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Use of Resins like Guggul, Asfoetida and Myrrh in Modern Pharmacognosy

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Abstract

Raw guggulu use has been linked in rare cases to skin breakouts, periods that are irregular, diarrhoea, headaches, mild nausea, and, at very high doses, liver damage, as documented in Ayurvedic texts. Many "dravyas," or fluids, employed in Ayurvedic purification rituals (shodhan vidhi) may be utilised to dilute the potentially harmful effects of uncooked guggulu while amplifying its medicinal properties. According to Ayurvedic texts, guggulu must be purified before it may be employed in herbal combinations. Many popular polyherbal pain relievers on the market centre on guggulu.

Temporary side effects from clinical trials utilising standardised gum the guggul extracts included skin rashes, diarrhoea, and irregular periods of menstruation. A study found that 10 out of 22 participants who took 2160 mg dose guggulu once day for 12 weeks had at least one adverse event, most often gastrointestinal distress, fatigue, and skin rash. Skin rashes were also seen in tests when 1-2 grammes of guggulipid (ethyl acetic fraction) was used once a day for a month. In this examination, no signs of digestive discomfort were seen. Guggul usage is generally considered to be safe, however extreme care may be warranted in certain cases. Toxicological data on guggulu are either lacking or unreliable.

Key words: Antidiabetic activity, antifungal activity, Ferula asafoetida Linn, ferulic acid, Guggulu

Introduction:

Damage to the bark of the "Commiphora wightii (Arnott) Bhandari tree, also known as Commiphora mukul (Hook. Ex Stocks) Engl. or Balsamodendron mukul (Hook. Ex Stocks)," causes the release of guggulu, an oleo-gum resin. Phytoconstituents such "monoterpenoids, sesquiterpenoids, diterpenoids, and triterpenoids, as well as steroid hormones flavonoids, guggultetrols, lignin, sugars, and amino acids", make up this oil-like compound. The purpose of this review is to compile data on all of the chemical constituents that contribute to its therapeutic value. There are just a few dry patches in the borders of Pakistan and the Indian state of Gujarat and Rajasthan where this species may be found in the wild. Guggulu, an oleo-gum resin harvested from the plant's stems, is widely used in the Indian herbal industry. Due to habitat loss and degradation as well as unregulated tapping & harvesting of oleo-gum resin, its natural population has declined over the last several decades. Because of this, the IUCN has added the species to its red list of endangered and critically endangered animals.

Asafoetida, which has a strong, persistent scent and a sulphurous taste, and oleo-gum-resin, a substance of medicinal and nutritional value, are both primarily derived from Ferula asafoetida Linn. As well as being used as traditional medicine around the world for numerous diseases, asafoetida is a flavouring agent in food. Numerous interesting properties have been discovered in recent investigations, mainly those that are muscle relaxants, memory enhancers, digestive enzymes, antioxidants, antispasmodic, hypotensive, hepatoprotective, anxiolytics, and anthelmintic. It is used to prevent and treat a variety of issues, including unplanned pregnancies, strange pain, sterility, and mostly female illnesses including painful and protracted menstruation and leukorrhea. Additionally, it is used to treat loose stools, gas, low stomach acid, and pressure in the stomach. This review examines the pharmacological properties, therapeutic benefits, and diverse phytoconstituents of asafoetida.

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As a result, Ferula asafoetida Linn. is a significant source of asafoetida, an aromatic spice with a strong, persistent scent of sulphur and nutritional and therapeutic value. As well as being used as traditional medicine around the world for numerous diseases, asafoetida is a flavouring agent in food. Numerous interesting properties have been discovered in recent investigations, mainly those that are muscle relaxants, memory enhancers, digestive enzymes, antioxidants, antispasmodic, hypotensive, hepatoprotective, anxiolytics, and anthelmintic. It is used to prevent and treat a variety of issues, including unplanned pregnancies, strange pain, sterility, and mostly

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Medicinal Value and Usage

Overweight patients, those with lipid metabolic abnormalities, those with gout, those with rheumatism, those with arthritis, and those with inflammation have all benefited from guggulu's usage in traditional Indian medicine (Urizar and Moore, 203). The Indian Pharmacopoeia of 1996 lists it under the names guggul, guggal, or Indian bdellium, among others.

Guggulu is made up of oleo-gum resin, commonly known as "balsamodendron mukul" (Hook. Ex Stocks) or "Commiphora wightii (Arnott) Bhandari [syn. Commiphora mukul (Hook. Ex Stocks) Engl. ; Balsamodendron mukul" (Hook. The "guggul tree," as the plant is often known, grows in dry areas of Pakistan, Bangladesh, & India. It may be found in the Indian regions of Gujarat, Rajasthan, Assam, the state of Madhya Pradesh, and Karnataka. It's a little, spiny tree that produces a yellow gum resin called guggulu from tiny channels all over its bark. The bark is cut away to get access to the trees. The oozing resin is allowed to harden before being collected. The resin is collected in May and June, after the tree has been tapped from November to January. According to The Ayurvedic pharmacies of India (2007), a guggul tree may yield anywhere from 250 to 500 grammes of dried resin during harvest season.

