

A Review on *Guggulu* Formulations Used in Ayurveda

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Abstract

Guggulu is an oleogum resin (oleo resin) that exudes spontaneously as a result of injury from the bark of *Commiphora mukul* Hook. ex Stocks is belongs to the family Burseraceae. It possesses a massive ethnomedical history and represents a phytochemical reservoir of heuristic medical values. *Guggulu* is one of the ingredients of many imperative formulations used in the Ayurveda most of which are named with suffix 'guggulu'. Guggulsterone is a main active substance in guggulipid, an extract of the *C. mukul*, used to treat a variety of disorders in human. In this review massive effort was made to compile the details of *guggulu* and its unexplored Ayurvedic formulations used in Ayurvedic System of Medicines. It is observed that purified *guggulu* is used in different *guggulu* formulations in various disease conditions with or without specific *anupana*. The formulation concept of *guggulu* in Ayurveda characterized for better pharmacokinetic and polyvalent effects with multiple mechanism of drug action. Hence, it is need of present era to conduct the preclinical and clinical trial to support the therapeutic efficacy of *Guggulu* formulations cited in the ancient literatures.

Key words: *Anupana*, Ayurveda, *Commiphora mukul*, *guggulu*, guggulsterone.

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Introduction

Ayurveda is one of the great gifts of sages of ancient India to mankind. It is one of the oldest scientific traditional medical systems in India and considered as most sacred par excellent system and honored by those proficient in the *Vedas*.^[1] Knowledge about the healing property of plants and formulations used in Ayurvedic therapeutics mentioned in classics are a result of astute clinical observations made over centuries. Details about their properties and therapeutic applications are available in ancient scriptures like *Vedas*, *Samhitas* and *Puranas*. Compilations of later periods that are called *Nighantus* also contain enormous amount of information. The usefulness of medicinal plant derived drugs to the body system can be conclusively proved only if drugs administered in its natural state or in which its therapeutic action has been described in the ancient literatures.^[2,3]

The current worldwide trend towards utilization of plant-derived natural remedies has, therefore, created a dire need

for accurate and up to date information on the properties and uses, efficacy, safety and quality of medicinal plant products.^[4] *Guggulu* is a popular herb classified as tridosha har in Indian Ayurvedic medicine that is used to treat several ailments. Due to its miraculous healing properties, it has been used for centuries in India to treat a range of health conditions. History revealed that *guggulu* has prime place in Atharva Veda. Detailed account of *guggulu* as a drug is given in the treatises of *Charaka* (1000 B.C.), *Sushruta* (600 B.C.), *Vagbhata* (17th century A.D.) and various *Nighantus* written in India between 12th and 14th centuries.^[5,6] *Guggulu* always formulated with other ingredients in formulation based concept in Ayurveda with or without specific *anupana*. Since, review on *guggulu* and its Ayurvedic classical preparations along with *anupana* mentioned in classics were not available on one platform during extensive literature search it was thought worthwhile to undertake detailed review study. In this review massive effort was made to compile the details of *guggulu* and its unexplored Ayurvedic formulations used in Ayurvedic System of Medicines.

Materials

A comprehensive review has been made through *Sangraha grantha*, *Samhita*, *Rasagrantha* and *Nighantus*. Views of their critics as well as contemporaries were also taken into consideration for compilation of guggulu formulations. The journals, modern books and internet were also screened during the review attempt on *guggulu* and their formulations.

Guggulu

Guggulu is an oleogum resin (oleoresin) that exudes spontaneously as a result of injury from the bark of *Commiphora mukul* Hook. ex Stocks belongs to the family Burseraceae. The Synonyms of *Guggulu* have been define the various characteristics of *guggulu* some of them are *guggul*, *devdhoop*, *kaushik*, *pur*, *mahishaksha*, *palanksha*, *kumbh*, *ullukhal*, *gum-guggul*, Indian bedellium etc. Therapeutic uses of *guggulu* in doses of 2 to 4 gm are mentioned in *amvata*, *kustha*, *prameha*, *vatavyadi*, *granthi*, *sopha*, *gandamala*, *medoroga*.^[7] Various *shodhana* (purification) processes have been described for *guggulu* which removes the impurities to some extent and helps in increasing the therapeutic values of the drugs. *Guggulu* should be cut in to small pieces, bundle in a cloth and immerse in *Dola yantra* containing any one of the liquid as *gomutra*, *godugdha*, *triphala kasaya*, *vasa kasaya/svarasa*, *nirgundi svaras* with *haridra churna*. Boil till the whole amount of *guggulu* passes in to liquid. Filter and heat the mixture till semisolid mass, dry further in sunlight.^[8]

Types of guggulu

Bhavamishra and *Kaidev* have classified the *guggulu* on the basis of its colour. These are *Mahishaksha* (*Krishna*), *Mahaneel* (*Neel*), *Kumud* (*Kapish*), *Padm* (*Rakt*) and *Kanak* (*Peet*). The *Kanak* type of *guggulu* having brightness, *madhur* smell and stickiness considered as best variety and used in human being. *Mahishaksha* is also used in human being and other three varieties of *guggulu* have been mentioned to be useful in animals.^[9,10]

Anupana

Anupana means adjunct administered either alongwith or

just after the principal medicine, to enhance its therapeutic action (When administered with the principal medicine it is described as *Sahapana*, though in practice, the term *anupana* connotes both.^[11]

Properties and action^[12]

