

# California College of Ayurveda

## Guggul - A Deep Dive into Ancient Literature and Modern Research

Kirsten Ahern, March 2021

**G**uggul, *Commiphora mukul* or *Commiphora Wightii* (syn.) is a highly effective plant resin widely used in Ayurvedic medicine. In fact, the classical Ayurvedic text *Caraka Samhita* calls guggul a “panacea for all diseases.”<sup>1</sup>



*Guggul / Indian Bedellium-tree / Mukul myrrh tree / Commiphora Wightii / Commiphora mukul, image courtesy of [www.indi-shop.com/glossary/guggul/guggulu](http://www.indi-shop.com/glossary/guggul/guggulu)*

Guggul is also referred to as guggulu or Indian bedellium and is known by its additional Sanskrit names *Deodhopp*, *Mahishaksh* (seen blackish like a buffalo’s eyes),

*Palankash*, *Kashi* (scraping - reduces fat in an obese person), *Kumbha Deveshta*, *Rakshouha*, and *Jatayu*.<sup>2</sup>

Guggul is a small thorny tree of the Byrseraceae family that is found scattered across India, Pakistan, Arabia, and Africa. The tree grows 1.5-2 meters high and its leaves are twice compound (bipinnate) with oval to elliptical-shaped leaflets that are dark green in color.<sup>3</sup> The resin is found in the balsam canals in the larger vein of the leaf and the soft base of the stem.<sup>4</sup> Its flowers are brownish with five petals and its fruits are pulpy, round, and red. When dissolved in water, it turns milky white. It produces a gum resin that is “thick, scented, multicolored, burnt on fire, and liquefied by the heat of the sun”, according to the *Dravaguna Vignyan*.<sup>5</sup> Guggul resin is collected in the winter after it has oozed from the tree during the summer and later solidified in colder temperatures.<sup>6</sup> On average, each plant yields approximately 200-800 grams of herb.<sup>7</sup> The potency of pure guggul lasts for 20 years, according to the *Dravaguna Vignayan*.<sup>8</sup> A 2013 study found that the low moisture content in guggul exudate allows for a longer preservation period.<sup>9</sup>

Guggul should be unctuous, soft, and sticky with a sweet smell, bitter taste, and yellowish color; it should be soluble in water and uncontaminated.<sup>10</sup> Any fraction of the plant that is insoluble is devoid of the hypolipidemic effects for which guggul is known.<sup>11</sup> Guggul is comprised of 61 percent resin, 29.3 percent gum, 0.6 percent volatile oils, 6.1 percent moisture, and 3.2 percent foreign matter.<sup>12</sup> Its products are essential oil, resin, gum, and bitters.<sup>13</sup> It is a chemical mixture of diterpenes, sterols, steroids, esters, and higher alcohols; its active components are called “guggulsterones”.<sup>14</sup>

Guggul is processed by wrapping the resin in a porous natural fiber cloth and boiling it in a decoction of *triphala* (amalaki, haritaki, and bibhitaki) to purify the resins, enhance absorption, and reduce toxicity. It is then cooked down to a thick paste, spread out on a pan or holder, dried, and broken into powder or chunks.<sup>15</sup>

Guggul has been listed on the International Union for the Conservation of Nature Red List of threatened species due to the over-harvesting of its habitat.<sup>16</sup> In addition to over-harvesting, it also faces threats such as tree droughts, over-grazing, overexploitation due to unscientific resin tapping methods, termites, and habitat destruction.<sup>17</sup> The U.S. Food and Drug Administration approved guggul for use as a dietary supplement in 1994.<sup>18</sup>

**The two varieties of guggul sold commercially are:**

1. *Kanaguggul*, cultivated in Marwar (a region of southwestern Rajasthan state in Northwestern India). It is greenish, yellow, soft, and granular. This is medicinal guggul.
2. *Bhaisa (Mhasha) guggul*, cultivated in Sindh (a province of southeastern Pakistan) and Kutch (a district of Gujarat State in western India). It is greenish yellow but brittle and soft.<sup>19</sup>

**The Ayurvedic properties of guggul are:**

**Guna (qualities):** light (*laghu*), penetrating (*tikshna*), unctuous (*snigdha*), viscid (*pichchil*), subtle (*sukshma*), spreading (*sara*)

**Rasa (taste):** bitter (*tikta*), pungent (*katu*), sweet (*Madhur*), astringent (*kasaya*)

**Vipaka (post-digestive effect):** pungent (*katu*)

**Virya (energy):** heating (*ushna*)

**Prabhava (special action):** tridoshic (*tridoshahara*)

**Dosha:** VPK-, can aggravate *pitta* in excess

**Dhatu (tissue):** all tissues

**Srotas (channel):** *raktavaha, mahavaha, majjavaha, pranavaha, shukravaha, and artavavaha*.<sup>2021</sup>

**The Ayurvedic actions of guggul** are tridoshic (*sarvadoshara*), fat-clearing (*medhoghna*), anti-diabetic (*prameha*), blood-purifying (*raktasodhaka*), channel-clearing (*lekhaniya*), digestive (*dipaniya*), rejuvenative (*rasayana*), strength-building (*balya*), sex drive-promoting (*vrsya*), bone-mending (*sandhaniya*), and analgesic (*vedanasthapana*). It also has an affinity for healing and promoting the voice (*kanthya/svarya*) and promoting menses (*artavajanana*). Its subtle properties enable it to enter deeply into the tissues (*sukshma*) and it is an excellent destroyer of *ama*, or toxins, (*amanasaka*).<sup>22</sup>

**Cautions and Contraindications.** When taking guggul, avoid the consumption of sour food, concentrated alcohol, indigestion, sexual intercourse, exercises, excessive sunlight, and anger.<sup>23,24</sup> One should only take an appropriate dose for their constitution and misuse can lead to pathologies in the liver and lungs. Excess dosing can also lead to dry mouth, vertigo, impotency, loss of weight, and dryness of skin. Individuals who currently have these complaints should not use guggul at all.<sup>25</sup> It should also not be used by those with an acute kidney infection, in excessive uterine bleeding, pregnancy, breastfeeding, and thyrotoxicosis (the clinical manifestation of excess thyroid hormone action at the tissue level due to inappropriately high circulating thyroid hormone concentrations<sup>26</sup>).<sup>27</sup> Guggullipid (a registered medicine and brand name) reportedly reduces the effect of antihypertensives such as propranolol and diltiazem and caution should be taken with hypoglycemic medication.<sup>28</sup>

