilpharmaceuticals.com/vibhitaki>
14. <https://www.aimilpharmaceuticals.com/guggulu>
15. Francis JA, Raja SN, Nair MG. Bioactive terpenoids and guggulosteroids from Commiphoramukul gum resin of potential anti-inflammatory interest. Chemistry and biodiversity. 2004 Nov;1(11):1842-53.
16. Kimura I, Yoshikawa M, Kobayashi S, Sugihara Y, Suzuki M, Oominami H, Murakami T, Matsuda H, Doiphode VV. New triterpenes, myrrhanol A and myrrhanone A, from guggul-gum resins, and their potent anti-inflammatory effect on adjuvant-induced air-pouch granuloma of mice. Bioorganic and Medicinal Chemistry Letters. 2001 Apr 23;11(8):985-9.
17. Matsuda H, Morikawa T, Ando S, Oominami H, Murakami T, Kimura I, Yoshikawa M. Absolute stereo structures of polypodane- and octanordammarane-type triterpenes with nitric oxide production inhibitory activity from guggul-gum resins. Bioorganic and medicinal chemistry. 2004 Jun 1;12(11):3037-46.
18. Chaudhary G. Pharmacological properties of Commiphorawightii Arn. Bhandari: An overview.

International Journal of Pharmacy and Pharmaceutical Sciences. 2012;4(3):73-5.

19.Sharma A, Patel VK, Rawat S, Ramteke P, Verma R. Identification of the antibacterial component of some Indian medicinal plants against *Klebsiella pneumoniae*. International Journal of Pharmacy and Pharmaceutical Sciences. 2010;2(3):123-7.

20.Goyal P, Chauhan A, Kaushik P. Assessment of *Commiphora wightii* (Arn.) Bhandari (Guggul) as a potential source for antibacterial agent. Journal of Medicine and Medical Sciences. 2010 Apr;1(3):71-5.

21.Ishnava KB, Mahida YN, Mohan JS. In vitro assessments of antibacterial potential of *Commiphora wightii* (Arn.) Bhandari. gum extract. Journal of Pharmacognosy and Phytotherapy. 2010 Nov 30;2(7):91-6.

22.Romero CD, Chopin SF, Buck G, Martinez E, Garcia M, Bixby L. Antibacterial properties of common herbal remedies of the southwest. Journal of ethnopharmacology. 2005 Jun 3;99(2):253-7.

23.Jasuja ND, Choudhary J, Sharma P, Sharma N, Joshi SC. A review on bioactive compounds and medicinal uses of *Commiphora mukul*. Journal of Plant Sciences. 2012 Jul 1;7(4):113.

24.Nagababu E, Lakshmaiah N. Inhibitory effect of eugenol on non-enzymatic lipid peroxidation in rat liver mitochondria. Biochemical pharmacology. 1992 Jun 9;43(11):2393-400.

25.Alsuleimani, Y. M, and Walker, M.J A. (2007). Allergic rhinitis and its pharmacology. Pharmacol. Ther. 114 (3), 233–260. doi:10.1016/j.pharmthera.2007.01.012

26.Aher, V., and Wahi, A. (2011). Immunomodulatory activity of alcohol extract of *Terminalia chebula* retz combretaceae. Trop. J. Pharm. Res. 10 (5), 37. doi:10.4314/tjpr.v10i5.5

27.Shashtri A, editor. Bhaishajyaratnavali, Karnarogachikitsa chapter 62, verses 72-77, 15th edition, Chaukhamba Sanskrit Sansthan, Varanasi; 2013. p. 685.

28.Tripathi B, editor. Sharngadhara Samhita, Uttarakhand, Chapter 11, lepadividhi, verse 128-29, Chaukhamba Surbharati Prakashan, Varanasi; 2006. p. 410.

29.Sharma AR, editor. Sushruta Samhita vol-III, Uttara tantra chapter 21, shloka 42-53, 1st edition, Chaukhamba Surbharati Prakashan, Varanasi; 2001. p. 161-162.

30.Kenna MA. Treatment of chronic suppurative otitis media. Otolaryngol Clin North Am 1994; 27(3): 457-472.

31.Sharma S, editor. Chakradutta, Karnarogachikitsa, verse 31, 3rd edition, Meharchand Lachhmandas publications, New Delhi; 2000. p. 347.

32.Tripathi B, editor. Ashtanga Hridayam, Sutra sthan chapter 20, verse 1, Chaukhamba Sanskrit Pratishthan, Delhi; 2009. p. 244.