Fresh guggulu is thick and golden in hue and has a pungent aroma and harsh, astringent smell, whereas dried guggulu is vermicular pieces of a pale yellow to brown mass. Total ash production shouldn't exceed 5%, and acid-insoluble ash shouldn't exceed 1%. A minimum of 27% of materials are soluble in alcohol, while at least 53% are soluble in water. According to the Ayurvedic pharmacies of India (2001), authentic guggulu samples should have a guggulsterone content of between 1% and 1.5%.

Vedic cleansing with guggul (vidhi shodhan). Raw guggulu, as described in Ayurvedic texts, may lead to skin breakouts, irregular periods, vomiting, headaches, mild nausea, and even liver damage at extremely high doses (Masten, 2005). Ayurveda offers several different purification techniques (shodhan vidhi) that use different liquids (dravyas) to counteract the harmful effects of uncooked guggulu. These methods not only mitigate the drawbacks, but also boost the efficiency of the treatment itself. According to Ayurvedic beliefs, guggulu should not be used in preparations until it has been cleansed. During the shodhan method, herbal juices, urine from cows, and cow milk are used to heal the guggulu.

Ayurvedic Formulations of Guggulu

Guggulu is the main component of a sizable number of commercial polyherbal anti-inflammatory preparations (Karan et al., 2009). With the exception of one report that claims that purification of guggulu reduces its gastrointestinal irritancy, no studies have been done to examine the Ayurvedic purification method and its likely impact on medicinal efficacy.

Foreign objects are physically removed from raw guggulu and broken into small pieces as

part of the purifying process. The fragmented mass is encased in fabric (called a potli) and hung inside an inert box (also referred to a dola yantra), that is then filled with one of the suggested media, such as urine from cows, triphala kasaya, vasapatra kasaya, an infusion of Adhatoda vasica departs an aqueous extract of Adhatoda vasica departs dugdha (milk), and the water. The guggulu is kept immersed in the liquid as it is heated to extract all that is the purification agent's soluble substance from the guggulu. Guggulu's insoluble component is removed and thrown away. Guggulu solution is continued to boil until it forms a mushy mass. It is then poured out onto a piece of smooth wood that has been coated with castor oil or cow ghee and left to dry in the sun. The dried mass is known as suddh guggulu, or refined guggulu.

Ayurvedic Use of Strongly Aromatic Plant Material

The plant Ferula asafoetida L. is used to produce dried latex (gum oleoresin), which is released from the rhizome and stems of this plant that belongs to the Umbelliferae family. The sliced surface of the rhizome emits a milky secretion, and stems and dried exudates are scraped off. The plant is 1-1.5 m tall, has very dissected leaves, and has unnoticeable yellow flowers maintained in compound umbels. There is a lot of viscous alliaceous fluid in the bark, which is wrinkled and dark. Asafetida can also be found in various Ferula species, including Ferula rigidula, Ferula rubricaulis, F. asafoetida, Ferula alliances, and Ferula narthex. In Iran's central and southern mountains, F. asafetida also thrives profusely. Iran uses the names "Anguzakoma," "Anghouzeh," and "Khorakoma" for the oleo-gum-resin Asafoetida. Asafoetida is a herbaceous perennial plant in the family Apiaceae that can reach a height of about 2 m and has a pungent odour.

Incisions made in the roots or the removal of the plant's stems are typically used to manufacture oleo-gum resin. Exudates that have dried out (oleo-gum-resin) are gathered and packaged for shipment. The gum contains polysaccharides, glycoproteins, rhamnose, glucose, l-arabinose, galactose, and glucuronic acid. The volatile fraction consists of volatile terpenoids, sulfur-containing chemicals, and monoterpenes. Studies on Asafoetida fractionation have shown some intriguing bioactive substances, such as antiviral sesquiterpene coumarins derived from Asafetida that are more effective than amantadine against influenza-A (Sangle, et al., 2004). The harsh taste and distinctive sulphurous smell of asafoetida are both present. In addition, Asafoetida is consumed regularly in Nepal by the population, and it is also believed to have aphrodisiac, sedative, and diuretic qualities (Bhati, 1950). From this oleo-gum-resin, pharmacological investigations have shown anti-oxidant, cancer-preventive, antidiabetic, antiviral, hypotensive, antifungal, antispasmodic, and molluscicidal effects. Along with treating snake and insect bites, it is also used to treat worm infections.