**Dosage.** Guggul can be taken at a dosage of three to nine grams per day in a decoction, 250 mgs to three grams per day in pills, 250-750mg three times per day of 1:4 concentrated powder, or three to ten milliliters per day of 1:5 at 90 percent tincture.<sup>29</sup>

Some classical scholars suggest that for internal use, guggul should be dissolved completely in doshically-appropriate liquids (warm water, milk, etc.). The *Ashtanga Samgraha* and the *Ashtanga Hridayam* advise consuming the herb with honey, while other practitioners suggest converting guggul to pills. Modern researchers suggest that given guggul's binding capacity, consumption as a pill requires greater disintegration time, potentially leading to inactivity in the stomach. Therefore, these researchers suggest the whole herb should be consumed for proper assimilation and absorption.<sup>30</sup>

## General Uses of Guggul in Ayurvedic Medicine

Guggul is “the most important resin used in Ayurvedic medicine”, according to Drs. David Frawley and Vasant Lad.<sup>31</sup> Guggul is considered one of the best herbs for *vata* and *kapha* conditions but is also tridoshic and used to treat a wide variety of pathologies. It is considered to be *sattvic*,<sup>32</sup> helps to move blocked energy and clear energy pathways,<sup>33</sup> is a powerful and deep-acting detoxifier,<sup>34</sup> and is combined in various herbal formulas to treat specific doshic conditions.<sup>35,36</sup> These formulas are described in detail at the end of this paper. The advantage of using guggul over a myrrh resin — also

extracted from a *Commiphora* tree species — is that guggul is purified and therefore does not damage kidney function.<sup>37</sup>

**Externally**, guggul can be used as an anti-inflammatory, analgesic, antibacterial, and as a vulnerary.<sup>38</sup> A paste made from guggul can be locally applied in rheumatoid arthritis, cervical lymphadenitis, skin diseases, and piles. Guggul can also be used to reduce foul odors, as a deodorant and disinfectant, and as a gargle to treat periodontitis (gum infection) as well as ulcerated conditions of the mouth and throat and other dental disorders.<sup>39,40</sup>

As an astringent, guggul's drying quality allows it to treat the skin and areas of inflammation.<sup>41</sup> Topical applications of guggul have also been shown to smooth the skin and reduce small and large wrinkles by promoting the synthesis of intracellular triglycerides.<sup>42</sup> Mixed with *triphala*, guggul can heal skin eruptions and wounds that are large and painful with weeping discharge.<sup>43</sup> Classically, guggul was mixed with droppings of house sparrows and pigeons to depress wounds with excessive granulation (excess tissue that rises above the surface of a wound and hinders healing).<sup>44</sup>

Modern research has shown that the essential oil of guggul is anti-bacterial and that the fumigation of guggul gum decreases the concentration of fungi such as *Aspergillus*, *Penicillium*, *Alternaria*, *Curvularia*, and *Cladosporium*<sup>45</sup> - all of which are common indoor molds<sup>46</sup>, except for *Curvularia*, which is found in soil.<sup>47</sup> Fumigating guggul, along with neem leaves, sweet flag, rape seeds and common barley mixed with ghee helps to alleviate irregular fever.<sup>48</sup>

Guggul lipid is an ethyl acetate extract of guggul resin. As lipid-based formulations can be used to influence absorption, guggul lipid helps enhance the administration of pharmaceuticals through the skin. A 2013 study found that nanoparticles prepared with guggul lipid produced a minimum particle size that enhanced skin permeability.<sup>49</sup>

**Internally**, guggul's biomedical actions are anti-inflammatory, antiplatelet, anticholesterolaemic, astringent, antiseptic, immune stimulant, and emmenagogue.<sup>50</sup> It is considered to be particularly valuable as a hypolipidemic (cholesterol-reducing)<sup>51</sup> by preventing accumulation of cholesterol through a scraping or *lekhana* property that clears the channels, joints, and tissues.<sup>52</sup> Guggul contains phenolics, or common natural plant products with substantial anti-inflammatory and antioxidant effects, which some modern

researchers cite as the basis for its “immense biological function against diverse human chronic diseases.”<sup>53</sup>

The *Dravaguna Vignyan* notes that guggul can be used internally on the nervous, digestive, circulatory, respiratory, urinary, and reproductive systems, as well as for dermatological diseases. Other authors have documented guggul’s effectiveness in treating chronic diseases.

- In the nervous system, guggul can be used as a nervine tonic and analgesic in neuralgia, rheumatoid arthritis, sciatica, facial paralysis, hemiplegia (one-sided paralysis), and gout.<sup>54</sup>
- In the digestive system, its pungency and bitterness help to increase appetite; it is also a laxative, liver stimulant, anti-hemorrhoidal and anthelmintic, rendering it useful in constipation, liver diseases, piles, and worms.<sup>55</sup>
- In the circulatory system, it is a cardiac tonic that increases hemoglobin and leucocyte count and enhances blood quality. These characteristics make it useful for edema, lymphadenitis, glandular enlargements and filaria (a tropical parasitic disease) when taken over longer periods of time.<sup>56</sup>
- In the respiratory system, it can be inhaled to help treat chronic rhinitis<sup>57</sup> and in other respiratory symptoms due to *kapha* and *vata dosha* vitiations, guggul along with castor plant, angelica, eaglewood, and sandalwood may be smoked.<sup>58</sup>
- In the urinary system, it acts as a lithotroph due to its diuretic properties and assists with dysuria (painful urination) and gonorrhea.<sup>59</sup>
- In the reproductive system, guggul increases sexual power with its sharp and heating qualities and acts as an emmenagogue. It can also be used in oligosperma (low sperm count), impotency, dysmenorrhoea (painful periods), leucorrhoea (white or yellow mucus discharge from the vagina) and other gynecological diseases.<sup>60</sup>
- In dermatology, guggul has been used to treat skin disease and helps to enhance complexion.<sup>61</sup>
- In chronic diseases, guggul treats infections by helping to increase white blood cell count and promote an immune response.<sup>6263</sup> Dr. Frawley notes that guggul — particularly *Triphala Guggul* — is effective in the treatment of AIDS because it helps to

cleanse the deeper tissues,<sup>64</sup> and is effective in treating deeper-seated or longer-lasting infections.<sup>65</sup> Khalsa and Tierra found that in fibromyalgia (chronic, generalized muscular pain and fatigue), guggul may be effective at a dose of 2-10 capsules per day.<sup>66</sup> Guggulipid has also been shown to suppress oxidative stress, which plays a role in many diseases. One study showed that guggul suppressed the formation of lipid peroxides and prevented oxidation of low-density lipoproteins (LDL).<sup>67</sup> This chemical process may render guggul therapeutically beneficial in diseases associated with oxidative stress such as myocardial ischemia and neurodegenerative diseases.<sup>68</sup>

