

Guggul – A Treasure of Chemical Constituents

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Received: 31st Jan, 19; Revised 17th Feb, 19; Accepted 28th Feb, 19; Available Online: 25th April, 19

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 tetrols 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 Gujarat¹⁻⁵. In Sanskrit Guggul means the one that protects us from all diseases. The main therapeutic uses of Guggul are ant rheumatic, anti-fertility, anti-inflammatory, hypolipidemic, anti-cancer activity and hypocholesteremic activity. There are 185 species of genus *Commiphora* are present⁶. 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 *Mulkiluvai* 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 present⁸.

*Taxonomical Classification of Commiphora wightii*⁷

Kingdom: Plantae
Subkingdom: Tracheobionta
Division: Magnoliophyta
Class: Spermatopsida
Sub Class: Maqnoliidae
Order: Sapindales
Family: Burseraceae
Genus: *Commiphora*
Species: *Wightii*

*Synonyms*¹¹⁻¹³

Bengali, Gujarati - Guggul
Hindi – Guggulu, Guggal

Kannada - Guggal
Marathi - Guggala
Malayalam - Gulgulu, Guggalu
Tamil – Maishakshi, Gukkal
Telugu – Guggal
Marathi: Gugal, Guggal, Guggul, hansaguggul, kantguggul, Mahaishsguggul
Sindhi: Gugaru
Arabic: Mukulyahuda, Mukal, Ahlatan, Mogal,
English: Gum guggulu, Indian bdellium, Borassus, Flabelliformis

Macroscopic characters^{19,20}

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, polygamous 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 Cholestrol and sesamin had been isolated {Sukh Dev et al }. He also had been isolated E-Guggulsterone , Z-Guggulsterone, Guggulsterol I , Guggulsterol II , Guggulsterol III¹⁵. Some other people had

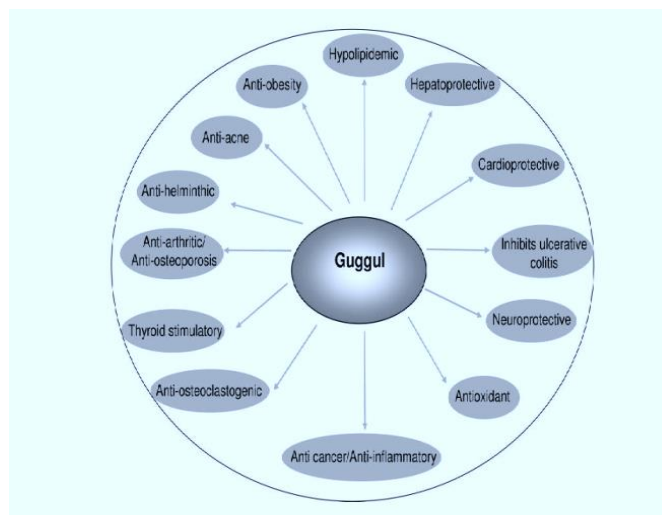


Figure 1: Leaves, stems, Fruits and gum of Guggul [26]



Figure 2: Chemical constituents of Guggul [25]

been isolated two more sterol compounds Guggulsterol IV and Guggulsterol-V^{16,17}. Beside from this all four steroid compounds and alcohol i.e...mukulol had been isolated¹⁸. 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 adecan-1,2,3,4-tetraols, terpenes and lignans i.e.. GuggullignanI, Guggullignan II ,ferulic acid and sesamin²¹⁻²³ 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%

Ethyl acetate 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 derived²⁴.

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 assay³¹.

Guggul tetrol ferulate has been isolated from the cytotoxic fraction of Ethyl acetate extract of guggul.

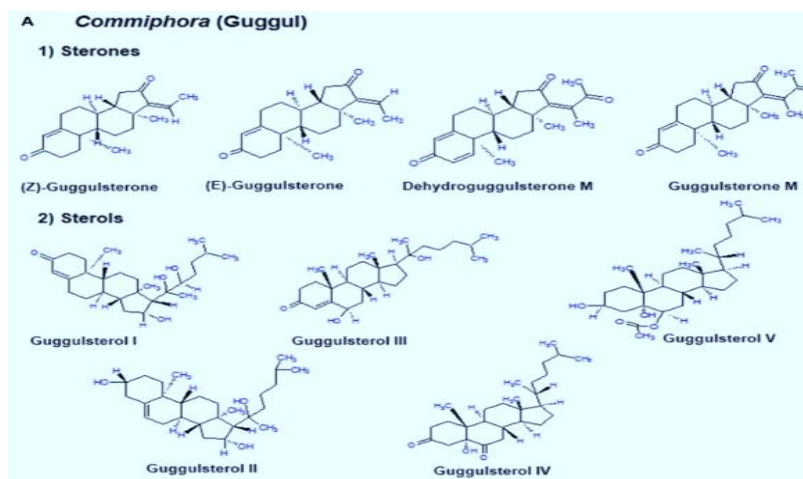


Figure 3: Therapeutic uses of guggul.

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 properties³³.

Cembranoids controls the gastrointestinal absorption of cholesterol and fat³⁴.

Myrrhanol i.e. triterpenoid of guggul gum acts as anti-inflammatory and also used to reduce pain for osteo arthritis patients³⁵.

Alpha pinene acts as anti-fungal and also anti-microbial agent³⁶.

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 agent³⁷.

Mansumbinoic acid also acts as anti-inflammatory and anti-bacterial agent³⁸.

Alpha terpineol has strong anti-microbial activity³⁹.

Beta sitosterol inhibits the cholesterol⁴⁰ in the body and reduces the level of cholesterol.

1,8-cineole acts as anti-inflammatory and anti-nociceptive⁴¹ agent.

Quercetin has the most effective inducer effect for the anti-carcinogenic⁴² activity.

Diayangambin has the immunomodulatory and anti-inflammatory activity and also used to reduce the ear swelling⁴³.

Ellagic acid has the anti-mutagen, anti-inflammatory and anti-cancer activity⁴⁴. It binds with cancer cells and makes them inactive.

L-Arabinose does not have any biological use but it is a good source of sugar⁴⁵.

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 tetrols 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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