



## Boswellia Serrata

SCIENTIFIC NAME  
**Boswellia serrata**

FAMILY  
**Burseraceae**

**CAUTION:** For information on the use of Boswellia species for topical application or as aromatherapy, see [Frankincense](#).

### ^ Other Common Names

Arbre à Oliban Indien, Boswellia, Boswellin, Boswellin Serrata Resin, Encens Indien, Gajabhakshya, Indian Frankincense, Oliban Indien, Salai Guggal, Salai Guggul, Sallaki Guggul, Shallaki.

### Overview

*Boswellia serrata* is a branching tree native to India, Africa, and the Arabian peninsula. The gum resin and the bark of the plant have been used medicinally. The *Boswellia* genus is most commonly known as the source of frankincense, which is made from the oleogum resin exuded from incisions in the tree bark. Frankincense, which is typically applied topically or inhaled as aromatherapy, is obtained from various *Boswellia* species, including *Boswellia serrata*, *Boswellia carteri*, and *Boswellia frereana* ([12443,17950,17951,91379](#)). This monograph discusses only the oral use of *Boswellia serrata*.

### WARNINGS

**Coronavirus disease 2019 (COVID-19):** Some experts have warned that *Boswellia serrata* might interfere with the body's immune and inflammatory response against COVID-19. There is no strong evidence to support these warnings. However, there is also no good evidence to support using *Boswellia serrata* for COVID-19. Recommend healthy lifestyle choices and proven prevention methods instead.

### Safety

**LIKELY SAFE** ...when used orally and appropriately. *Boswellia serrata* extract in doses up to 1000 mg daily has been safely used in several clinical trials lasting up to 6 months ([1708,1709,12432,12434,12438,17948,17949,17950,91379](#)) ([100699,100713,102089,109568](#)). *Boswellia serrata* extract has been used with apparent safety at a dose of 2400 mg for up to 1 month ([102092](#)).

**PREGNANCY AND LACTATION:** **LIKELY SAFE** ...when used orally in amounts commonly found in foods ([4912](#)). There is insufficient reliable information available about the safety of using *Boswellia serrata* in medicinal amounts; avoid using.

### ^ Adverse Effects

**General:** Orally, *Boswellia serrata* extract is generally well-tolerated. For information on the safety of *Boswellia serrata* when applied topically or used as aromatherapy, see the [Frankincense](#) monograph.

#### Most Common Adverse Effects:

*Orally:* Abdominal pain, diarrhea, headache, heartburn, itching, nausea.

#### Serious Adverse Effects (Rare):

*Orally:* Large amounts of *Boswellia serrata* gum resin can cause bezoar formation.

#### ^ Dermatologic

Orally, *Boswellia serrata* extract (5-Loxin) has been associated with itching at doses of 100-250 mg daily ([17948](#)).

#### ^ Gastrointestinal

Orally, *Boswellia serrata* extract may cause diarrhea, nausea, abdominal pain, and heartburn ([1708,12432,12438,17948,17949,17950,21149,109567](#)). A case of a large gastrointestinal bezoar has been reported in a 17-year-old female who chewed and swallowed large quantities of *boswellia* gum resin (*Boswellia* species not specified) for celiac disease ([36914](#)).

#### ^ Musculoskeletal

Orally, *Boswellia serrata* extract (5-Loxin) has been associated with one case of foot edema and four cases of generalized weakness in one clinical study ([17948](#)).

#### ^ Neurologic/CNS

Orally, *Boswellia serrata* extract may cause dizziness, headache, and vertigo. In one clinical study, nearly 11% of patients taking a specific *Boswellia serrata* extract (K-Vie) reported headache. Dizziness and vertigo were also reported, but at lower rates ([109567](#)). In another study, headache was reported in one patient taking a specific *Boswellia serrata* extract (5-Loxin) ([17948](#)).

## ^ Psychiatric

Orally, one case of mania is reported in a 73-year-old male who took Boswellia powder mixed with honey for 3 days. The patient recovered after hospitalization and treatment with olanzapine ([110526](#)).

## ^ Effectiveness

### POSSIBLY EFFECTIVE

**Osteoarthritis.** Oral Boswellia serrata extracts, taken alone or in combination with other ingredients, appear to reduce pain and improve function in knee osteoarthritis. However, most clinical studies have been small and methodologically flawed.