In the treatment of drug disorders, the formulas *Yogaraj Guggul* and *Mahayogaraj Guggul*, in particular, help to cleanse the deeper tissues in conjunction with an anti-*vata* or anti-*pitta* diet.<sup>69</sup> In all serious conditions, guggul gum with milk is beneficial as a vitalizer, according to the *Caraka Samhita*,<sup>70</sup> which also lists guggul as a “resuscitative.”<sup>71</sup>

## Guggul and Disease Management

**Arthritis and Inflammation.** Guggul has a specific action of cleansing bone tissue, as well as strengthening the bones and improving flexibility, making it a good anti-rheumatic herb, including for sports injuries that lead to arthritis.<sup>72</sup> It is also effective in the swelling and cracking of the hands, feet, and joints in the elderly;<sup>73</sup> in addition, it can be used to break open suppurated swelling.<sup>74</sup> Dr. Frawley recommends taking guggul in the *Yogaraj Guggul* formulation (see page 14 of this report) for the best results against arthritis.<sup>75</sup>

The first documented Western medical evidence of guggul’s anti-inflammatory activity was in 1960.<sup>76</sup> In 2004, Western science demonstrated its ability to suppress activation of the pro-inflammatory transcription factor and the genes its regulates.<sup>77</sup> A 1977 study of guggul’s treatment of arthritis found that it reduced the thickness of joint swelling in a rheumatoid arthritis model.<sup>78,79</sup> Likewise, in 2003, a study of patients with arthritis in at least one knee showed that guggul gum taken at dose of 500 mg three times daily for two months significantly improved pain, stiffness, and function of the knee; in addition to showing no side effects.<sup>80</sup>

**High Cholesterol.** Guggul is a specific and tridoshic herb for lowering cholesterol, and is particularly useful for *kapha dosha* vitiations as it will improve circulation, reduce pain, remove accumulations, and promote healing.<sup>81</sup> Herbalists and Ayurvedic

practitioners Karta Purkha Sing Khalsa and Michael Tierra note that “guggul rivals any natural substance in lowering cholesterol” and researchers have found that without dietary adjustments, guggul has lowered total cholesterol by 20 percent, while increasing good HDL cholesterol by 36 percent.<sup>82</sup> According to Dr. Frawley, to reduce cholesterol, take the *Triphala Guggul* formula or pure guggul in a dose of one gram morning and evening for three months.<sup>83</sup>

Modern research suggests guggul acts as a bile acid receptor antagonist, taking action primarily against receptors in the liver, kidney, and small intestine; and regulating bile acid, cholesterol, triglyceride, and glucose metabolism.<sup>84</sup> A 2008 study found four mechanisms by which guggulsterones reduce cholesterol:

- 1) inhibiting biosynthesis of cholesterol in the liver;
- 2) enhancing uptake of LDL by the liver by stimulating receptor-binding activity in liver cells;
- 3) increasing fecal excretions of bile acids and cholesterol (which decreases the rate of fat and cholesterol absorption in the intestine); and
- 4) stimulating the thyroid gland.<sup>85</sup>

**Cardiovascular Disease.** In ischemic heart disease, angina, and congestive heart failure, guggul increases blood flow, reduces blood clots, and clears arteriosclerosis (the build-up of cholesterol in the arteries, blocking blood flow to the heart) by regulating *vyana vayu*, moving *avalambaka kapha* and the *raktavaha srotas*, and scraping *ama*, or toxins, from the channels.<sup>86</sup> In fact, Tierra asserts that guggul is “the most potent remedy against *ama*”.<sup>87</sup> Guggul prevents abnormal blood clotting and, when used to lower cholesterol and reduce body fat, it also reduces retinopathy (eye damage), neuropathy (nerve degeneration), and gangrene, which are secondary to atherosclerosis.<sup>88</sup> Dr. Frawley suggests taking guggul as a tincture 10-30 drops twice a day as “an excellent remedy to treat heart disease.”<sup>89</sup>

In a 1993 study of 200 patients with ischemic heart disease who experienced chest pain and abnormal electrocardiogram (ECG) results, gum guggul in combination with *Inula racemosa* — an expectorant and bronchodilator — reduced total cholesterol, triglyceride, and total blood lipids; it also produced normal ECG in 26 percent of patients and ECG improvement in another 59 percent. Chest pain also subsided in 25 percent of

patients and decreased in the remainder.<sup>90</sup> A 2003 study similarly found that guggul “exhibited profound cardioprotective effects” during *in vivo* studies, including reversing cardiac damage induced by isoproterenol (a bronchodilator used to treat asthma, bronchitis, and emphysema).<sup>91</sup>

**Obesity.** Researchers and practitioners agree that guggul is excellent in the treatment and reduction of obesity, working through its pungent quality and stimulation of *medas dhatu agni*, which regulates fat metabolism; and its channel clearing quality, which helps to enhance thyroid function.<sup>92</sup> Aged guggul is best for obesity and diabetes and helps with the digestion of oil and ghee.<sup>93</sup> In contrast, fresh guggul acts as a *rasayana*, or rejuvenative, in cases of weakness and weight loss.<sup>94</sup> Dr. Frawley recommends taking guggul for obesity and weight loss in doses of one gram, two-to-three times per day with ginger and honey,<sup>95</sup> while Khalsa and Tierra suggest taking guggul at a dose of 1500 mg three times daily.<sup>96</sup>

**Dermatology.** Guggul taken internally acts on the skin by disinfecting secretions such as mucus, sweat, and urine.<sup>97</sup> Ayurvedic practitioner, Chinese herbalist, and author Sebastian Pole notes guggul’s use in treating skin inflammation, citing clinical trials that have proven its “efficacy in treating acne in lieu of antibiotic treatment.”<sup>98</sup> Furthermore, chronic skin lesions that do not respond to other treatments can benefit from guggul, which can also treat lipomas (benign fatty tumors under the skin) and general inflammation of the mucous membranes.<sup>99</sup> According to the *Caraka Samhita*, the use of guggul to treat dermatosis can “stand in for the use of heavy metals and minerals such as mercury, diamond, and mineral pitch.”<sup>100</sup> Guggul is also widely used in leprosy at a dose of five grams per day or more for an acute condition.<sup>101</sup>

