AMERICAN BOTANICAL COUNCIL

Post Office Box 144345
Austin, Texas 78714-4345
Phone 512/926-4900
Fax 512/926-2345
Email: abc@herbalgram.org
www.herbalgram.org

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FILE: · **Frankincense (*Boswellia serrata*)**
· **Anti-inflammatory activity**

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RE: Frankincense Literature Review

Schauss, A.G., R.B.R. Milholland, and S.E. Munson. Indian frankincense (*Boswellia serrata*) gum resin extract: A review of therapeutic applications and toxicology. *Natural Medicine Journal*. 1999; Vol. 2, No. 2, pp. 16-20.

Boswellia serrata is a moderate-sized deciduous tree that is found in the dry, mountainous areas of central India. The common names for *B. serrata* are Indian Frankincense Tree, Indian Olibanium, Kundur, Salai Guggal, Guggul, Salakhi [and, in Sanskrit, Shallaki]. [Because there are many different species of frankincense (*Boswellia* spp.), *B. serrata* is more precisely referred to as Indian frankincense, as the authors have in their article's title. Used alone and without precision, the word frankincense usually refers to *B. carterii*, which is found in southern arabia.] The ancient herb Indian frankincense (*Boswellia* spp.) has anti-inflammatory properties, and the gum resin of *Boswellia serrata* Roxb. (Burseracea) has been marketed in India for the treatment of rheumatoid arthritis since 1982. The gum resin has also been used extensively in traditional and Ayurvedic medicine to treat chronic ulcers, diseased bones, rheumatic and nervous diseases, cervical tuberculosis lymphadentitis, urinary tract disorders, skin diseases, amenorrhea, dysmenorrhea, sore nipples, ringworm, jaundice, diarrhea, dysentery, dyspepsia, hemorrhoids, and so forth. [Although the gum resin fraction has been used therapeutically for centuries, frankincense's fame derives from the aromatherapeutic properties of the resin and essential oils, as were the related myrrh (*Commiphora*). The medicinal use of *B. serrata* in India has been eclipsed, until recently by the other Guggul, *Commiphora mukul.]*

There are numerous active constituents in the gum resin of *B. serrata*. It contains the fatty acids palmitic, stearic, oleic, and linoleic. It also contains the sugars glucose, arabinose, raminose, galactose, fructose, glucoronic acid, and idose. The gum resin also contains triterpene alcohol, serratol, and triterpenoids. The volatile oil contains p-cymene, d-limonene, terpenolene, bornyl acetates, and methyl chavicol. The anti-inflammatory activity is attributed to four triterpene pentacyclic acids commonly known as boswellic acids.

B. serrata gum resin administered orally to rats elicited anti-arthritic activity in numerous models of acute and chronic inflammation and arthritis. In 260 humans with rheumatoid arthritis, an extract of the gum resin called H15(r) re-

duced joint swelling, pain, stiffness, erythrocyte sedimentation rate, and the need for additional pain medication. In contrast, a similar but smaller clinical trial showed no significant improvement.

Researchers propose three possible mechanisms for the anti-inflammatory activity of *B. serrata*. *B. serrata* may inhibit the formation of 5-lipoxygenase, which prevents the formation of inflammatory mediators. Another possibility is that *B. serrata* may inhibit the C3 convertase enzyme of the complement pathway, which participates in release of pro-inflammatory peptides. Finally, *B. serrata* may inhibit infiltration of polymorphonuclear leukocytes, which contribute to the destruction of tissue.

B. serrata has been shown to posses other therapeutic benefits as well. *B. serrata* gum resin may be equally successful in treating ulcerative colitis as standard therapy. *B. serrata* may play a role in the development of new anti-cancer drugs because it inhibits DNA, RNA and protein synthesis in human leukemia cells *in vitro*. In rats, *B. serrata* has analgesic properties and slight sedative effects depending upon the dose. Also in rats, *B. serrata* gum resin decreases cholesterol and triglyceride levels.

In animals, *B. serrata* appears to be safe. The therapeutic window between the lethal and effective dose is large. To treat inflammation or arthritis, the dosage should be based on the level of boswellic acids in the resin or extract. The gum resin typically contains approximately 30% boswellic acids, and the ethanol extract typically contains 43% boswellic acids. When purchasing *B. serrata* as a dietary supplement, it is important that it does not include citric acid as a flow agent. Citric acid adversely affects the activity and potency of the boswellic acids.

B. serrata gum resin has been used for centuries in traditional and Ayurvedic medicine to treat a variety of disorders. There are extensive *in vitro* and *in vivo* studies, however there is a shortage of clinical trials. [There is also, at this time, insufficient data characterizing fraction used in studies, leading to possible variations in the therapeutic value of *B. serrata*, depending on the chemical profile of the fraction used.] *—Heather S. Oliff, Ph.D.*

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