Isolation of Phytoconstituents of Guggulu

In addition to trace levels of sesamin and other unknown components, guggulu contains a range of inorganic ions, ferulates, lignans, long-chain aliphatic tetrols, steroids, and long-chain aliphatic esters.

Steroids: Several steroidal components have been isolated from gum resin, according to reports. One of the main components is “E-guggulsterone Z-guggulsterone (24), along with guggulsterol-1 (25), guggulsterol-II (26),

guggulsterol-III (27), guggulsterol-IV (28), guggulsterol-V (29) and guggulsterol-VI (30). There are three further isolated steroids: 20-hydroxy-4-pregnen-3-one (31), 20-hydroxy-4-pregnen-3-one, and 16-hydroxy-4,17(20)-Z-pregnadien-3-one, also known as Z-guggulsterol. Progesterone and related steroids, 4-pregnene-3,16-dione (32) ,(20R)-20-acetoxy-4-pregnene-3,16-dione,16β-acetyloxypregn-4,17(20)-trans-diene-3-one (33)),3α-acetyloxy-5α-pregnan-16-one (34) , and 20R,22R-dihydroxycholest-4-en-3-one (35) , have also been identified. Also mentioned is cholesterol. Guggulsterol-Y (37), dihydro guggulsterone-M (36), and guggulsterone-M (37)", three new and newly isolated steroids, are all present. The drug's hypolipidemic and anti-inflammatory properties have been linked to its steroidal components.

Flavonoids: A novel antifungal flavone called muscanone (38) and the well-known naringenin were produced from an ethanolic extract of the C. wightii tree trunk on a silica gel-packed column. According to a microbiological sensitivity assay, muscanone is effective against Candida albicans.

Chemical Constituents Present in Asafoetida

Asafoetida is typically composed of about 68% carbs, 16% moisture, 4% protein, 1% fat, 7% minerals, and 4% fibre (Kakrani, 1981). "Asafetida consists of three primary components: resin (40–64%), gum (25–25%), and essential oil (10–17%). Coumarins, sesquiterpene coumarins, ferulic acid and its esters, along with other terpenoids, can be found in the resin part. Glucuronic acid, glucose, galactose, 1-arabinose, rhamnose, polysaccharides, and glycoproteins are all present in the gum component." The volatile fraction includes volatile terpenoids, monoterpenes, and substances containing sulphur (Kumar and Dev, 1987).

Amino Acids: "After the solvent had been removed, the extract of C. mukul was divided between water and ether. After being chromatographed, the aqueous fraction revealed the presence of different amino acids. Cysteine, histidine, lysine, arginine, aspartic acid, serine, glutamic acid, threonine, alanine, proline, tyrosine, tryptophan, valine, leucine, and isoleucine were among the amino acids found."

Traditional Therapeutic Uses of Guggulu

The use of guggulu in Ayurveda dates back a long time. The first source that discusses its curative and restorative effects is the Atharvaveda. Numerous Ayurvedic treatises, such as the Charaka Samhita (1000 B.C.), Sushruta Samhita (600 B.C.), and Vagbhata (7th century A.D.), provide in-depth descriptions of the activities, uses, and indications of guggul as well as the different kinds. Additionally, between the 12th and 14th centuries A.D., a number of medical texts were created (Sahni, Hepfinger, and Sauer, 2005).

In traditional medicine, it can be used in a variety of ways. When consumed internally, it has astringent and antibacterial properties as well as carminative, bitter, and stomachic effects. Like all oleo resins, it increases leucocyte count and promotes phagocytosis. It functions as an emmenagogue, diaphoretic, expectorant, diuretic, and uterine stimulant.

Lipid Lowering Input of Guggulu

The first study on the lipid-lowering effects of In January 1966, a PhD thesis on the effects of guggulu on atherosclerosis or obesity (medoraga) was submitted to the Banaras

Hindu University (BHU). Before this study was published, guggulu was often used as an Ayurvedic treatment for a wide variety of arthritis. The inspiration for this work came from a single line of cryptic Sanskrit in the classic Ayurvedic treatise Sushruta Samhita. The shloka presents very clear and scientific information about the causes, mechanisms, treatments, and effects of obesity and associated lipid problems. Obese animals and individuals with high cholesterol levels also showed signs of the hypolipidemic effect.

Extensive, well-designed studies on rabbits spanning two years showed for the very first time that oil guggulu could not just significantly decrease blood cholesterol within hypercholesterolemic rabbits, which additionally it could protect them from triglycerides-induced atherosclerosis during the fatty streak stage. The total body mass of the animals was also reduced. Patients using obesity and hypercholesterolemia showed a comparable propensity to significantly decrease blood cholesterol levels in clinical trials using crude guggulu. The Central Drug Research Centre (CDRI), Lucknow, has conducted chemical, pharmacological, and clinical research on guggulu.