**Reproductive disorders.** Gynecologically, guggul can be used internally to clear endometriosis, polycystic ovarian syndrome, and clots. It also regulates the cycle and is a strong emmenagogue.<sup>102</sup> Guggul can be used in the treatment of dysmenorrhea and in endometriosis given its anti-tumor quality — it addresses the excess growth of the uterine membrane (a *kapha* condition) — and detoxifying quality.<sup>103</sup> It also has a long-lasting normalizing effect on menstrual flow - either decreasing or promoting it depending on the vitiation.<sup>104</sup> Classically, guggul along with deodar and barley soaked in ghee were used to fumigate excess vaginal discharge.<sup>105</sup> Likewise, guggul is effective in cases of enlarged male prostate, especially the *Gokshura Guggul* formula,<sup>106</sup> and can be used to help treat male sexual debility in cases of *kapha dosha* vitiation.<sup>107</sup>

**Nervous Disorders.** Based on an Ayurvedic understanding of its qualities, guggul's oily nature makes it an effective herb for alleviating nervous disorders.<sup>108</sup> For degenerative nervous system conditions, such as Multiple Sclerosis and Parkinson's, guggul is a nervine tonic when prepared in a ghee or herbal jelly.<sup>109</sup> Guggul can also help to dispel nerve pain<sup>110</sup> and treat *kapha*-type depression by opening the channels of the body and mind.<sup>111</sup>

A 2007 study showed the neuroprotective activity of guggulsterone in mice. Specifically, guggulipid reversed neuronal damage and memory deficits and significantly increased levels of glutathione (an antioxidant) in the brain. These findings suggest guggul is a potential anti-dementia drug and cognitive enhancer.<sup>112</sup>

**Cancer.** Guggul is used to treat all growths, accumulations, and cancers.<sup>113</sup> It is particularly good for *vata* and *kapha*-type cancers, according to Dr. Frawley, as "a strong circulatory stimulant and blood-moving herb that will help break stagnation, reduce masses and aid in the healing of tissues."<sup>114</sup>

According to a 2008 study, guggulsterone suppressed the growth and proliferation of a wide variety of tumor cells, including leukemia, head and neck carcinoma, multiple myeloma, lung carcinoma, melanoma, breast cancer, and ovarian cancer. It also induced apoptosis (cell death) in many cells and inhibited angiogenesis, which is essential for the growth and metastasis of tumor cells.<sup>115</sup> Other studies have also cited the anti-tumor efficacy of guggul in breast, esophagus, head, neck, pancreatic, and prostate cancers.<sup>116</sup> Specifically in prostate cancer, guggul taken orally was found to be highly effective at preventing angiogenesis (the development of new blood vessels), according to a series of studies between 2005-2015.<sup>117</sup>

Specifically, guggulsterone inhibits the actions of the bile acid receptor farnesoid X receptor (FXR), which is a target in some cancer therapies.<sup>118</sup> The 2008 study also found guggulsterone's up-regulation of the bile salt port pump, which mediates the excretion of bile salts from the liver, to be a possible mechanism by which guggulsterone exerts its anticancer and hypolipidemic effects.<sup>119</sup>

Guggulsterone may also suppress an ancient protein transcription factor (nuclear factor kappa B) that regulates innate immunity and is involved in cell proliferation, cell invasion, metastasis, angiogenesis, and resistance to chemotherapy.<sup>120</sup> In lab studies,

guggulsterone blocked proteins (signal transducer and activator of transcription (STAT)) that help activate the vascular endothelial growth factor responsible for angiogenesis.<sup>121</sup>

Finally, guggul exerts its anti-inflammatory effects through the suppression of cytokines (signaling molecules that mediate and regulate immunity, inflammation, and hematopoiesis, or the production of blood cells and platelets in the bone marrow), preventing cytokine-induced cell damage that is often seen in aging and certain types of cancers such as multiple myeloma and breast cancer.<sup>122</sup>

## Combinations and Formulas

Guggul can be combined with any number of herbs to treat a variety of symptoms. Here, we will explore a few popular formulas and their healing potential. Please note that the ingredients listed in each formulation may vary by source of formulation. Please consult an Ayurvedic practitioner or herbalist prior to taking any of these formulas.

**Gokshura Guggul.** Its ingredients are guggul, *triphala* (amalaki, haritaki, bibhitaki), and *trikatu* (ginger, black pepper, long pepper). Gokshura guides the other herbs in the formula to the genitourinary system while guggul purifies *ama* accumulation, *triphala* clears *ama* and detoxifies the *mutravaha srotas*, and *trikatu* enkindles the *agni* (digestive fire) in all tissues.<sup>123</sup> This formula supports the proper function of the genitourinary tract.<sup>124</sup> It is indicated in infections such as cystitis, nephritis, incontinence with burning, frequent urination, cloudy urine, albuminuria (excess albumin protein in urine), bleeding, excessive or obstructed urination in *vata/pitta* disorders, and as a lithotrope in *kapha* disorders.<sup>125</sup>

Pole notes that *Gokshura Guggul* can also be used in male reproductive disorders such as premature ejaculation, nocturnal emissions, spermatorrhoea (the involuntary loss of semen), prostatitis, and benign prostatic hypertrophy. It is also useful in female disorders such as leucorrhoea, endometriosis, and infertility. For sexual dysfunction, *Gokshura Guggul* can be combined with shilajit; for bladder and kidney stones, combine it with *Punarnava Guggul*; and for enlarged prostate, sandalwood and coriander. The appropriate dosage of *Gokshura Guggul* is 500 mgs to one gram three times per day. It can be taken with a musta decoction or coriander seed cold water infusion.<sup>126</sup>

***Kaishore Guggul.*** Its ingredients are guggul, *triphala* (amalaki, haritaki, bibhitaki), guduchi, shunthi, mariach, pippali, vidanga, jayapala, and trivrut. Its main Ayurvedic action is to pacify *pitta* and inflammatory conditions. It is an anti-inflammatory, diuretic, alterative, antipyretic, and arthritic. Guduchi delivers the powerful anti-inflammatory action, guggul scrapes the toxins and excess *pitta* from the plasma, blood, and muscles; while *triphala*, vidanga, and trivrut together clear inflammatory toxins.<sup>127</sup>

*Kaishore Guggul* is best for inflammatory, painful, red, and swollen arthritis; as well as sciatica, tendonitis, and polymyalgia (muscular inflammatory disease). It is also useful in cases of gout, removing obstructed *vata* that causes pain, cooling the blood, and scraping out uric acid and crystalline deposits affecting the joints. This formula should be used for skin inflammations with infection, heat, and burning such as chronic eczema, psoriasis with lichenification, chronic plaques, itching, and bleeding. It is also effective in cases of certain cancerous growths and cirrhosis that are mixed with inflammatory toxins. The appropriate dosage of *Kaishore Guggul* is 500 mgs to one gram three times per day.<sup>128</sup>