Guna of puran(old)guggulu: Laghu, Ruksh, Tikshna, Vishad, Suksham, Sar, Sugandhi

Guna of Naveen(fresh) guggulu: Snigdha, Picshil

Rasa: Katu, Tikta, Kasaya

Vipaka: Katu

Virya: Ushna

Prabhav: Tridosh har

Karma: Balya, Rasayana, Varnya, Vatabalasajit, Bhagnasandhanakrit, Medohara

Chemical constituents

The medicinal plants used in traditional medical system have proven to be an abundant source of novel biological active compounds, many of which have been basis for the development of new lead chemicals for Pharmaceuticals for new drug discovery.^[13] Chemical study of *guggulu* revealed that it is a complex mixture of steroids, diterpenoids, triterpenes, aliphatic esters, alcohols, carbohydrates, amino acids, cholesterol, guggulusterol, flavanoid and variety of inorganic compounds.^[14,15] Some of phytoconstitute have been reported in *Commiphora mukul* such as dimyrcene,^[16] α -camphorene,^[17] linoleic acid, steric acid, palmitic acid, sitosterol,^[18] guggulusterone,^[19] (8R)-3cc,8-dihydroxy-polypoda-13E,17E,21-triene(myrrhanolC,4-pregnene-3,16-dione,20S acetyloxy-4-pregnene-3,16-dione, 4,17(20)-(cis)-pregnadiene-3,16-dione, 4,17(20)-(trans)-pregnadiene-3,16-dione, 16 α -acetyloxy-pregn-4,17(20)-trans-dien-3-one, 3 α -acetyloxy-5 α -pregnan-16-one, 20R,22R-dihydroxycholest-4-en-3-one^[20] and others have been mentioned in Table 1 along with their biological activities.

Table 1. Phyto-constituents of *C. mukul* and their biological activities

Phytoconstituents	Biological activities
Guggulsterone	Hypoglycemic, ^[21] hypolipidemic activity, ^[21,22,23] Anti-platelet activity, ^[24] potent inhibitor of NF- κ B, COX-2 and MMP-9, ^[25] cardiac protective activity, ^[26] antioxidant activity ^[27] and reduces the pro-inflammatory cytokines and markers IL-1b, IL-2, TNF- α ^[28]
Naringenin	Hepatoprotective, prevent the accumulation of plasma lipid and lipoprotein. Anti-inflammatory, anti-histaminic, antibacterial and antiviral properties ^[29]
Cembranoids	Control the gastrointestinal absorption of fat and cholesterol ^[30]
Myrrhanol	Potent anti-inflammatory activity ^[31,32]
α - pinene	Antifungal and antimicrobial ^[15]
Eugenol	Antioxidant, ^[33] cytotoxic and apoptotic cell death, ^[34] antimutagenic ^[35]
Ellagic acid	Antioxidant, antimutagen, chemoprotective and anticancer properties, detoxifies the reactive intermediates, ^[15] antiviral and antibacterial activities ^[36]
L-arabinose	Good source of sugar ^[29]
Ferulic acid esters	Antitumor properties ^[37]

Pharmacological activities

Guggulu has a wide range of usefulness in indigenous medicine.^[38] *C. mukul* has possesses hypocholesterolemic activity,^[39-46] thyroid-stimulant,^[47] like all oleo-resins, it causes an increase of leucocytes in the blood and stimulates phagocytosis.^[48] *C. mukul* has antiarthritic, anti-inflammatory,^[49-51] osteoarthritic activity,^[52] antiseptic, antibacterial and antifungal activity,^[53-56] anti-diabetic,^[57] used in nervous diseases^[58] and used in cardiovascular diseases.^[59] *Guggulu* possesses activity like demulcent, aphrodisiac stimulant, liver tonic, antispasmodic, anti-suppurative, anthelmintic, skin disorders, muscle spasms, hypertension, urinary disorders, vulnerary etc.^[15,60,61] In a recent study, *C. mukul* and guggulsterone were found to be effective antioxidant.^[62]

Ayurvedic formulations of *guggulu*

Guggulu has been used since ancient times in the various Indian system of medicines. *Guggulu* classified as *rasayana*. *Rasayanas* are nontoxic Ayurvedic complex herbal formulations or individual herbs used to rejuvenate or attain the complete potential of an individual in order to prevent diseases and degenerative changes that leads to diseases and promote longevity by providing strength and immunity.^[63] *Guggulu* is one of the ingredient of many imperative formulations used in the Ayurveda. The list of *guggulu* formulations along with dose, uses, *anupana* and its ingredients are listed in Table 2.

Table 2. Details of Ayurvedic formulations of *C. mukul* mentioned in Ayurvedic literatures

Name of Guggulu formulations	Ingredients	Dose	Anupana (Vehicle)	Rogadhikara
<i>Abha Guggulu</i> ^[64]	<i>Babool, Haritaki, Bibhitaki, Amalaki, Shunthi, Maricha, Pippali, Shuddha Guggulu</i>	1 Masha (1 gm) vati twice a day	—	<i>Sandhi bhagana</i>
<i>Abhyadi Guggulu</i> ^[65]	<i>Haritaki, Amalaki, Munakka, Shatahwa, Bharangi, Shvet Sariva, Krishana Sariva, Majith, Haridra, Daruharidra, Vach, Shuddha Guggulu. Musli, Mulethi, Muramansi, Dalchini, Sukshamaila, Tejpatra, Nagkeshar, Vidanga, Lvang, Durlabha, Trivrit, Trayamana, Sunthi, Maricha, Pippali</i>	1 Masha (1 gm) vati twice a day	<i>Madhu, Dugdhd</i>	<i>Snayu, Mastishka roga</i>
<i>Amrita Guggulu</i> ^[66]	<i>Guduchi, Shuddha Guggulu, Haritaki, Bibhitaki, Amalaki, , Dantimula, Pippali, Shunthi, Twak, Vidanga, Trivritmula</i>	1-3 Masha (1-3 gm) vati	—	<i>Amalpitta, Vatarakta, Kushtha, Gudaroga, Mandagni, Dushtvrana, Prameha, Amavata, Bhagandar, Nadigatavata, Adhyavata, Shotha</i>
<i>Amrita Guggulu dvitya</i> ^[67]	<i>Guduchi, Guggulu, Haritaki, Bibhitaki, Amalaki, Dantimula, Pippali, Shunthi, Maricha, Dalchini, Vidanga, Trivritmula</i>	1-3 Masha (1-3 gm)	—	<i>Vatarakta, Kushtha, Gudaroga, Mandagni, Dushtvrana, Prameha, Amavata, Bhagandar, Nadigatavata, Adhyavata, Shotha</i>
<i>Amritadi Guggulu</i> ^[68]	<i>Guduchi, Shuddha Guggulu, Haritaki, Bibhitaki, Amalaki, Varshambu, Danti, Chitrakmula, Pippali, Shunthi, Tvak, Vidanga, Trivrit</i>	250 to 500 mg twice a day	—	<i>Amalpitta, Vatarakta, Kushtha, Arsha, Agnimandya, Dusht Vrana, Prameha, Amavata, Bhagandar, Nadi Vrana, Adhyavata, Shotha</i>
<i>Amritadyo Guggulu</i> ^[69]	<i>Guduchi, Sukshamaila, Vidanga, Kude ki chaal, Bibhitaki, Haritaki, Amalaki and Shuddha Guggulu</i>	Churna- 2 Masha (2 gm)	<i>Madhu</i>	<i>Prameha Pidika, Sthoulya, Bhagandar</i>
<i>Dashang Guggulu</i> ^[70]	<i>Shunthi, Maricha, Pippali, Haritaki, Bibhitaki, Amalaki, Musta, Vidanga, Suddha Guggulu</i>	—	—	<i>Medroga, Kapharoga, Aamroga, Vata roga</i>
<i>Dwatrinsako Guggulu</i> ^[71]	<i>Shunthi, Pippali, Maricha, Amalaki, Haritaki, Bibhitaki, Mustaka, Vidanga, Chavya, Chitrakamula, Vach, Shukshamaila, Pippalimula, Hauber, Devdaru,</i>	1 Kola (6 gm)	—	<i>Ama nashaka, Udavarta, Antravidhi, Guda krimi, Mahajwar, Bhutounmada, Anaha, Unmada, Kushtha,</i>