Gugulipid, a standardised extract of ethyl acetate of the oleoresin produced at CDRI, has been sold in India as a -p agent since 1988. The guggulu is thought to have hypolipidemic action because to the presence of -guggulsterones and -guggulsterones in the plant. The amount of guggulsterones in gugulipid ranges from 4% to 6%. For economic considerations, as well as because the additional elements of the extract of ethyl acetate demonstrated synergistic (hypolipidemic) impact, the ethyl acetate extract was chosen above two guggulsterones. The hypolipidemic action of guggulu or gugulipid has been confirmed by a number clinical trials. The function of gugulipid as a hypolipidemic drug was validated by the results of multicentric clinical studies conducted with gugulipid at 7 different centres in India organised in conjunction with CDRI.

In several animal models and human trials, guggulu and its various fractions have been examined for their hypolipidemic efficacy. According to early research, crude guggulu has a positive hypolipidemic effect on rabbits. Other species, including domestic pigs, albino rats, Presbytis monkeys, and white leghorn chicks, also shown this behaviour.

Additional research on the petroleum ether extract, an alcoholic extract, and two extracted pure chemicals (a terpenoid and a steroid) revealed that the steroid was particularly effective in decreasing serum cholesterol by 69.3 percent. Compared to the terpenoid, the alcohol extract was able to cut cholesterol by 59.2%, whereas it only managed to do so by 54.3%.

Animal models have also been used to investigate the hypolipidemic action of guggulsterone's isomers, - and -guggulsterone. Rats with either triton (WR-1339)- or cholesterol-induced hyperlipidemia experienced a marked reduction in serum lipid levels after receiving guggulsterone.

Two separate locations that are likewise regulated by bile salts to govern the absorption of cholesterol and catabolism have been shown to be specifically modulated by guggulsterone or cembrenoids from the root bark resin of C. mukul. Guggulsterone blocks the cholesterol-regulating nuclear farnesoid X receptors (FXR) in the liver. Human pancreas IB phospholipase A2 (hPLA2), that regulates gastrointestinal digestion of fat and cholesterol, was shown to

be attenuated by the cembrenoids when triggered by cholate. There was no observable impact of the cembrenoids on FXR.

Antioxidant Activity of Guggulu for Lowering Lipid Activity

The antioxidant effects of guggulu reduced platelet stickiness, lowered lipid oxidation, and lowered the risk of ischemic heart disease. Protein synthesis, lipid activity, and glucose metabolism were all improved as a result of the enhanced production of hormones such as triiodothyronine and thyroxin.

It was hypothesised that the antioxidant action was caused by guggulsterones. The ability to withstand the formation of oxygen free radicals was tested in vitro. When LDL was oxidised using rat peritoneal macrophages or human LDL, the production of products from lipid peroxidation was dramatically boosted. Guggulsterone (50 M) inhibited the formation of thiobarbituric acid reactive chemicals and low density lipoprotein lipid hydroperoxide in the aforementioned system. However, it did not protect lipids against the initiation of the peroxidation of lipids cascade, the formation of conjugated dienes. Lipid peroxidation was significantly inhibited in liver microsomes treated with sodium ascorbate and guggulsterone. Therefore, guggulsterone's ability to scavenge free radicals may contribute to its antioxidant properties. The antioxidant characteristics of guggulsterone may be explained by its propensity to chelate metals. Furthermore, C. mukul alcoholic extract has antioxidant properties.

Conclusion

"Guggulu has been used historically to treat a wide range of medical conditions, including inflammation, arthritis, obesity, microbiological infections, wounds, pain, fractures, tumours, and gastrointestinal diseases. It is one of the oldest and most well-known plants used in Ayurvedic therapy. Pharmacological studies have validated the traditional medicine usage of this herb. Terpenoids, steroids, flavonoids, guggultetrols, lignans, sugars, and amino acids are all present in this plant as bioactive components. Guggulsterones, the primary bioactive components of this resin, have enormous pharmacological importance. These results may have important implications for how this plant is used in Ayurveda." Reviewers agree that the Sanskrit definition of guggul, "one who guards against diseases," is an accurate one. The many medicinal uses for this Ayurvedic remedy are a fantastic illustration and confirmation of this.

Asafoetida has a long history of usage in traditional medicine for the treatment of a variety of conditions. It is extensively used across the globe as a flavour enhancer in a variety of dishes. Sterility, unusual discomfort, unwanted pregnancies, and disorders unique to women including leukorrhea and painful or irregular menstruation are only some of the conditions that it is used to treat. A wide variety of therapeutic benefits, including sedative, neuroprotective, memory-improving, digestive enzyme, antioxidant, antispasmodic, hypotensive, hepatoprotective, antibacterial, anticancer, and anthelmintic effects, have been uncovered by recent pharmacological studies of asafoetida. Although asafoetida has tremendous medicinal value, further work is needed to discover its active chemical components.

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