***Punarnava Guggul.*** Its ingredients are punarnava, castor oil, ginger, guggul, Operculina turpethum, Baliospermum montanum, guduchi, black pepper, pippali, triphala, psyllium, rock salt, Semicarpus anacardium, vidanga, and Swarna makshik. This formula is a powerful, deep-acting detoxifier and diuretic.<sup>129</sup>

Other formulations of *Punarnava Guggul* include many of the ingredients above as well as guduchi, dantimool, trivrut, chritak, saindhav, and ballatak. Punarnava and guduchi act as diuretics while *triphala*, guggul, antimool, and trivrut clear *ama* through the bowel; *trikatu*, bhallatak, and chritak burn toxins and evaporate excess fluids; and salt loosens the toxins. Pole notes that the use of castor oil in *Punarnava Guggul*, while common, is contraindicated as it tends to go rancid quickly.<sup>130</sup>

*Punarnava Guggul* is a broad-spectrum remedy for gout, sciatica, arthritis, edema, and pain in the lower abdomen and bladder areas.<sup>131</sup> It is recommended for those with prostatic hypertrophy.<sup>132</sup> It strengthens the heart by clearing fluids and freeing circulation, rendering it useful in *kapha*-type hypertension.<sup>133</sup> It can be taken in a dose of one to three grams per day (500 mgs to one gram three times per day<sup>134</sup>) with water or punarnava tea.<sup>135</sup>

***Triphala Guggul***. Its ingredients are guggul, *triphala* (amalaki, haritaki, bibhitaki), and pippali. This formula acts as a rejuvenator and removes aggravated *vata* disorders. It works as a laxative, appetizer, and blood purifier.<sup>136</sup> *Triphala* cleans the bowels, pippali stokes digestion, burns toxins, and relieves *vata*-type pain; and guggul clears the channels by scraping away toxins specifically in the *medas dhatu* and acts as an anti-inflammatory.<sup>137</sup>

The formula is a natural antiseptic and antibiotic that promotes the natural healing of deeper tissues in the body. It can be taken after bone, joint, or colon surgery to aid with healing. It is used in constipation conditions resulting in hemorrhoids, fistula, and edema. Tierra suggests taking *Triphala Guggul* in the morning and evening “to counteract obesity, blood disorders, constipation, skin problems, chronic venereal disease, ascites and sores that are difficult to heal.”<sup>138</sup>

*Triphala Guggul* aids in cardiac pain from atherosclerosis, angina, and chest congestion as well as generalized edema or edema in the heart. It works on the gastrointestinal tract to relieve *kapha*-type symptoms such as slow digestion, low metabolism, tiredness, and obesity. It allows *medas dhatu* to metabolize nutrients efficiently and also treats hemorrhoids and fistulas. It will clear congested *kapha* from the lungs and acts on sinus congestion, nasal drip, and rhinitis. The formula can be used as part of a broader strategy to strengthen the entire human physiology by “removing the causes that necessitate a response to accumulated pathogens,” according to Pole.<sup>139</sup> It also combats allergies, repetitive colds, boils, and infections in *kapha* types and has a specific action on *sleshaka kapha* (synovial joint fluid), alleviating conditions of rheumatoid and osteoarthritis aggravated by cold, wet, and damp conditions in addition to *vata* and *ama* accumulation.<sup>140</sup>

It can be taken in one to three grams (500 mg to one gram three times<sup>141</sup>) per day.<sup>142</sup> For acute injuries, Dr. Frawley recommends “three pills, three times per day for up to one week. Or take two pills twice a day for up to a month for milder injuries or injuries that are slow to heal.”<sup>143</sup>

***Yogaraj Guggul***. Its ingredients are guggul, pippali, ajwan, caraway, vidanga, celery seed, cumin, cedars deodars, piper chaba, cardamom, rock salt, Costs specious, *Vanda roxburghii*, gokshura, coriander seed, *triphala*, *musta*, *trikatu*, cinnamon,

lemongrass, *Hordeum vulgare*, *Abies webbing*, and *Cinnamomum* miners. This is the most well-known preparation of guggul in India.<sup>144</sup>

Other formulations of *Yogaraj Guggul* include herbs such as karchur, hapusha, devadaru and twak, which encourage circulation in the joints. Shatapushpa, dhanyaka, jivak, talispatra, ela, ajmoda and ajwain are antispasmodics that are often included to reduce *vata*. Rock salt can be added to help digest the formula; meanwhile, maricha, shunthi, lavanga, citraha, pippali and pippalimool warm coldness in the joints. Rejuvenative herbs ashwaghandha, lohabhasma, yavkasahar, and shatavari nourish nerve, bone, and muscle tissues. Finally, guggul, usher, amalaki, gokshura, and musta help clear inflammation.<sup>145</sup>

*Yogaraj Guggul* is considered to be a *tridoshic* and well-balanced formula suitable for long-term use. It is best for chronic arthritis.<sup>146</sup> It is used for sciatica, rheumatism, gout, arthritis, amenorrhea, obesity, painful menses, amenorrhea, hemorrhoids, worms, fistula, and impotence. It increases elimination of wastes through sweat, promotes normal secretion of digestive enzymes, regulates the bowels, and prevents and eliminates intestinal gases.<sup>147</sup> In excessive use injuries such as sciatica, spasms, neuralgia, tingling sensations, tremors and stiffness, *Yogaraj Guggul* helps to increase circulation and nourish the *asthi* and *majja dhatus*. It is also useful in tinnitus caused by *vata*. In painful menstruation or dysmenorrhea, the formula will eliminate obstructions and relax the muscles to allow for a painless menstrual cycle.<sup>148</sup> It can be take in a dose of 500 mg to one gram three times per day.<sup>149</sup>

**Other Combinations.** Guggul can also be combined with arjuna to treat cardiovascular disease and high cholesterol.<sup>150</sup> Interestingly, in many parts of India, guggul gum is mixed with bhumyamalaki to help cure indigestion in camels.<sup>151</sup> According to a placebo-controlled study in 1999, guggul combined with *Garcinia cambogia* extract and tyrosine helps to reduce body fat mass and average body weight without depleting lean mass.<sup>152</sup><sup>153</sup> A medicated ghee prepared with the paste of guggul, sweet flag, purging casein, curry neem, guduchi, asafetida, and angelica is beneficial in *vata/kapha*-type epilepsy.<sup>154</sup>

## Conclusion

Guggul offers many benefits to those seeking relief from a wide variety of physical body ailments, including cancer and chronic diseases, and is considered an excellent compliment for many modern medical treatments. Guggul's historic use to clear energy and purify the environment suggests it may also provide psycho-spiritual benefits. Those seeking to incorporate guggul into their diet or lifestyle should consult with an Ayurvedic or herbal professional to obtain guidance on how best to use the herb and to learn of any possible contraindications with an individual's current health conditions, diet, medications, or lifestyle habits.