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	<i>Tumbru phala, Pushkar mula, Kushtha, Ativisha, Haridra, Daruharidra, Krishan Jirak, Jirak, Tejpatra, Yawasa, Sauvarchal lavana, Svarjikakshar, Yavakshar, Gajpippali, Saindhav lavana, Shuddha Guggulu</i>			<i>Parshavshula, Hrid roga, Gridhrasi, Hanusthambh, Pakshaghata, Aptantrak, Shotha, Atiugra pleeha, Kamala, Apachi</i>
<i>Ekvinshtik Guggulu^[72]</i>	<i>Chitrak ki chaal, Haritaki, Bibhitaki, Amalaki, Shunthi, Maricha, Pippali, Shveta jirak, Krishan Jirak, Vach, Saindhav lavana, Ativisha, Kushtha, Chavya, Shukshamaila, Jwasa, Vidanga, Yavani, Mustaka, Devdaru, Shuddha guggulu, Go Ghrita</i>	1 Masha(1 gm)	Jala	<i>Ashtadash Kushtha, Krimi, Dusht Vrana, Sangrahnhi, Arsha, Mukh roga, Gal graha, Gridhrasi, Bhagana, Gulma, Sarvkoshthgata roga</i>
<i>Guggulu Vatika^[66]</i>	<i>Guggulu, Guduchi svarasa/Munnaka svarasa, Bijora nimbu svarasa/Triphala rasa</i>	Ber pramaan	Madhu	<i>Sadhya vatarakta, Asadhya vatarakta</i>
<i>Gokshuradi Guggulu^[73]</i>	<i>Gokshura panchaag , Shuddha Guggulu, Shunthi, Maricha, Pippali, Haritaki, Bibhitaki, Amalaki, Mustaka</i>	3 gm	Mustaka kvatha, Usira kvatha, Pashanbheda kvatha	<i>Prameha, Mutrakricha, Pradar, Mutraghat, Vatarakta, Vataroga, Viryadosha, Ashmari, Shukardosha</i>
<i>Guggulwadi Vati^[68]</i>	<i>Shuddha Guggulu, Lashun, Nimb beej, Shuddha Hingu, Shunthi</i>	500 mg to 1 gm	Sheetal Jala	<i>Arsha, Vata roga</i>
<i>Hritkyadi Guggulu^[74]</i>	<i>Haritaki, Sunthi, Vidharamula, Shuddha Guggulu, Erand taila</i>	750 mg to 3 gm	Ushnodak , Dugd	<i>Amavata, Vatavyadhi, Pristh shula, Kati shula, Jangha shula, Koshtabadhta</i>
<i>Kaishor Guggulu^[73]</i>	<i>Shuddha Guggulu, Haritaki, Bibhitaki, Amalaki, Guduchi, Pippali, Shunthi, Maricha, Vidanga, Trivrit mula, Dantimula, Go ghrita</i>	3 gm	Mudag Yusha, Dugd, Sugandhita jala	<i>Vatarakta, Vrana, Kasa, Kustha, Gulma, Shwathu, Udar roga, Pandu, Prameha, Mandagni, Vibandha, Prameha-pidikaye, Jaradosha</i>
<i>Kanchnar Guggulu^[73]</i>	<i>Kanchnar, Haritaki, Bibhitaki, Amalaki, Shunthi, Maricha, Pippali, Varun Chaal, Tejpatra, Sukshamaila, Dalchini, Shuddha Guggulu</i>	3 gm	Mundi kvatha, Khadirasara kvatha, Haritaki Kvatha, Ushnodak	<i>Gulma, Gandmala, Apachi, Granthi roga, Vrana, Kustha, Bhagandar, Shleepad</i>
<i>Kshatshulakhar Guggulu^[75]</i>	<i>Lauh bhasma, Mulethi, Haritaki, Bibhitaki, Amalaki, Pippali, Shuddha Guggulu</i>	1 gm	Ghrita, Madhu	<i>Shuiak roga and Vata roga</i>
<i>Laksha Guggulu^[73]</i>	<i>Laksha, Asthi samhrita, Arjun, Aswagandha, Nagbala, Shuddha Guggulu</i>	—	Ushnodak	<i>Asthi bhagna, Asthi chyuti, Asthi ruja</i>