^ **Details:** A meta-analysis of small, randomized, controlled trials in patients with knee osteoarthritis shows that taking Boswellia serrata extract 100-250 mg daily for 1-3 months moderately reduces pain and improves function when compared with placebo ([103785](#)). However, the validity of the included studies is limited by incomplete reporting, inadequate blinding, and other methodological issues. Studies included in the meta-analysis tested a specific Boswellia serrata extract (5-Loxin), as well as a specific Boswellia serrata gum resin extract (ApresFLEX, also known as Aflapin). Pain reduction was first noted within 7 days of treatment ([17948,17949,21145](#)). More recent evidence on the use of a Boswellia serrata gum resin extract (Aflapin) 100 mg daily for 30 days is consistent with the findings in this meta-analysis ([109564](#)). Lower quality studies, not included in the meta-analysis, tested another specific Boswellia serrata gum resin extract (Wokvel, Pharmedica). When taken in a dose of 333 mg three times daily for 2-6 months, this product improves pain and knee function when compared with control. Wokvel seems to have comparable benefit to a solid lipid Boswellia serrata particle product (Wokvida) ([12432,21146,103784](#)). Finally, another clinical trial not included in the meta-analysis shows that taking a different Boswellia serrata extract (Boswellin, Sabinsa Corp.) 169 mg twice daily for 4 months also moderately improves pain, stiffness, functional ability, and quality of life when compared with placebo ([100699](#)).

Several studies also show that taking specific combination products containing Boswellia serrata and other ingredients can improve pain and functionality in patients with osteoarthritis. These products have combined Boswellia serrata 100 mg with ashwagandha 450 mg, turmeric 50 mg, and zinc complex 50 mg (Articulon-F) three times daily for 3 months ([19276](#)); Boswellia serrata 100 mg with ginger 33.33 mg, Tinospora cordifolia 73.33 mg, and Indian gooseberry 166.66 mg three times daily for 6 months ([89557](#)); a specific Boswellia serrata extract (BosPure, Arjuna Natural Extracts Ltd) 300 mg with turmeric extract (BCM 95, Arjuna Natural Extracts Ltd) 700 mg daily for 12 weeks ([89719](#)); boswellic acid 7.2 mg (from Boswellia serrata) with methylsulfonylmethane 5 grams and vitamin C daily for 2 months ([96446](#)); and a specific combination product (Tregocel, Max Biocare) providing Boswellia serrata extract 1 gram, curcumin 100 mg, devil's claw tuber 1 gram, celery seed 1 gram, and ginger rhizome 330 mg daily for 36 weeks ([106078](#)). However, research in patients with osteoarthritis of the hand suggests that taking a combination of Boswellia serrata extract 250 mg, pine bark extract 100 mg, methylsulfonylmethane 1500 mg, and curcumin 168 mg daily for 12 weeks does not improve pain or functionality ([109563](#)).

### INSUFFICIENT RELIABLE EVIDENCE to RATE

**Allergic rhinitis (hay fever).** Although there is interest in using oral Boswellia serrata for hay fever, there is insufficient reliable information about the clinical effects of Boswellia serrata for this condition.

**Alzheimer disease.** It is unclear if oral Boswellia serrata improves cognitive function in patients with Alzheimer disease.

^ **Details:** A small clinical study in adults with mild to moderate Alzheimer disease shows that taking a specific Boswellia serrata extract (K-Vie, Kondor Pharma) 1200 mg daily for 6 months improves neuropsychiatric symptoms, dementia severity, and some but not all measures of cognitive function when compared with placebo ([112807](#)).

**Aromatase inhibitor-induced arthralgia.** Oral Boswellia serrata has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** A small clinical study in patients with estrogen receptor positive (ER+) breast cancer and aromatase inhibitor-induced arthralgia shows that taking a specific combination product (Opera, Gamfarma Srl) containing Boswellia serrata 40 mg, alpha-lipoic acid 240 mg, methylsulfonylmethane 200 mg, and bromelain 20 mg once daily for 6 months reduces arthralgia intensity when compared to baseline, with around 22% of patients having complete symptom resolution at the end of the study ([109570](#)). The validity of these findings is limited by a lack of control group.

**Asthma.** It is unclear if oral Boswellia serrata can improve symptoms of asthma.

^ **Details:** One small preliminary clinical study in patients with asthma suggests that taking a specific Boswellia serrata gum resin (S-compound, Rahul Pharma) 300 mg three times daily for 6 weeks may improve symptoms of asthma, such as forced expiratory volume (FEV), the number of asthma attacks, and dyspnea and rhonchi, in 70% of patients, compared to only 27% of patients in a control group ([1708](#)).