## Abstracts

**Journal: Indian Journal of Pharmaceutical Sciences**

**Title: Physicochemical Characterization and Antioxidant Activity of Essential Oils of Guggul (*Commiphora wightii*) Collected from Madhya Pradesh**

**Author: M. Z. Siddiqui, M. Thomas, and N. Prasad**

### Abstract

The present study reports physicochemical characterization and antioxidant activity of essential oils extracted from guggul (*Commiphora wightii*) exudates collected from different places in Madhya Pradesh, India. The guggul exudates were hydrodistilled for 3-4 h in Clevenger apparatus. The oil obtained was dried over anhydrous Na<sub>2</sub>SO<sub>4</sub> and stored at 4° until testing. Before extraction of oils from the exudates, their % moisture and tristimulus values of the colors namely L (white-black), a (green-red) and b (blue-yellow) were determined. Physicochemical characterization of the extracted oils was carried out to determine their solubility, yield%, acid value (mg/KOH/g), saponification value (mg/KOH/g), ester value, iodine value (g/g), peroxide value (mEq/kg) and Fourier transformed infrared analyses. The storage-effect on the % moisture and tristimulus values of the colors of guggul exudates as also the % oil yield and physicochemical parameters of the essential oils extracted from them, were studied using three different packaging materials viz., local plastic, low density polyethylene (200 G) and high density polyethylene (200 G). The antioxidant potential of extracted oils was evaluated by free radical scavenging activity using 1,1-diphenyl-2-picryl hydrazyl assay.

**Journal: ANTICANCER RESEARCH**

**Title: The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets**

**Author: Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.**

### Abstract

Identification of active principles and their molecular targets from traditional medicine is an enormous opportunity for modern drug development. Gum resin from *Commiphora wightii* (syn *C. mukul*) has been used for centuries in Ayurveda to treat internal tumors, obesity, liver disorders, malignant sores and ulcers, urinary complaints, receptor and glucocorticoid receptors. Modulation of gene expression by guggulsterone leads to inhibition of cell proliferation, induction of apoptosis, suppression of invasion and abrogation of angiogenesis. Evidence has been presented to suggest that guggulsterone can suppress tumor initiation, promotion and metastasis. This review describes the identification of molecular targets of guggulsterone, cellular responses to guggulsterone, and animal studies and clinical trials of guggulsterone in cancer and other diseases.

**Journal: International Journal of Ayurveda and Pharma Research****Title: A CRITICAL REVIEW ON GUGGULU [COMMIPHORA WIGHTII (ARN.) BHAND.] & ITS MIRACULOUS MEDICINAL USES****Authors: D.C. Singh, Srishti Dhyani, Gagandeep Kaur****Abstract**

Guggulu has been a key component in ancient Indian Ayurvedic system of medicine. It has been used extensively by Ayurvedic physicians for centuries to treat a wide variety of disorders, besides its use in pharmaceutical and perfumery industries. Guggulu is a gum or resin extracted from the plant *Commiphora wightii* (Arn.) Bhand. (Syn. *Commiphora mukul* Hook. ex. Stocks) or Guggulu tree. Guggulu is a shrub or small tree belonging to Burseraceae family. Guggulu contains volatile oil, gum resin, guggulipids, guggulsterones, guggulsterols, mukolol and other steroids. Guggulu is very much used in Ayurvedic system of medicine as astringent, anti-septic, expectorant, aphrodisiac, carminative, anti-spasmodic, emmenagogue. In Ayurveda, Guggulu is the best among herbs that are used for Medoroga and Vata disorders. It is widely used for obesity and it is also known as fat burning agent all over the world. It helps to lower cholesterol and triglycerides level. Guggulu is very effective in rheumatoid arthritis, gout and sciatica. It is also one of the most important Rasayana of Ayurveda. In addition it treats sluggish liver, stimulates libido, nervous diseases, bronchial congestion, cardiac and circulatory problems, weak digestion, wounds, abscess, foetid ear, fractures, gynaecological problems and various skin diseases. Guggulu is a very important and trustworthy herb in Ayurvedic medicine. Basically it is used almost in every kind of illness due to its amazing treating power. This review is an attempt to describe the pharmacological activities of Guggulu and variable uses of Guggulu in several diseases.

**Journal: Global Journal of Research on Medicinal Plants and Indigenous Medicine****Title: GUGGULU [COMMIPHORA WIGHTII (Arn.) Bhandari] AND ITS FORMULATIONS IN BRIHATRAYEE - A REVIEW****Authors: Kruti Yagneshkumar Vyas, Galib, Pradeep Kumar Prajapati****Abstract**

Guggulu [(*Commiphora wightii* (Arn.) Bhandari)]. and its formulations are frequently used since vedic period. A meticulous screening was done through Brihatrayee to analyse all formulations that contain Guggulu in their composition. Maximum formulations that hold Guggulu as a component were found to be liquids or semi-liquids or semi-solids. But, in current scenario, most of the Guggulu based formulations are available in solid forms like pills or tablets. As Guggulu pills are associated with problems related to disintegration, physicians advocate crushing them before their internal administration. Possibly, observing this inconveniency; seers of brihatrayee preferred dispensing Guggulu in liquid media that will by-pass the problem of disintegration and the associated

inconveniencies. This review makes clear that, solid form of Guggulu Kalpa (like pills or tablets) is a latest pharmaceutical development that probably took place to have certain added advantages.

**Journal: BioMed Research International**

**Title: Solid Lipid Nanoparticles of Guggul Lipid as Drug Carrier for Transdermal Drug Delivery**

**Authors: Praveen Kumar Gaur, Shikha Mishra, and Suresh Purohit**

#### **Abstract**

Diclofenac sodium loaded solid lipid nanoparticles (SLNs) were formulated using guggul lipid as major lipid component and analyzed for physical parameters, permeation profile, and anti-inflammatory activity. The SLNs were prepared using melt-emulsion sonication/low temperature-solidification method and characterized for physical parameters, in vitro drug release, and accelerated stability studies, and formulated into gel. Respective gels were compared with a commercial emulgel (CEG) and plain carbopol gel containing drug (CG) for ex vivo and in vivo drug permeation and anti-inflammatory activity. The SLNs were stable with optimum physical parameters. GMS nanoparticle 1 (GMN-1) and stearic acid nanoparticle 1 (SAN-1) gave the highest in vitro drug release. Guggul lipid nanoparticle gel 3 (GLNG-3) showed 104.68 times higher drug content than CEG in receptor fluid. The enhancement ratio of GLNG-3 was 39.43 with respect to CG. GLNG-3 showed almost 8.12 times higher  $C_{max}$  than CEG at 4 hours. The AUC value of GLNG-3 was 15.28 times higher than the AUC of CEG. GLNG-3 showed edema inhibition up to 69.47% in the first hour. Physicochemical properties of major lipid component govern the properties of SLN. SLN made up of guggul lipid showed good physical properties with acceptable stability. Furthermore, it showed a controlled drug release profile along with a promising permeation profile.