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<i>Lauh Guggulu</i> ^[76]	<i>Shuddha Lauh bhasma, Shuddha Guggulu, Shunthi, Maricha, Pippali, Haritaki, Bibhitaki, Amalaki</i>	1 tola(12gm)	<i>Madhu, Dughad</i>	<i>Rasayana</i>
<i>Lauhadi Guggulu</i> ^[77]	<i>Lauh bhasma, Mulethi, Haritaki, Bibhitaki, Amalaki, Pippali, Shuddha Guggulu</i>	½ to 1 Masha (½ to 1 gm)	8 Masha (8 gm) ghrith and 4 Masha(4 gm) Madhu	<i>Sarv Shukal roga (netraroga)</i>
<i>Mahayograj Guggulu</i> ^[73]	<i>Shunthi, Pippali mula, Pippali, Chitrak, Chavya, Maricha, Bhrisht Hingu, Ajmoda, Sarshap, Krishan jirak, Shwet jirak, Indrayav, Renuka, Patha, Vidang, Gajpippali, Kutaki, Ativisha, Bharangi, Vach, Murva, Tejpatra, Devdaru, Kustha, Rasna, Mustaka, Saindhav lavana, Gokshur, Haritaki, Bibhitaki, Amalaki, Shuddha Guggulu, Vanga bhasma, Rajat bhasma, Naga bhasma, Loha bhasma, Abhrak bhasma, Mandura bhasma, Rasa sindura</i>	½ to 1gm	<i>Rasnadi kvatha, Kakolyadi kvatha, Aragvadhadi kvatha, Triphla kvatha, Nimb kvatha, Madhu</i>	<i>Gulma, Udavarta, Vata roga, Prameha, Bhagndar, Vatarakta, Kustha, Arsha, Grahni, Nabhisula, Kshaya, Apasmar, Urograha, Mandagni, Shvasa, Kasa, Aruchi, Shukar dosha, Rajo dosha, Vandhyatva, Shula, Pandu, Medo vridhhi, Mushak visha, Netra roga, Udar roga, Rasyana</i>
<i>Navak Guggulu</i> ^[69]	<i>Pippali, Shunthi, Maricha, Haritaki, Bibhitaki, Amalaki, Chitrakmula, Musta, Vidang, Shuddha Guggulu</i>	Churna- ½ to 1 Masha (½ to 1 gm)	Madhu	<i>Medorogajanya vikara, Kapha vikara, Amavata</i>
<i>Navkarshik Guggulu</i> ^[78]	<i>Haritaki, Bibhitaki, Amalaki, Shuddha Guggulu, Pippali</i>	1 Masha (1 gm) twice a day	—	<i>Shotha, Gulma, Arsha, Bhagandar</i>
<i>Navkshaya Guggulu</i> ^[79]	<i>Guruch, Vasachaal, Patolpatra, Nimbchaal, Triphala, Khairsara, Amaltas ka guda, Shuddha Guggulu</i>	—	—	<i>Vishjanya visarpa, Ashtadash kushtha</i>
<i>Nirgundi Guggulu</i> ^[80]	<i>Nirgundimula, Mahishaksha Guggulu, Ghrit</i>	1 Karsh (12gm)	Ghrita	<i>Mandal kushta, Vata roga</i>
<i>Panchamrit Lauha Guggulu</i> ^[81]	<i>Shuddha parada, Shuddha gandhaka, Rajat bhasma, Abhrak bhasma, Svarnmakshik bhasama, Lauh bhasma, Shuddha Guggulu, Katu taila</i>	375 mg	Water and milk	<i>Mastishka roga, Snayu ruja, Vata roga</i>
<i>Panchtikghrit Guggulu</i> ^[72]	<i>Nimbchaal, Guduchi, Adusapanchang, Patolpatra, Kantkarimula, Shuddha Guggulu, Goghrita, Patha, Vidanga, Devdaru, Gajpippal, Swarjikakshar, Yavakshara, Shunthi, Haridra, Shatahva, Chavya, Kushtha, Tejowati, Maricha, Indrayava, Jirak, Chitrak chaal, Kutaki, Shuddha bhallatak, Vach, Pipplamula, Manjishtha, Ativisha, Haritaki,</i>	3 to 6 Masha (3 to 6 gm)	--	<i>Visha dosha, Prabalvataroga, Sandhi, Asthi, Majjadi gambhir dhatugat kushtha vikara, Nadivrana, Arbuda, Bhagandar, Gandmala, Udharvjatrugata roga, Gulma, Guda roga, Prameha, Rajyakshma, Aruchi, Shvasa, Pinas,</i>

