Guggul – A Treasure of Chemical Constituents

Bhagyasree B, Mruthunjaya K*, Paramakrishnan N, Suresh J

Department of Pharmacognosy JSS College of Pharmacy, Mysore

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ABSTRACT
Commiphora wightii, also known as Indian bdellium, Guggul, a flowering plant (Family: Burseraceae), which produces a gum resin. It has many medicinal properties. It is a treasure for many chemical constituents. Guggul plant mostly present in the arid and rocky tracts of the world. It is the medicinal treasure for various disorders like inflammation, obesity, rheumatism and disorders of lipid metabolism. Various chemical constituents like terpenoidal compounds, steroids, sterols, amino acids, sugars, guggul tetrals and flavonoids are present. In this review brief information about the chemical constituents had given which are responsible for its wonderful therapeutic action.

Keywords: Guggul, Oleo gum resin, Chemical constituents, Guggulsterones, tapping, Burseraceae.

INTRODUCTION
Guggul (oleo gum resin) exudes out from the bark of Commiphora wightii plant which is belonging to the family Burseraceae. It is also known as Indian bdellium. It is present in the rocky and arid areas of the world. In India it is most favorable in the Madhya Pradesh and Gujarat. In Sanskrit Guggul means the one that protects us from all diseases. The main therapeutic uses of Guggul are anti-rheumatic, anti-fertility, anti-inflammatory, hypolipidemic, anti-cancer activity and hypocholesteremic activity. There are 185 species of genus Commiphora are present. Out of this only 4 species are produced in India i.e., Commiphora mukul, Commiphora berryi, Commiphora wightii and Commiphora agallocha. From this 4 species Commiphora mukul and commiphorawightii gives the good yield of guggul. C.Berryi is also known as Mukiluvai by south India people. Other species were found in the Saudi Arabia, Africa and their adjoining countries.

The collected oleoresin which comes out from the bark then the sap was tapped is pale yellow – yellowish which turns into stalactic pieces or agglomerate of tears i.e., reddish brown, dull green or golden brown in colour. From 4-6 foot tall tree 700-900 g of resin are present. Taxonomical Classification of Commiphora wightii

Kingdom: Plantae
Subkingdom: Tracheobionta
Division: Magnoliophyta
Class: Spermatopsida
Sub Class: Magnoliidae
Order: Sapindales
Family: Burseraceae
Genus: Commiphora
Species: Wightii
Synonyms
Bengali, Gujarati - Guggul
Hindi – Guggulu, Guggal

Kannada - Guggal
Marathi - Guggala
Malayalam - Gulgulu, Guggalu
Tamil – Maishakshi, Guikal
Telugu – Guggul
Marathi: Gugal, Guggal, Guggul, hansaguggul,
kantguggul,Mahaishsguggul
Sindhi: Gugaru
Arabic: Mukulyahuda, Mukal, Ahlatan, Mogal,
English: Gum guggulu, Indian bdellium, Borassus, Flabelliformis
Macroscopic characters
Branches: spirally ascending spine scent young parts are like glandular, pubescent
Leaves: 1-3 foliate
Leaflets: sessile to sub sessile, terminal ones are the largest, rhomboid to ovate in shape, irregularly toothed margin leaves alternate, one to three foliate, ovate, serrate-toothed in the upper parts lateral leaflets when present only less than half the size of the terminal ones.
Flowers: small, brown to pink, unisexual flowers small, brownish red, polygonal in fascicles
Calyx: glandular hairs, forming cylindrical cap
Petals: four to five times as long as sepal
Stigma: eight to ten, inconspicuously bi-lobed
Stamens: eight to ten, alternately long and short
Fruit: drupe, red ovate, acuminate in shape, with 2-celled-store, rarely four-valve.

Chemical Constituents
A detailed study of guggulu was done on chemical constituents of the guggul and explained that guggul is a complex mixture of steroids, amino acids, carbohydrates, aliphatic esters, diterpenoids, and a different inorganic compounds Cholesterol and sesamin had been isolated [Sukh Dev et al ]. He also had been isolated E-Guggulsterone, Z-Guggulsterone, Guggulsterone I, Guggulsterone II, Guggulsterone III. Some other people had