**Journal: Frontiers in Pharmacology**

**Title: Googling the Guggul (Commiphora and Boswellia) for Prevention of Chronic Diseases**

**Authors: A. Kunnumakkara, K. Banik, D. Bordoloi, C. Harsha, B. Sailo, G. Padmavathi, N. Roy, S. Gupta, B. Aggarwal**

#### **Abstract**

Extensive research during last 2 decades has revealed that most drugs discovered today, although costs billions of dollars for discovery, and yet they are highly ineffective in their clinical response. For instance, the European Medicines Agency has approved 68 anti-cancer drugs, and out of which 39 has reached the market level with no indication of increased survival nor betterment of quality of life. Even when drugs did improve survival

rate compared to available treatment strategies, most of these were found to be clinically insignificant. This is a fundamental problem with modern drug discovery which is based on thinking that most chronic diseases are caused by alteration of a single gene and thus most therapies are single gene-targeted therapies. However, extensive research has revealed that most chronic diseases are caused by multiple gene products. Although most drugs designed by man are mono-targeted therapies, however, those designed by “mother nature” and have been used for thousands of years, are “multi- targeted” therapies. In this review, we examine two agents that have been around for thousands of years, namely “guggul” from Commiphora and Boswellia. Although we are all familiar with the search engine “google,” this is another type of “guggul” that has been used for centuries and being explored for its various biological activities. The current review summarizes the traditional uses, chemistry, in vitro and in vivo biological activities, molecular targets, and clinical trials performed with these agents.

## Endnotes

- <sup>1</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 634
- <sup>2</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>3</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>4</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; “The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets”, *Anti Cancer Research* 0250-7005 (2008): 3648
- <sup>5</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>6</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>7</sup> M.Z. Siddiqui, M. Thomas, N. Prasad, “Physicochemical Characterization and Antioxidant Activity of Essential Oils of Guggul (*Commiphora wightii*) Collected from Madhya Pradesh”, *Indian Journal of Pharmaceutical Sciences* 2013 (April 2013): 2
- <sup>8</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>9</sup> M.Z. Siddiqui, M. Thomas, N. Prasad, “Physicochemical Characterization and Antioxidant Activity of Essential Oils of Guggul (*Commiphora wightii*) Collected from Madhya Pradesh”, *Indian Journal of Pharmaceutical Sciences* 2013 (April 2013): 2
- <sup>10</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>11</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>12</sup> M.Z. Siddiqui, M. Thomas, N. Prasad, “Physicochemical Characterization and Antioxidant Activity of Essential Oils of Guggul (*Commiphora wightii*) Collected from Madhya Pradesh”, *Indian Journal of Pharmaceutical Sciences* 2013 (April 2013): 2
- <sup>13</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>14</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; “The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets”, *Anti Cancer Research* 0250-7005 (2008): 3648
- <sup>15</sup> Tierra, Michael, *Planetary Herbology* (Twin Lakes: Lotus Press, 1988), 134

- <sup>16</sup> D.C. Singh, S. Dhyani, G. Kaur, “A Critical Review on Guggul [Commiphora Wightii (arn.) Bhand.] & its Miraculous Medicinal Uses,” *International Journal of Ayurveda and Pharma Research*, (March 2015): 1-9
- <sup>17</sup> International Union for Conservation of Nature (IUCN), IUCN Staff, Workshop on Guggul Tree Conservation. <https://www.iucn.org/content/workshop-guggul-tree-conservation>.
- <sup>18</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; “The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets”, *Anti Cancer Research* 0250-7005 (2008): 3656
- <sup>19</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>20</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>21</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>22</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>23</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>24</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>25</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>26</sup> Mayo Clinic Proceedings, Sharma, A., Stan, M. Thyrotoxicosis: Diagnosis and Management. [https://www.mayoclinicproceedings.org/article/S0025-6196\(18\)30799-7/fulltext](https://www.mayoclinicproceedings.org/article/S0025-6196(18)30799-7/fulltext).
- <sup>27</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>28</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>29</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>30</sup> Kurt Yagneshkumar Vyas, Galib, Pradeep Kumar Prajapati, “Guggulu [Commiphora Wightii (Arn.) Bhandari] and its formulations in Brihatrayee - A Review, *Global Journal of Research on Medicinal Plants and Indigenous Medicine*, Volume 3, Issue 9 (September 2014), 359-369
- <sup>31</sup> Frawley, David; Lad, Vasant, *The Yoga of Herbs* (Twin Lakes: Lotus Press, 1986), 172
- <sup>32</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 323
- <sup>33</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 349

- <sup>34</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 141
- <sup>35</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>36</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>37</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 370
- <sup>38</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>39</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>40</sup> Frawley, David; Lad, Vasant, *The Yoga of Herbs* (Twin Lakes: Lotus Press, 1986), 174
- <sup>41</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 78
- <sup>42</sup> Kurt Yagneshkumar Vyas, Galib, Pradeep Kumar Prajapati, "Guggulu [Commiphora Wightii (Arn.) Bhandari] and its formulations in Brihatrayee - A Review, *Global Journal of Research on Medicinal Plants and Indigenous Medicine*, Volume 3, Issue 9 (September 2014), 359-369
- <sup>43</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 216
- <sup>44</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 882
- <sup>45</sup> Kurt Yagneshkumar Vyas, Galib, Pradeep Kumar Prajapati, "Guggulu [Commiphora Wightii (Arn.) Bhandari] and its Formulations in Brihatrayee - A Review," *Global Journal of Research on Medicinal Plants and Indigenous Medicine*, Volume 3, Issue 9 (September 2014), 359-369
- <sup>46</sup> Science Direct, Stewart G., Robinson, C. Indoor and Outdoor Allergens and Pollutants. <https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/cladosporium>.
- <sup>47</sup> Science Direct. Shoff, C., Perfect, J. Uncommon Yeasts and Molds Causing Human Disease. <https://www.sciencedirect.com/topics/immunology-and-microbiology/curvularia>.
- <sup>48</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 592
- <sup>49</sup> P.K. Gaur, S. Mishra, S. Purohit, "Solid Lipid Nanoparticles of Guggul Lipid as Carrier for Transdermal Drug Delivery" *Biomed Research International*, 2013 (July 2013): 1,4.
- <sup>50</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>51</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 141
- <sup>52</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192