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	<i>Bibhitaki, Amalaki, Yavani</i>			<i>Kasa, Shosha, Hrudyaroga, Pandu, Galvidradhi, Vatrakta</i>
<i>Pathyadi Guggulu</i> ^[82]	<i>Haritaki, Bibhitaki, Amalaki, Guggulu, Vidanga, Danti, Guduchi, Pippali, Trivrit, Shunthi, Maricha</i>	—	<i>Sheetal jala</i>	<i>Gridhrasi, Nutan khanjata, Ugar pleeha, Agnimandya, Gulma, Pandu, Kandru, Vamana, Vatarakta</i>
<i>Punarnava Guggulu</i> ^[81]	<i>Punarnava mula, Erand mula, Shunthi, Shuddha Guggulu, Trivritmula, Dantimula, Guduchi, Pippali, Shunthi, Maricha, Haritaki, Bibhitaki, Amalaki, Chitrakmula, Saindhav lavana, Shuddha Bhallatak, Vidanga, Swarnmakshik</i>	3gm in divided doses	—	<i>Vatrakta, Vriddhi roga, Gridhrasi, Amavata, Jangha shula, Uru shula, Prisht shula, Trik shula, Vasti shula</i>
<i>Punarnavadi Guggulu</i> ^[83]	<i>Punarnava, Devdaru, Haritaki, Guduchi, Gomutra, Shuddha Guggulu</i>	—	—	<i>Twak vikara, Shotha, Udar roga, Pandu roga, Stiholya, Praseka, Udharvjatrugata Kapha roga</i>
<i>Ras Guggulu</i> ^[84]	<i>Parad, Sharkara, Mahishaksh Guggulu, Ghrita</i>	—	—	<i>Kustha, Updansha, Vatadi vrana</i>
<i>Rasabhr Guggulu</i> ^[67]	<i>Shuddha parad, Lauha bhasma, Shuddha gandhaka, Abhrak bhasma, Guggulu, Guduchi svarasa, Pippali, Shunthi, Maricha, Haritaki, Bibhitaki, Amalaki Dantimool, Indrayanmula, Vidanga, Nagkesar, Trivritmula</i>	$\frac{1}{2}$ karsavati (6 gm)	<i>Guduchi kvatha</i>	<i>Sfutit galita Vatarakta, Ashtadash Kushtha, Krumiroga, Ashmari, Bhagandar</i>
<i>Rasanadi Gutika</i> ^[68]	<i>Rasna, Shuddha Guggulu, Ghrit</i>	500 mg to 1 gm	<i>Ushnodak</i>	<i>Gridhrasi, Vata roga</i>
<i>Rasanadhyo Guggulu</i> ^[71]	<i>Rasna, Guduchi, Erandmula, Devdaru, Shunthi, Shuddha Guggulu</i>	—	—	<i>Vata roga, Shiro roga, Nadivrana, Bhagandar</i>
<i>Saarsangrahadya YograjGuggulu</i> ^[71]	<i>Chitrakmula, Pippramula, Yavnika, Krishan jirak, Vidanga, Ajmoda, Jirak, Devdaru, Chavya, Sukshamaila, Saindhav lavana, Kushtha, Rasna, Gokshur, Dhanyak, Amalaki, Haritaki, Bibhitaki, Mustaka, Shunthi, Pippali, Maricha, Twak, Ushir, Yavakshar, Talishpatra, Lavang, Swarjikakshar, Shati, Danti, Guduchi, Hapusha, Ashwagandha, Shatavari, Lauh bhasma, Shuddha Guggulu</i>	—	<i>Rasna kvatha</i>	<i>Amavata, Vatadi roga, Krimi roga, Dusht vrana, Pleeha roga, Gulma, Udar roga, Anaha, Arsha, Agnivaradhak, Viryavaradhak, Balvaradhak, Sandhigat vata, Majjagat vata, Padgraha, Koshtushirsh, Manyastambha, Hanugraha, Karangraha, Karan shula</i>
<i>Samsharkar Guggulu</i> ^[66]	<i>Yavakshara, Devdaru, Saindhav lavana, Mustaka, Shukshamaila, Vach, Yavani, Shunthi, Maricha, Pippali, Ajmoda, Haridra, Haritaki, Bibhitaki, Amalaki,</i>	4 to 12 Masha (4 to 12 gm)	—	<i>Vatarakta, Udar vikara, Bhagandar, Pleeha, Rajyakshma, Vishamjawar, Garvish, Shwetkustha,</i>

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	<i>Shvet jirak, Krishana jirak, Vidanga, Chitraka, Guggulu, Sharkara, Ghrita</i>			<i>Sampuran Vrana, Darun chitvibhram roga, Gridhrasi, Arsha roga, Agnimandhya, Kosthgata maharoga</i>
<i>Saptang Guggulu</i> ^[68]	<i>Shuddha Guggulu, Haritaki, Bibhitaki, Amalaki, Shunthi, Marich, Pippali, Go Ghrita</i>	1 to 3 gm twice a day	<i>Triphla kvatha, Phaltrikadi kvatha, Ushnodak</i>	<i>Nadivrana, Dusth vrana, Vrana Shula, Bhagandar</i>
<i>Saptvinshtika Guggulu</i> ^[73]	<i>Pippali, Shunthi, Maricha, Haritaki, Bibhitaki, Amalaki, Mustaka, Vidanga, Guduchi, Chitraka, Shati, Sukhamaila, Pippalimula, Hapusha, Devdaru, Tumburu, Pushkarmula, Chavya, Vishala, Haridra, Daruharidra, Vid lavana, Sauvarchal lavana, Yavakshara, Saindhav lavana, Gajpippali, Shuddha Guggulu</i>	6 gm	<i>Ushanodak, Madhu</i>	<i>Kasa, Shvasa, Shotha, Arsha, Bhagandar, Hrudayashula, Parshavshula, Kukshiruja, Vaktra ruja, Guda ruja, Ashmari, Mutrakruhra, Antravidhi, Krimiroga, Jwar, Rajyakshma, Unmada, Apsamar, Anaha, Kustha, Udar roga, Nadi vrana, Dushta vrana, Prameha, Shleepada</i>
<i>Shadang kvath Guggulu</i> ^[77]	<i>Haritaki, Bibhitaki, Amalaki, Patol patra, Nimbpatra, Vasapatra, Shuddha Guggulu</i>	—	—	<i>Netrashotha, Netrapaka, Netrashula, Pilla, Svranshukra, Netra lalima</i>
<i>Shadang Guggulu</i> ^[85]	<i>Rasna, Guduchi, Devdaru, Shunthi, Erandmool, Shuddha Guggulu, Triphala kvath (shodhanarth), GoGhritha</i>	—	<i>Mandoshana Jala, Mandoshana Dugadh</i>	<i>Vata roga</i>
<i>Shadshiti Guggulu</i> ^[71]	<i>Katsaraiya, Jawasa, Ativisha, Devdaru, Kantkari, Vrihati, Chavya, Vasa, Pippali, Mustaka, Vach, Dhanyak, Shatavari, Bariyara, Soya, Krishna Vidhara, Haritaki, Shunthi, Guduchi, Gokshura, Aragvadh, Karchur, Punarnava, Murva, Kutaki, Pipplamool, Brahmadandi, Vidarikand, Gorkhmundi, Palash, Ajmoda, Kakadsinghi, Rudraksh, Musli, Renuka, Kakoli, Yavani, Trivrit, Danti, Chitrakamula, Talamakhana, Yavasa, Vrihat Panchmool, Veertaru, Kushtha, Agar, Javitri, Jayaphala, Ela, Nagkesar, Twak, Chirayata, Kesar, Lavang, Indrayan, Haridra, Saindhav</i>	1 Karsh (12 gm)	<i>Ghritha, Madhu</i>	<i>Vata roga, Samavata, Niramvata, Dwandaja roga, Kaphaj roga, Rajyakshma, Agnimandya, Dhatugata Jwara, Gulf roga, Jaanu roga, Ururoga, Kati roga, Prishtha roga, Udar roga, Hrid roga, Kukshigat roga, Paksahghat, Ans roga, Hanu roga, Karn roga, Bhru roga, Lalaat roga, Netra Roga, Shankha roga, Prameha, Mutrakricha, Shula, Adhyaman, Ashmari, Medogatvata, Napunsakata</i>