**Brain tumor.** It is unclear if oral Boswellia serrata improves outcomes in patients with brain tumors.

^ **Details:** One small clinical study in adults with brain tumors undergoing radiation therapy shows that taking an H15 Boswellia serrata extract 4200 mg in three divided doses daily throughout radiotherapy reduces cerebral edema and tumor volume, but not dexamethasone dosage, when compared with placebo ([21149](#)).

**Chronic prostatitis and chronic pelvic pain syndrome (CP/CPPS).** Rectal Boswellia serrata has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** Two small, open-label clinical studies in males with prostatitis-like symptoms or CP/CPPS types IIIa or IIIb shows that rectal administration of a specific suppository containing Boswellia serrata resin extract and propolis polyphenols (MICTALASE) once daily for 20 days or once daily for 15 days per month for 3 months improves pain, urinary symptoms, quality of life, and total symptom scores, as measured by the Chronic Prostatitis Symptom Index (CPSI), when compared to baseline. However, there were no improvements in scores on the International Index of Erectile Dysfunction (IIED), and studies showed mixed findings regarding improvements on the International Prostate Symptom Score (IPSS) ([102091,109566](#)). The validity of these results is limited by the lack of a comparator group.

**Cluster headache.** Although there is interest in using oral Boswellia serrata for cluster headache, there is insufficient reliable information about the clinical effects of Boswellia serrata for this condition.

**Coronavirus disease 2019 (COVID-19).** Oral Boswellia serrata has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** A small clinical study in adults hospitalized with moderate COVID-19 infection in Egypt shows that taking *Boswellia serrata* extract 300 mg and licorice extract 300 mg twice daily for 14 days, along with conventional therapy, reduces the risk of death, shortens the time to hospital discharge by around 5.5 days, and reduces the rate of mechanical ventilation when compared with placebo. For every five patients treated with this combination product, one additional patient survived. The standard treatments administered in this study included azithromycin, vitamin C, and zinc ([108579](#)).

Another large clinical study in adults hospitalized with moderate COVID-19 infection in India shows that taking a specific product containing *Boswellia serrata*, ashwagandha, ginger, and turmeric (Artovid-20, Bioved Pharmaceuticals, Inc) 1,776 mg twice daily after meals for 14 days, starting within 48-96 hours of symptom onset along with conventional therapy, decreases the duration of illness by about 1 day and reduces patient-assessed severity scores of various symptoms (e.g. nasal congestion, sore throat, cough, taste and smell disorders) when compared with placebo. Almost all patients in this study also received steroids, and over 50% received remdesivir. Study results were similar in the subgroup of patients who received remdesivir ([109899](#)). However, the validity of this study is limited by use of data only from patients who fully adhered to the study protocol per protocol analysis and exclusion of patients with risks for progression to severe COVID-19, including uncontrolled hypertension, asthma, chronic obstructive pulmonary disease, diabetes, obesity, or immunocompromise.

**Crohn disease.** It is unclear if oral *Boswellia serrata* reduces relapse rates in patients with Crohn disease.

^ **Details:** One small clinical study in patients with Crohn disease who are in remission shows that taking *Boswellia serrata* (Boswelan, Pharmasan) 800 mg orally three times daily for one year does not decrease relapse rates or improve quality of life when compared with placebo ([17241](#)).

**Diabetes.** It is unclear if oral *Boswellia serrata* improves glycemic control in patients with diabetes.

^ **Details:** A small clinical study in patients with diabetes who are taking metformin shows that taking powdered *Boswellia serrata* gum resin 400 mg twice daily after meals for 12 weeks modestly decreases fasting blood glucose, glycated hemoglobin (HbA1c), insulin, and lipid levels when compared with a toasted powder placebo ([91378](#)). In contrast, another small clinical study in patients with diabetes shows that taking capsules containing powdered *Boswellia serrata* gum 250 mg (standardized for 60% boswellic acids) twice daily after meals for 8 weeks does not improve fasting blood glucose, HbA1c, other glycemic parameters, or lipid levels when compared with placebo ([105010](#)). However, the interpretation of these findings, specifically the lack of improvement in HbA1c, may be limited by the short duration of the study. A meta-analysis pooling the results of the two trials described above shows that *Boswellia serrata* reduces HbA1c by about 0.5% and fasting blood glucose by about 24 mg/dL, with no improvement in lipid levels, when compared with placebo ([111503](#)).

