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MUQIL (*COMMIPHORA MUKUL*) –A WONDER DRUG IN TRADITIONAL MEDICINE

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ABSTRACT

Muqil in unani literature has been described as a gum which is obtained from the stem of a small tree, *commiphora mukul*. It has a specific smell. Out of 165 species, five species of *Commiphora muqil* occur in India. Out of these five species the genuine drug is derived from *Commiphora mukul* (Hook-ex-stock). The plant *Commiphora muqil* is also known as Balsamodendron mukul stock. *Commiphora mukul* contains wide number of phytochemical constituents i.e flavonoids, terpenes, phytosterols etc which have different biological activities like antimicrobial, anti-inflammatory, anti carcinogenic activity and various other important medicinal properties. Oleoresin gum of *C. Mukul* commonly known as "*Guggul*'' or *"Gugulipid''* is an important drug in Indian system of medicine. Guggulsterone- the main active substance in it is highly efficacious in the treatment of obesity, dyslipidemia, rheumatism, urinary disorders, skin diseases, chronic tonsillitis, ulcerated throat and various neurological and syphilitic disorders. Ancient *Ayurvedic* authorities, particularly *Sushruta* has emphasized the value of *guggul* in the treatment of obesity and its various vascular and neurological complications arising as a result of an inherent disorder in lipid metabolism. It has also been mentioned by *Charaka* and in *Athar veda*. In this review an effort is made to review this plant and update the information regarding its medicinal uses and pharmacological activities in traditional system of medicine.

INTRODUCTION [1,2,3,4,5]

Many herbal drugs are used now-a-days to provide lasting results without any adverse side effects. Importance of medicinal plants and traditional health systems are always concerning issue to resolve the health care problems in the world. Many medicinal plants have been used since ages to cure many disorders and are still being researched constantly to provide safe alternatives to allopathic drugs so that side effect can be minimized to the maximum extent. The inherent properties of herbal medicine have increased to fill the lacunae created by synthetic medicine.[1. 2] The biological and pharmacological properties of many plants are still unknown. The scientists worldwide are exploring the possibilities of utilizing or finding out pharmacologically active compounds from medicinal plants.[3.4,5.] Among these *Commiphora mukul* is of high medicinal value as it has been used to cure various diseases now-a-days.

Description of Commiphora mukul Plant; [6,7,8] *Commiphora mukul* Hook ex. Stocks is a thorny shrub reaching up to the height of 9ft. It belongs to family *Burseraceae*. It appears a dense thorny shrub or bushes. The height of the tree is usually found to be between 1-4mts at maturity and the bark is rough and ash colored, peeling off in flakes.

Stem;

The young stem is glandular and pubescent. Branches knotty, crooked and divaricated usually end in sharp spine. The old stem is brownish to pale yellow in color and is covered by a thin paper like layer which appears by the coals of the dead cells. The small lumps of fresh yellow gum on the surface appears as a result of cuts made by the collectors or of natural oozing through the lenticels. Stem diameter is variable reaching up to 20cm.

Leaves; The leaves are 1-3 foliate, alternate, simple obviate, serrate toothed in the upper parts with tapering base and entire apex. Leaflets are sub sessile rhomboid, smooth and shiny.

Flowers; The flowers are small brownish, red colored, unisexual or bisexual, with few pedicles solitary or in clusters. Calyx campannulate, glandular hairy with 4-5 lobes, petals are brownish, red broadly, linear thrice the length of the calyx and reflex at the base. Stamens are 8-10, alternately long and short. Dise 8-10 lobed.

Fruits; Are round, fleshy and red in color, when ripe-fruit is 6-8mm in diameter, ovoid, acute, epicarp, four valved pyrens ovate, readily splitting into two parts.