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<i>Shatavari Guggulu</i> ^[85]	<i>lavana, Madar mula, Vidang, Satyanashi, Suryamukhi, Gajpippali, Apamarga, Kevanch, Karanj, Rasna, Babool chaal, Shuddha Guggulu, Shuddha Parad, Shuddha Gandhak, Shuddha Hingul, Shuddha Tankan, Lauh bhasma, Abhrak bhasma, Tamra bhasma, Vanga bhasma, Parad bhasma/Rasa Sindoor, Naga bhasma, Swaranmakshika bhasma</i>	$\frac{1}{2}$ Karsh (6 gm) twice a day	<i>Mandoshan Dugadh</i>	<i>Sarv Vata roga</i>
<i>Shiva Guggulu</i> ^[86]	<i>Shatavari, Guduchi, Gandhprasarini, Gokshura, Pippali, Shatahva, Yavani, Rasna, Ashwgandha, Sanghyak, Karchur, Shunthi, Mahishaksh Guggulu, Triphala kvath (shodhanarth), Go Ghrit</i>	—	—	<i>Aamvata, Katishula, Gridhrasi, Krosthtushirshaka</i>
<i>Singhnaad Guggulu</i> ^[86]	<i>Haritaki, Bibhitaki, Amalaki, Erand taila, Shuddha Guggulu, Shuddha Gandhaka, Rasna, Vidanga, Maricha, Pippali, Dantimula, Jatamansi, Shunthi, Devdaru</i>	—	<i>Ushnodak, Sura, Sauviri</i>	<i>Aamavata, Shirogata vataroga, Sandhigata vataroga, Janu vJanghagata vata, Katigraha, Ashmari, Mutrakrichr, Bhagana, Timir, Udar roga, Amalpitta, Kushta, Prameha, Gudbhransha, Kasa(5 types), Shvasa, Kshya, Vishma jwar, Plihavidhi, Shleepada, Gulma, Pandu, Kamala, Shotha, Antravidhi, Shula, Arsha (all types), Medovridhi, Kaphavidhi, Aamdosha</i>
<i>Singhnaad Guggulu Rasa</i> ^[73]	<i>Haritaki, Bibhitaki, Amalaki, Shuddha Gandhaka, Shuddha Guggulu, Erand taila</i>	3 gm	<i>Ushnodak</i>	<i>Vata roga, Pitta roga, Kapha roga, Khanj, Pangu, Shvasa, Kasa, Kushta, Vatrakta, Gulma, Shula, Udar roga, Amavata, Jara roga, Palitya</i>
<i>DvityaSinghnaad Guggulu</i> ^[66]	<i>Shuddha Guggulu, Haritaki, Bibhitaki, Amalaki, Danti, Trivrit, Shunthi, Maricha, Pippali, Bhumyamalaki, Vidanga, Mustaka, Guduchi, Kutaki,</i>	2 Masha (2 gm)	<i>Ushnodak</i>	<i>Amavata, Sandhigata vata, Shirogatvata, Janugatvata, Kati gatvata, Arsha, Visham Jwar, Prameha, Kushta,</i>

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<i>Tritya Singhnaad Guggulu</i> ^[66]	<i>Vach, Aaluk, Mankand, Gandhaka, Parad, Shuddha dhatur phal churna Katu taila Kuttit Guggulu, Haritaki, Bibhitaki, Amalaki, Shunthi, Maricha, Pippali, Mustaka, Vidanga, Guduchi, Chitraka, Trivrit, Danti, Vach, Suran, Mankanda, Kasturi, Rasont, Parad, Shuddha dhatur phal churna</i>	2 Masha (2 gm)	Ushnodak	<i>Bhagandar, Medoroga, Vata roga, Kapha roga Amavata, Shirovata, Granthi vata, Bhagandra, Janugatvata, Janghagatvata, Katishula, Ashmari, Mutrakrichr, Bhagan, Timir roga, Amalpitta, Kushta, Prameha, Gudabhransha, Kasa, Shvasa, Kshaya, Vishamjwara, Pleeha roga, Shleepada, Gulma, Pandu, Kamala, Shotha, Antarvridhi, Shula, Arsha, Meda roga, Kapha roga, Ama roga</i>
<i>Svayambhuv Guggulu</i> ^[87]	<i>Bakuchi, Shilajit, Guggulu, Swarnmakshik, Lauh bhasma, Mundi, Haritaki, Amalaki, Karanj patra, Kher, Guduchi, Trivrit, Jamalghota, Mustaka, Vidanga, Haridra, Kutaj chaal, Madhu</i>	—	With gomutra in Kushta and Vatarakt	<i>Kushta, Vatarakta, Shvitra, Panduroga, Udar roga, Gulma, Prameha, Vali, Palitya</i>
<i>Triphala Guggulu</i> ^[73]	<i>Haritaki, Bibhitaki, Amalaki, Pippali Shuddha Guggulu</i>	3 gm	<i>Mandoshana jala</i>	<i>Shotha, Bhagandara, Arsha, Gulma</i>
<i>Tryodshang Guggulu</i> ^[73]	<i>Babool twak, Ashwagandha, Hapusha, Guduchi, Shtavari, Gokshur, Vridhadaru, Rasna, Shathava, Shati, Yavani, Shunthi, Shuddha Guggulu, Ghrita</i>	3 gm	<i>Triphala kvatha, Madhu, Lasuna svarasa, Yusha, Mandoshana jala, Dugdha</i>	<i>Kati graha, Gridhrasi, Bahu shula, Janu stabhta, Hanugraha, Jangha v pada stabdhta, Asthi sandhigata vata, Majja snayugatvata, Vata Kapha janya roga, Hrit graha, Yoni dosha, Asthibhagana, Khanjvata., Vidradhi</i>
<i>Trayushanadi Guggulu</i> ^[70]	<i>Shunthi, Marich, Pippali, Chitraka, Mustaka, Vidang, Vacha, Mahishakash Guggulu, Go Ghrit</i>	—	—	<i>Kapha Dosha, Vata Dosha, Medo Dosha</i>
<i>Vatari Guggulu</i> ^[73]	<i>Erand taila, Shuddha Gandhak, Shuddha Guggulu, Haritaki, Bibhitaki, Amalaki</i>	3 gm	<i>Mandoshana jala</i>	<i>Amavata, Katishula, Gridhrasi, Khanjta, Pangu, Vatrakta, Shotha, Daha, Krosthushirshak</i>
<i>Varadi Guggulu</i> ^[68]	<i>Haritaki, Bibhitaki, Amalaki, Nimba, Arjun, Ashwatha, Khadira, Asan, Vasa, Shuddha Guggulu</i>	2 gm twice a day	<i>Triphla kvatha, Manjishthadi kvatha, Ushnodak</i>	<i>Updansha, Rakta dosha, Dushta vana</i>