**Diarrhea.** It is unclear if oral *Boswellia serrata* is beneficial in patients with acute diarrhea.

^ **Details:** A small clinical study in adults with acute diarrhea shows that taking a specific lecithin-based delivery form of *Boswellia serrata* extract (Casperome, Indena S.p.A.) 250 mg twice daily for 5 days decreases the time to diarrhea resolution by nearly 1.4 days, reduces stool frequency, and improves symptoms of abdominal pain and nausea when compared with placebo ([109568](#)).

**Dysmenorrhea.** Oral *Boswellia serrata* has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** A small clinical study in adults with moderately painful dysmenorrhea shows that taking a single dose of a combination product containing *Boswellia serrata*, turmeric, and sesame (Rhuleave-K, Arjuna Natural Private Ltd.) 1000 mg at the start of menstruation relieves menstrual cramp pain and reduces pain intensity for up to 6 hours when compared with placebo ([112806](#)). It is unclear if these effects are due to *Boswellia serrata*, other ingredients, or the combination.

**Exercise-induced muscle soreness.** Oral *Boswellia serrata* has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** Clinical research in healthy active adults with moderate to severe exercise-induced muscle pain shows that taking a single, 1000-mg dose of *Boswellia serrata* and turmeric extracts in black sesame oil (Rhuleave-K; Arjuna Natural Private Ltd.) improves pain relief when compared with placebo, with maximal benefits within about 3 hours. The number of people needed to treat to obtain pain relief of at least 50% over a 6-hour period was 1.1 ([109277](#)).

**Irritable bowel syndrome (IBS).** Small clinical studies suggest that an oral *Boswellia serrata* extract may improve symptoms of IBS.

^ **Details:** A small clinical study in patients with mild IBS shows that taking a specific lecithin-based delivery form of *Boswellia serrata* extract (Casperome, Indena S.p.A.) 250 mg daily for 6 months reduces abdominal pain, cramps, and gas when compared with standard management with hyoscine butylbromide or papaverine hydrochloride plus belladonna extract 10 mg. Patients receiving Casperome required fewer rescue medications and had a 46% lower risk of needing additional medical care, including hospitalization ([100713](#)). In a short-term clinical trial of the same *Boswellia serrata* extract 250 mg daily for 4 weeks, the risk for requiring additional medical care was reduced by 67% when compared with the same standard treatment options above. While IBS symptoms improved over baseline, significant differences between Casperome and standard treatment options were lacking ([102089](#)). These studies were funded by the supplement manufacturer, which may limit the reliability of these findings.

**Knee pain.** It is unclear if oral *Boswellia serrata* is beneficial for knee pain.

^ **Details:** A small clinical study in otherwise healthy adults with knee pain shows that taking *Boswellia serrata* extract 12.5% tablets twice daily for 8 weeks improves physical function and pain but not stiffness, functional mobility, muscle function, or level of physical activity when compared to baseline ([112808](#)).

**Menorrhagia.** It is unclear if oral *Boswellia serrata* is beneficial for menorrhagia.

^ **Details:** A small clinical study in otherwise healthy adults with menorrhagia shows that taking *Boswellia serrata* oleoresin powder 300 mg three times daily for 7 days, repeated over 2 menstrual cycles, improves quality of life and modestly reduces the average duration of menstrual bleeding after the second cycle when compared with placebo. All patients were permitted to use ibuprofen 200 mg as needed ([105401](#)).

**Microscopic colitis.** There is limited evidence on the oral use of *Boswellia serrata* in patients with collagenous colitis.

^ **Details:** One small clinical trial shows that taking *Boswellia serrata* extract 400 mg three times daily for 6 weeks increases the clinical remission rate by 64% when compared with placebo in patients diagnosed with a type of microscopic colitis called collagenous colitis. Clinical remission was defined as having an average of three or fewer soft or solid stools daily during the last week of the study ([21152](#)).

**Pain (acute).** Oral *Boswellia serrata* has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** Preliminary clinical research in adults with acute musculoskeletal pain shows that taking a specific combination product containing *Boswellia serrata* and turmeric extracts in black sesame oil (Rhuleave-K; Arjuna Natural Private Ltd.) 1000 mg daily for 7 days is as effective as acetaminophen 1000 mg daily for pain relief, onset of pain relief, and onset of maximal pain relief (109287). This study is limited by its lack of blinding and placebo control. Additionally, the dose of acetaminophen used in this study is below the standard recommended daily dose.