Morphology of gum and its varieties; The yellowish exudates which comes out from the tree stem through incision becomes reddish in color, thick and solid exudates changes into pieces of various sizes ranging from small grain to an egg. Some pieces contain white streaks

and oily spots. When broken they exhibit rough wax like fracture with a moist and sticky appearance. The gum has a peculiar and agreeable fragrance with an aromatic and acrid taste. It disintegrates in water and forms light brown emulsion. Alcohol dissolves the volatile resins of *C Mukul* .The volatile oil is yellowish, viscous and rapidly resinifies. The resin portion of gum is not properly soluble in ether.[9]

According to the *Greeko-Arabic* Scholars, this gum is of various types as follows;

1; *Muqil-e Arzaque:* Red or brown in color.

2; *Muqil-e-Yahud*: Yellowish Shiny gum.

3; *Muqil-e-Saqalibi:* Blackish brown or dark brown textured gum.

4; *Muqil-e-Arabi*: violet colored gum.

Unani physicians considered the best variety of gum as shiny, viscous yellow in color and bitter in taste and dissolve easily in water. It must be free from Sand, dust, vegetable debris. It can be used up-to 20yrs.

However, the varieties of *Guggul (Muqil)* as mentioned in *Athar veda* are as follows;

1-*Bhainsa-Guggul*: Blackish brown or black shiny, sweet gum.

2-*Heera*-Bhainsa-*Guggul*: Dull brown sweet gum.[10]

Distribution; *C. Mukul* occurs in North East Africa, Somali and Southern Arabia. In Southern Arabia, it occurs in Ghizan, Gison, while in Pakistan it is abundant in Sindh and Buluchistan. In India it is found in Gujrat, Mysore, Bengal, M.Pradash, Belleri and in Rajputana Desert of Rajastasthan.[5, 6, 11]

Alternate or Vernacular names; [5 , 6, 7 8, 9, 10, 11, 12]

English: Myrrh, Bdellium, Indian Bedallium.

Arabic: Muqil-arzaqi, Aphalatana.

Hindi: Gogil, Guggul.

Persiaz: Boejahudan

Sanskrit; Guggulu, Devastha, Dhurta.

Cutch: Gugal

Sindhi: Gugal

Tamil: Gukkal, Gukal

Chemical constituents; Oleo resin gum of C. mukul called Gugulipid has active ingredients like Ketosteroids cis- and trans-4,17(20)- pregnadiene-3,16-dione, also known as E- and Z guggulsterone.[13] Guggulsterone- II, III, IV, V, VI, myrcene, dimyrcene.[14]

Bioactive compounds in extract of *mukul* reported are dimyrcene.[15]

α –camphorene. [16]

Linoleic, Oleic, stearic, palmitic acids, sitosterol. [17]

Z- and E- guggulsterones.[18]

(8R)-3 α, 8 -dihydroxy-polypoda-13E, 21-triene (myrrhanol C, 4-pregnene-3, 16-dione, 4, 17(20)- (cis)-pregnadiene-3,16-dione, 4, 17(20)- (trans)-pregnadiene-3,16-dione, β–acetyloxy-pregn-4, 17(20)-trans-dien-3-one, 3 α- acetyloxy-5alphpregnan-16-one, 20R,22R-dihyrdroxycholest-4-en-3-one. [19]

Epiexcelsin and 5`-dimethoxy-epiexcelsin. [20]

Amino acids: The amino acids reported in extract of *Commiphora mukul* are ctstine, histidine, alanine, proline, tyrosine, valine, leucine, and isoleucine.[21]

t3◦, Dry2◦,

Temparament (Mizaj); [22, 23, 24, 25,]

Ho t3◦, Dry2◦,

Therapeutic Dosage (Mikdar-e-Khurak);

1-3 *Masha* (1-2grms) [22]

1-12 *Masha* (1-12grms) [25]

3-9 *Masha* (3-9gms) [23]

4-4 1/2 *Masha*(4-41/2 gms) **[26]**

Actions of Commiphora mukul; [23, 21, 25, 6, 8, 27, 28, 29, 30, 31, 32, 33]

Commiphora mukul has been described in ethnomedical and Unani literature in detail and many actions have been reported as antiobesity**,** antihyperlipidemia, diuretic, emmenogogue, anti-inflammatory, thrombocytic, concoctive, desiccant, anti-arthritic, laxative, carminative, resolvent, astringent, nervine tonic, lithotriptic, liver tonic, expectorant, ecbolic, detergent, alternative, antidote, tonic, aphrodisiac, rejuvenating, disinfectant, antitoxin, antihelminthic, expectorant, thermogenic.