*Author for Correspondence: kmruthunjaya@jssuniedu.in
been isolated two more sterol compounds Guggulsterol IV and Guggulsterol-V\textsuperscript{16,17}. Beside from this all four steroid compounds and alcohol i.e. mukulol had been isolated\textsuperscript{18}. Extracts of guggul oleo gum resin contains the compounds which is known for their hypolipidemic activity. Main reported compounds are E-Guggulsterone, Z-Guggulsterone and other guggulsterone compounds. Other constituents of guggul (oleo gum resin) are Guggul tetrols, Octadecane-1,2,3,4-tetrol, non decan-1,2,3,4-tetraols, terpenes and lignans i.e., Guggullignan I, Guggullignan II, ferulic acid and sesamin\textsuperscript{21-23}. The essential oil of Commiphora wightii and their percentage present by weight myrcene 3.50\%, Alpha-pinene 4.75\%, Methyl chavicol 5.40\%, 1,8-cineole (eucalyptol) 3.5\% and other unidentified compounds. The following are the percentage of guggulsterones:

- Crude gum guggul-2\%
- Ethylacetate extract-4 to 4.5\%
- Neutral subfraction-4.2 to 4.7\%
- Ketonic subfraction-35 to 40\%

From this 10\% of E-Z Guggulsterones were derived\textsuperscript{24}.

**Medicinal Uses**

Guggul means “fights against disease”. It is mainly used for the treatment of obesity, High cholesterol. Other uses are anti-inflammatory, astringent, rheumatoid arthritis, enrich blood, diuretic, thyroid stimulant, liver tonic, stomachic, expectorant, carminative, sedative, appetite stimulant. The oleo gum resin is also known for its use in indolent ulcers in lotion form and also used as gargle for ulcerated throat. Guggul is one of the main ingredient or secondary ingredient for several drugs or medicines. It is also recommended for hay fever, laryngitis, chronic bronchitis. It is also used in gout and heart diseases.

**Use of the chemical constituents**

The steroids present in guggul were associated with the hypolipidemic and anti-inflammatory activity. Commiphora wightii ethanol extract of trunk was separated and gave an anti-fungal flavone known as Muscanone along with old known compound known as naringenin. They have found that Muscanone was active against Candida albicans in microbial assay\textsuperscript{31}. Guggultetrol ferulate has been isolated from the cytotoxic fraction of Ethyl acetate extract of guggul.
E-Guggulsterone and Z-Guggulsterone (ketonic part) has the property of lowering blood lipid (hypolipidemic activity)\(^32\). Naringenin prevents the accumulation of lipoproteins and also acts as anti-bacterial, anti-inflammatory, anti-viral properties\(^33\). Cembranoids controls the gastrointestinal absorption of cholesterol and fat\(^34\). Myrrhanol i.e. triterpenoid of guggul gum acts as anti-inflammatory. and also used to reduce pain for osteo arthritis patients\(^35\). Alpha pinene acts as anti-fungal and also anti-microbial agent\(^36\). Eugenol (mono terpenoid) has the anti-oxidant property and it also plays a vital role in the cell proliferation in tumors. It also acts as anti-microbial agent\(^37\). Mansumbinoic acid also acts as anti-inflammatory and anti-bacterial agent\(^38\). Alpha terpineol has strong anti-microbial activity\(^39\). Beta sitosterol inhibits the cholesterol\(^40\) in the body and reduces the level of cholesterol. 1,8-cineole acts as anti-inflammatory and anti-nociceptive\(^41\) agent. Quercetin has the most effective inducer effect for the anticarcinogenic\(^42\) activity. Diayangambin has the immunomodulatory and anti-inflammatory activity and also used to reduce the ear swelling\(^43\). Ellagic acid has the anti-mutagen, anti-inflammatory and anti-cancer activity\(^44\). It binds with cancer cells and makes them inactive. L-Arabinose does not have any biological use but it is a good source of sugar\(^45\).

**CONCLUSION**

From this review article, it is figured that Guggul is a plant of many bioactive constituents which are used for treating many diseases like rheumatoid arthritis cancer, anti-inflammation, microbial infection, wound, cholesterol level, hypolipidemic, gastrointestinal problems and tumors. It is one the best and old traditional medicine.

Many chemical constituents like steroids, sterons, flavonoids, tri terpenoids, amino acids, lignans, and Guggul tetrals are present in guggul. In this article it is clearly concluded that guggul means protection against many diseases. Beta sitosterol, Eugenol shows the high medicinal properties like anti-inflammatory, hypolipidemic, anti-cancer. Plants like guggul are the most incredible gift of our nature.

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