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<i>Vidangadi Guggulu</i> ^[68]	<i>Vidang, Haritaki, Bibhitaki, Amalaki, Shunthi, Maricha, Pippali, Shuddha Guggulu, Go Ghrita</i>	1 to 2 gm	<i>Triphla kvatha, Shigru kvatha, Madhu, Ushnodak</i>	<i>Dushta vrana, Apachi, Meha, Kushta, Nadi vrana</i>
<i>Vranari Guggulu</i> ^[88]	<i>Pippali, Shuddha Guggulu, Haritaki, Bibhitaki, Amalaki, Rasa Sindoor</i>	1 Tola (12 gm)	—	<i>Sarvavidha Vrana</i>
<i>Vranatak Guggulu</i> ^[89]	<i>Shunthi, Maricha, Pippali, Haridra, Daruharidra, Khareti, Ashwagandha, Prasarani, Manjishtha, Arjun chaal, Mulethi, Devdaru, Punarnava, Parad bhasma /Rasa Sindhoor, Abhrak bhasma, Lauh bhasma, Shuddha Shilajit, Asthishrinkhala svarasa, Shuddha Guggulu</i>	2 to 4 Ratti (250 to 500mg)	<i>Mans rasa, Jeevaniyia kvath</i>	<i>Dushta vrana, Bhagna, Sandhi bhagnaAsthi bhagana</i>
<i>Vyadhishardhul Guggulu</i> ^[86]	<i>Haritaki, Bibhitaki, Amalaki, Katutaila, Shunthi, Pippali, Maricha, Amalaki, Mustaka, Vidand, Guduchi, Chitrakmula, Trivrit, Dantimoola, Chavya, Suran, Mankanda, Jaipal, Lauh bhasama, Abhrakbhasama</i>	2 Masha (2 gm)	<i>Mandoshana jala</i>	<i>Agribalvridhikarak, Arsha, Ashmari, Mutrakricha, Shirovata, Amalpitta, Kasa, Shavasa, Daha, Udar roga, Bhagandar, Shotha, Antravriddhi, Timir roga, Shaleepad, Plihavriddhi, Kamala, Shula, Gulma, Kshaya, Kushtha, Pandu, Vishamjwar, Janugatvata, Janghagatvata, Hastagatvata, Padagatvata, Katigraha, Kapha roga, Amavata</i>
<i>Vyoshadi Guggulu</i> ^[73]	<i>Shunthi, Maricha, Pippali, Chitraka, Mustaka, Haritaki, Bibhitaki, Amalaki, Vidanga, Shuddha Guggulu</i>	3 gm	<i>Ushnodak</i>	<i>Medo roga, Kapha roga, Amavata</i>
<i>Yogottama Gutika</i> ^[68]	<i>Shunthi, Maricha, Pippali, Haritaki, Bibhitaki, Amalaki, Svarjikakshar, Yavakshara, Saindhav lavana, Sauvarchal lavana, Samudar lavana, Vida lavana, Audbhid, Chitraka, Talisha, Chavya, Karkatshringi, Haridra, Daruharidra, Gajpippali, Ela, Twak, Vidang, Pushkar, Nagkesar, Swarnmakshik bhasma, Yavani, Musta, Lauh bhasma, Shuddha Shilajit, Shuddha Guggulu</i>	1 to 3 gm	—	<i>80 Nanatmaj Vata Roga, 40 Nanatmaj Pitta Roga, 20 Nanatmaj Kaphaj Roga, prameha (20 types), Udar roga (8 types) Vatjanya Shotha, Mutrakrichar (20 types), Dusht Nadivrana, Kushta Roga (18 types), Maha kshaya (7 types), Shwasa, Kasa, Hikka, Hrichshula, Shardi,</i>