Therapeutic uses; [6, 8, 21, 23, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36]

It is therapeutically used in obesity, hyperlipidemia, arthritis, coronary thrombosis, cardiac disorders, Diabetes, Paralysis, asthma, bronchitis, gout, hemorrhoids, Tumors, thyroid disorders, hepatic obstruction and weakness, ulcers, hay fever, septic conditions, sexual weakness, pharyngitis, lumbago, lymphadenopathy, neurological disorders, pleurisy, sciatica, renal calculus and uterine disorders.

Substitute (Badal); *Murmuki*.[22,23,25,32]

Sibre-Zard. [22, 23, 24, 32]

Correctives (Muzir and musleh) ; [22, 23, 24, 25, 32] It can have adverse affects on lungs, liver and spleen but correctives like *Katira()* and *Zafran()* have been used for lungs, *Zafran* for liver and for spleen *Kaharba* can be used for prevention.

Toxicology; No acute, subacute, or chronic toxicology has been reported in rats, monkeys and dogs. No mutagenesis or teratogenicity has been described for gum guggul.[37]

PHARMACOLOGICAL STUDIES

Antihyperlipidemic effect; Hyperlipidemia also called hyperlipoprotenemia or high cholesterol, characterized by high concentration of fats (lipids) in blood is related to the development of atherosclerosis, the underlying cause for CHD, HTN and stroke. The active ingredients in *gugulipid* are Ketosteroids cis- and trans-4,17(20)- pregnadiene-3,16-dione also called E- and Z guggulsterone extracted from the resin is safer and more effective than many cholesterol lowering drugs. The hypolipidemic activity of *guggul* can be attributed to the several mechanisms including inhibition of cholesterol biosynthesis and enhancement in cholesterol degradation and / or excretion. *Guggul* compounds are antagonist ligands for bile acid receptor called Farnesoid X receptor (FXR), which is an important regulator for cholesterol homeostasis.[37,38,]

Anti-inflammatory effect; Extracts of the plant have Anti-inflammatory action and inhibit carrageenan induced rat paw edema in animal models. Fraction containing gum *guggul* (acidic fraction of ethyl acetate extract) in experimental arthritis decreased the thickness of joint swelling during the course of drug treatment. 30 elderly patients of knee osteoarthritis were given 500mg of *C. mukul* (Guggulsterone, 3.5%) three times daily with food in a study and significant improvement in WOMAC and visual analog scores was found.[39]

Anticarcinogenic effect;[37,40,41,43,44,45] The bioactive compound Eugenol present in *C.mukul* is known to inhibit lipid peroxidation which plays an important role in cell proliferation especially in tumors.[41] Ellagic acid has antioxidant, antimutagenic and anti cancer properties. It also has shown chemo protective effects in various chemically induced cancers. [41.]Eugenol inhibits mutagenecity of aflatoxin B1 and N-methyl N-nitrosoguanidine.[42] Various in vitro studies done to evaluate the effect of extracts of *C. mukul* have shown its effects in a variety of cancer cell lines like leukemia, skin, ovarian, prostate, lung, neck, breast, bone, head, neck and bone cancers. [43, 44, 45, 46 ,47,48]