- <sup>53</sup> A. Kunnumakkara, K. Banik, D. Bordoloi, C. Harsha, B. Sailo, G. Padmavathi, N. Roy, S. Gupta, B. Aggarwal, "Googling the Guggul (Commiphora and Boswellia) for Prevention of Chronic Diseases" *Frontiers in Pharmacology*, 2018 (6 August 2018): 2
- <sup>54</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>55</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>56</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>57</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 898
- <sup>58</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 902
- <sup>59</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>60</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>61</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>62</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>63</sup> Frawley, David; Lad, Vasant, *The Yoga of Herbs* (Twin Lakes: Lotus Press, 1986), 172
- <sup>64</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 265
- <sup>65</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 271
- <sup>66</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 248
- <sup>67</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3656
- <sup>68</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3656
- <sup>69</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 344
- <sup>70</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 936

- <sup>71</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 25
- <sup>72</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 280-281
- <sup>73</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 300
- <sup>74</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 878
- <sup>75</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 280-281
- <sup>76</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3656
- <sup>77</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3656
- <sup>78</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3657
- <sup>79</sup> A. Kunnumakkara, K. Banik, D. Bordoloi, C. Harsha, B. Sailo, G. Padmavathi, N. Roy, S. Gupta, B. Aggarwal, "Googling the Guggul (Commiphora and Boswellia) for Prevention of Chronic Diseases" *Frontiers in Pharmacology*, 2018 (6 August 2018): 9
- <sup>80</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3657
- <sup>81</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 217
- <sup>82</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 141
- <sup>83</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 217
- <sup>84</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3651
- <sup>85</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3656
- <sup>86</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>87</sup> Tierra, Michael, *Planetary Herbology* (Twin Lakes: Lotus Press, 1988), 135

- <sup>88</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 246
- <sup>89</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 215
- <sup>90</sup> Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3657
- <sup>91</sup> A. Kunnumakkara, K. Banik, D. Bordoloi, C. Harsha, B. Sailo, G. Padmavathi, N. Roy, S. Gupta, B. Aggarwal, "Googling the Guggul (Commiphora and Boswellia) for Prevention of Chronic Diseases" *Frontiers in Pharmacology*, 2018 (6 August 2018): 9
- <sup>92</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>93</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>94</sup> Gogte, Vd. V.M., *Ayurvedic Pharmacology & Therapeutic Uses of Medicinal Plants - Dravyaguna Vignyan* (New Delhi: Chaukhambha Publications, Enlarged Reprint 2020), 357-59
- <sup>95</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 163
- <sup>96</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 142
- <sup>97</sup> Frawley, David; Lad, Vasant, *The Yoga of Herbs* (Twin Lakes: Lotus Press, 1986), 172
- <sup>98</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>99</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>100</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 634
- <sup>101</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 267
- <sup>102</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- <sup>103</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 250
- <sup>104</sup> Tierra, Michael, *Planetary Herbology* (Twin Lakes: Lotus Press, 1988), 135
- <sup>105</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 960
- <sup>106</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 261

- 107 Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 260
- 108 Tierra, Michael, *Planetary Herbology* (Twin Lakes: Lotus Press, 1988), 135
- 109 Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 326
- 110 Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013) 304
- 111 Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 326
- 112 Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3657
- 113 Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 191-192
- 114 Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 286-287
- 115 Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3655
- 116 A. Kunnumakkara, K. Banik, D. Bordoloi, C. Harsha, B. Sailo, G. Padmavathi, N. Roy, S. Gupta, B. Aggarwal, "Googling the Guggul (Commiphora and Boswellia) for Prevention of Chronic Diseases" *Frontiers in Pharmacology*, 2018 (6 August 2018): 9
- 117 A. Kunnumakkara, K. Banik, D. Bordoloi, C. Harsha, B. Sailo, G. Padmavathi, N. Roy, S. Gupta, B. Aggarwal, "Googling the Guggul (Commiphora and Boswellia) for Prevention of Chronic Diseases" *Frontiers in Pharmacology*, 2018 (6 August 2018): 9
- 118 Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3651
- 119 Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3652
- 120 Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3652
- 121 Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3652
- 122 Shishodia, S., Harikumar, K. B., Dass, S. Ramawat, K.G., Aggarwal, B. B.; "The Guggul for Chronic Diseases: Ancient Medicine, Modern Targets", *Anti Cancer Research* 0250-7005 (2008): 3653

- <sup>123</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 304-5
- <sup>124</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 139
- <sup>125</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 304-5
- <sup>126</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 304-5
- <sup>127</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 305-6
- <sup>128</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 305-6
- <sup>129</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 211
- <sup>130</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 307-8
- <sup>131</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 211
- <sup>132</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 211
- <sup>133</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 307-8
- <sup>134</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 307-8
- <sup>135</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 211
- <sup>136</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 210
- <sup>137</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 308-9
- <sup>138</sup> Tierra, Michael, *Planetary Herbology* (Twin Lakes: Lotus Press, 1988), 135
- <sup>139</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 308-9
- <sup>140</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 308-9
- <sup>141</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 308-9
- <sup>142</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 210
- <sup>143</sup> Frawley, David, *Ayurvedic Healing, A Comprehensive Guide* (Twin Lakes: Lotus Press, 2013), 225-226
- <sup>144</sup> Tierra, Michael, *Planetary Herbology* (Twin Lakes: Lotus Press, 1988), 135

- <sup>145</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 310-11
- <sup>146</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 211
- <sup>147</sup> Tierra, Michael, *Planetary Herbology* (Twin Lakes: Lotus Press, 1988), 135
- <sup>148</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 310-11
- <sup>149</sup> Pole, Sebastian, *Ayurvedic Medicine, The Principles of Traditional Practice* (London and Philadelphia: Singing Dragon, 2006), 308-9
- <sup>150</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 93
- <sup>151</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 103
- <sup>152</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 151
- <sup>153</sup> Khalsa, K.P.S., Tierra, M., *The Way of Ayurvedic Herbs* (Twin Lakes: Lotus Press, 2008), 269
- <sup>154</sup> Punarvasu, A., Agnivesa, Caraka, Dridhabala; *Caraka Samhita, Volume V, Sutra Sthana* (Jamnagar: Shree Gulabkunverba Ayurvedic Society, 1949), 670