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<p><i>Yograj Guggulu</i>^[73]</p>	<p><i>Chitraka, Pippali, Ajmoda, Krishan Jirak, Vidang, Yavani, Shwet Jirak, Devdaru, Chavya, Shuksham aila, Saindhava lavana, Kushta, Rasna, Gokshura, Dhanyaka, Haritaki, Bibhitaki, Amalaki, Mustaka, Shunthi,, Marich, Pipli, Twak, Ushir, Yavakshar, Talispatra, Tejpatra, Ghrita, Shuddha Guggulu</i></p>	<p>3 gm</p>	<p><i>Rasnasaptak kvatha, Lasun svarasa, Madhu</i></p>	<p><i>Arochak, Gulma, Paandu (5 types), Grahni (4 types), Arsha (6 types), Arbuda, Gandamala, Vidradhi, Bhagandar Amavata, Adyavata, Krimi roga, Dusht vrana, Pleeha vridhi, Gulma, Udar roga, Anaha, Arsha, Mandagni, Sandhigat vata, Majjagat vata, Daurbalya</i></p>
<p><i>Yograj Guggulu (Vrihat)</i>^[86]</p>	<p><i>Shunthi, Maricha, Pippali, Haritaki, Bibhitaki, Amalaki, Patha, Shtahva, Haridra, Daruharidra, Yavani, Vach, Ghrita Bharjit Hing, Hapusha, Gajpipali, Krishan Jirak, Karchur, Dhanyak, Vid lavana, Sauvarchal lavana, Saindhava lavana, Pippalimula, Dalchini, Aila, Tejpatra, Nagkesar, Tulsi bheda (Maruodana), Lauh bhasma, Shuddha Ral, Gokshura, Rasna, Ativisha, Shunthi, Yavkshara, Amalvetas, Chitrakamula, Pushkaramula, Chavya, Vrikshamal, Dadim chaal (Anardana), Erandmula, Ashwagandha, Trivritmula, Dantimula, Ber chaal/Badri phal majja, Devdaru, Haridra, Kutaki, Murvamula, Trayaman, Durlabha, Vidanga, Vang bhasma, Yavani, Adusamula chaal, Abhrak bhasma, Ghrut kuttit Shuddha Guggulu</i></p>	<p>—</p>	<p>—</p>	<p><i>Amavata krit bhagna, Katibhagana, Ekangashoth, Kushtha, Kshata kustha, Vatkrit padvistrati, Gridhrasi, Sandhivata, Krosthushirshak, Vata roga (80 types), Pitta roga (40 types), Kapha roga (20 types)</i></p>
<p><i>YogarajGuggulu Rasayanam</i>^[90]</p>	<p><i>Shunthi, Pippalimula, Pippali, Chavya, Chitrakmula, Bharjit Hinga, Ajmoda, Sarshap, Krishan Jirak, Shvet Jirak, Renuka, Indrayava, Patha, Vidanga, Gajpipal, Kutaki, Ativisha, Bharangi, Vach, Murva, Haritaki, Bibhitaki, Amalaki, Ghrut kuttit Guggulu, Vang bhasma, Rajat bhasma, Lauha bhasma, Abhrak bhasma, Mandur bhasma, Rasa Sindoor</i></p>	<p>—</p>	<p><i>Go mootra, Madhu and kvath of Drvyas as per diseases</i></p>	<p><i>Sarvvata rog, Kushta, Arsha, Grahni, Prameha, Vatrakta, Naabhishula, Bhagandar, Udavarta, Kshaya, Gulma, Apsmara, Agnimandya, Shavasa, Kasa, Aruchi, Shukra dosha, Rajo dosha, Vandhyatav</i></p>

Discussion

Guggulu and guggulipid have a long history in the treatment cardiovascular diseases including hypercholesterolemia and atherosclerosis. *C.mukul* can be regarded as plant of high medicinal value as it is an active source of number of bioactive compounds such as guggulsterone, eugenol, ellagic acid, quercetin, stigmasterol and camphosterol. The therapeutic benefits of guggul and guggulsterone appear to be due to the multiple pharmacological activities, notably the hypolipidemic, anti-inflammatory, anti-arthritic, hepatoprotective, chemoprotective, antimicrobial, immunomodulatory and overall anti-oxidant properties. The cumulative data from *in vitro*, preclinical and clinical studies largely support the therapeutic claims for guggul and *guggulu* formulations described in the ancient Ayurveda.^[59]

Administration of raw *guggulu* reported to may produce skin rashes, irregular menstruation, diarrhoea, headache, mild nausea, and with very high doses, liver toxicity.^[61] Ayurvedic classics advocate use of *shuddha* (purified) *Guggulu* in clinical uses. Various *shodhana* processes have been described which may removes the impurities to some extent and helps in increasing the therapeutic values of *guggulu*. Previous study also suggested to reduce gastric irritancy^[91] and pharmacological action has found to be increased with purified *guggulu*.^[92]

In present study, it has been observed that purified *guggulu* is used in 61 different imperative *guggulu* formulations used in the Ayurveda most of which are named with suffix '*guggulu*'. The review advocates that *guggulu* is generally used in compound dosage forms like vati, guti, pills, churna, kvatha, lepa, taila and ghritain Ayurvedic medical practice. However, various functional limitations and constant improvisations seemed to have shaped the *guggulu* Kalpana in its today's form like tablet. The difference in choice of kalpana is explained on the basis of soluble alkaloid content and insoluble resinous gum content of *guggulu*.

The uses of formulations indicate in almost disease conditions with or without specific *anupana*. The *guggulu*

formulation and *anupana* concept in Ayurveda characterized for polyvalent actions and interpreted as additives or in some cases they synergistically produce the observed therapeutic effect. The formulation concept also designed for better pharmacokinetic of *guggulu* in clinical practice in Ayurveda.^[93] The dose of purified *guggulu* is 2-4 gm however, it is observed that even after formulating *guggulu* with different ingredients the dose remain same for almost Ayurvedic *guggulu* formulations between 1-3 gm except certain rasa preparation like *Vranatak Guggulu* the dose is lower as 250 mg while for lepa external preparation like *Vranari Guggulu* the dose is high up to 12 gm.

Gum guggulu act as binder in preparation of vati, pills and tablet while act as suspending and emulsifying agent in case of liquid dosage forms. The solid dosage forms thus developed more disintegration time which delay therapeutic action of *guggulu* formulations.^[94] Possibly considering this in view; the seers of ancient time had advised dissolving *guggulu* completely in suitable liquids before its consumption and Ayurvedic Physicians in present scenario advice to break *guggulu* solid dosage forms like vati, pills and tablet before oral administration for proper assimilation and absorption in GI tract.

Conclusion

From present study, it is concluded that researches have been carried out on hypolipidemic, anti-inflammatory, antioxidant and cardiovascular protective activity of gum *guggulu* and its chemical constituents in present era. *Guggulu* is generally used in compound dosage forms along with *anupana* in Ayurvedic medical practice. Pharmaceutics of *guggulu* Kalpana highlights the pliant nature and prominence of *guggulu* in Ayurveda. Comparatively less preclinical and clinical research work reported on uses of *guggulu* and its unexplored Ayurvedic formulations compiled in present review study. Finally, it is observed that no data on bioavailability, metabolism, and pharmacokinetics of *guggulu* in animal models or humans are currently available. The knowledge of these basic parameters is needed for proper evaluation of the clinical findings with *guggulu* and its formulations.

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