Cardiac effects; *Guggul* is useful in providing protection against atherosclerosis, helps in reducing of stickiness of platelets thus plays an important role in prevention of coronary artery diseases. [49, 50] The hydroalcoholic extract of *C. mukul* has shown significant results in improving cardiac function and preventing myocardial ischemic impairment manifested in the form of increased heart rate, increased left ventricular end diastolic pressure, decreased arterial pressure and altered myocardial contractility indicies.[50] *Commiphora mukul* in combination with *Inula racemosa*, an *ayurvedic* herb has been used to reduce chest pain and dyspnea of angina.[51]

Endocrine effects; *Guggul* possess the capacity to enhance the production of the thyroxin (T4), triidothyronine (T3), which also accounts to its lipid lowering effects. [52]

2-guggulestrone –a ketosteroid counteracts the thyroid suppressant activity of carbimazole.[53]

Antidiabetic effect; some molecules derived from *guggulipid* extract are reported to have the capability of decreasing insulin resistance in human beings.[54] Administration of *C. mukul* extract in diabetes induced rat has shown improvement in glucose tolerance and lipid profile. Also decrease in plasma insulin levels and reduction in weight gain was seen.[55]

Antimicrobial effect; The essential oil, chloroform extract and 7sesquiterpenoids compounds extracted from oleoresin gum of *Guggul* showed a wide range of inhibiting activity against both gram(+) and gram (-) bacteria.[56] Active plant extracts of *C. mukul* have shown significant antibacterial activities against human pathogenic strains. [57]

The bicyclic monoterpene alpha- pinene present in *C. mukul* has also showed antifungal activity [58]. Oils and active components were studied for antibacterial and antifungal activities against a variety of human pathogenic bacteria.[59] Ellagic acid present in *C. mukul* also has antiviral and antibacterial activities.[60]

Dermatological effect; Guggulstrone fractions have been used in allergic dermatitis. *Guggulipid* and alcoholic fractions possess skin care properties like anti-sebum and antioxidant activity. The compositions provide sebum control, oil control, improved skin feel, prevent shine and stickiness resulting reduced appearance of wrinkles and aged skin, improvement in skin color, radiance, health and youthful appearance of skin. [61] Guggulsteroe has been found as effective as tetracycline in treatment of nodulocystic acne in one study.[62]

Immunomodulatory effect; *Guggul* possess immune modulator properties. It provides support to immune fractions, improves the defense mechanism of body and also increases the production of white blood cells.[63]

Antiobesity effect; *Guggul* has well known antiobesity effects and has been used for obesity and hyperlipidemia since ages in *Ayurveda.* In USA, patent dietary supplements containing *Guggul* claim reduction in buildup of body fat other than associated with medical problems of endocrine and neuroendocrine system.[64]

Conclusion: Studies done on *Commiphora mukul* have proven it to be very beneficial for human being due to its pharmacological actions and therapeutical uses in a number of diseases. It has been widely acceptable due to its anti-bacterial activity, anti-spasmodic activity, anti-diabetic activity, anti-carcinogenic and mutagenic activity, anti-oxidant activity, analgesic activity, anti-fungal activity, anti-inflammatory, anti-obesity, hepatoprotective activity, immunomodulatory activity, & cardioprotective activity, anti-hyperlipidemic and anti-artritic activity. This drug is used in traditional medicine since long time and reference goes to *Sushruta, Charaka* and Ibn-Sena. It has also been mentioned in in *Athar veda.* It has been regarded as a plant of high medicinal value because of presence of a number of bioactive compounds like guggulsterone, eugenol, ellagic acid, myrcene, and dimyrcene etc. In present scenario people are distressed by diseases like obesity, arthritis, diabetes, hyperlipidemia and even deadly diseases like tumors and cancer have become very common but studies on *Commiphora mukul* have proven it to be a guiding source for treating and curing these diseases in a natural way. Further research and clinical trails need to be done to explore its medicinal properties further. So, this paper may be helpful to know the pharmacological actions and uses of *Muqil* (*Commiphora mukul*) which is mentioned in Unani system of medicine.

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Competing Interests

The authors declare no conflict of interest.

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