**Rheumatoid arthritis (RA).** Oral *Boswellia serrata* has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** One clinical trial in patients with RA shows that taking two capsules of a specific product containing *Boswellia serrata* 100 mg, ashwagandha 450 mg, turmeric 50 mg, and zinc complex 50 mg (Articulon-F) three times daily for 3 months improves pain, morning stiffness, grip strength, and disability scores when compared with placebo (21154). However, another clinical trial in patients with RA shows that taking two tablets of a standardized extract formulation (RA-1) containing *Boswellia serrata*, ashwagandha, ginger, and turmeric three times daily for 16 weeks does not improve most symptoms when compared with placebo (21155). It is unclear if these findings are due to *Boswellia serrata*, other ingredients, or the combination.

**Rhinosinusitis.** Oral *Boswellia serrata* has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** A small clinical study in patients over 12 years of age with chronic sinusitis shows that taking a combination product containing *Boswellia serrata*, black currant, bromelain, and vitamin D (Flogostop Forte, Humana Italia) with inhaled corticosteroids daily for 30 days reduces rhinorrhea, hyperemia of mucosa, and local inflammation when compared with inhaled corticosteroids alone (111501). It is unclear if these findings are due to *Boswellia serrata*, other ingredients, or the combination.

**Pharyngitis.** Although there is interest in using oral *Boswellia serrata* for pharyngitis, there is insufficient reliable information about the clinical effects of *Boswellia serrata* for this condition.

**Stroke.** It is unclear if oral boswellic acids improve neurological function after stroke.

^ **Details:** One small clinical study in adults with recent ischemic stroke who are taking aspirin and clopidogrel shows that taking boswellic acids 800 mg three times daily for 30 days improves neurological function, as measured using the National Institutes of Health Stroke Scale, when compared with placebo (102092).

**Traumatic brain injury (TBI).** It is unclear if oral *Boswellia serrata* is effective for reducing disability, or improving cognitive function or memory in adults recovering from TBIs.

^ **Details:** A small clinical crossover study in adults admitted to the hospital for diffuse axonal injury shows that taking powdered *Boswellia serrata* oleogum resin 360 mg three times daily for 6 weeks does not improve disability when compared with placebo (91379). However, another small clinical study in patients suffering from a TBI 3 months to 3 years earlier shows that taking a specific *Boswellia serrata* extract (K-Vie, Kondor Pharma) 400 mg three times daily for 3 months improves performance on cognitive function tests, including those assessing processing speed, memory, and overall cognitive function, when compared with placebo (109567). A moderate-size clinical study in adults with memory dysfunction due to a recent mild traumatic brain injury in Iran shows that taking a specific product containing *Boswellia serrata* 360 mg and ginger 36 mg (Memoral, Goldarou) three times daily for 1 month modestly improves practitioner-assessed memory function scores when compared with placebo (110132). However, it is unclear if this effect is due to *Boswellia serrata*, ginger, or the combination.

**Ulcerative colitis.** Small clinical studies suggest that oral *Boswellia serrata* extracts may improve symptoms of ulcerative colitis.

^ **Details:** Two very small clinical trials in patients with active ulcerative colitis suggest that taking *Boswellia serrata* gum resin 300-350 mg three times daily for 6 weeks improves symptoms and disease markers comparably to taking sulfasalazine 1 gram three times daily (1709,12438). These findings are limited because the sample size may have been inadequate to assess differences between groups.

In patients with ulcerative colitis in remission, one observational study has found that taking a specific lecithin-based delivery form of *Boswellia serrata* extract (Casperome, Indena S.p.A.) 250 mg daily for 4 weeks is associated with a reduction in abdominal pain, cramps, and malaise, a decrease in the need for additional medications, and a 58% lower risk for requiring additional medical care when compared with no treatment. Additionally, weekly episodes of bloody diarrhea, bowel movements, and watery stools were reduced when compared with baseline (102090).

**Urinary incontinence.** Oral *Boswellia serrata* has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** A small clinical study in postmenopausal adults with urinary incontinence shows that taking a 3 tablets of a multi-ingredient herbal product containing *Boswellia serrata* 100 mg and five other herbs twice daily for 4 weeks reduces urinary incontinence frequency and leakage amount when compared with placebo, with improvements similar to those reported with solifenacin as standard therapy (111502). It is unclear if these effects are due to *Boswellia serrata*, other ingredients, or the combination.

**Urinary tract infections (UTIs).** Oral *Boswellia serrata* has only been evaluated in combination with other ingredients; its effect when used alone is unclear.

^ **Details:** A small observational study in patients with an uncomplicated UTI has found that taking two tablets of a specific combination product (Acidif plus) containing *Boswellia serrata* gummy dry extract 100 mg, L-methionine 400 mg, and hibiscus 100 mg daily for 7 days is associated with reduced UTI symptoms and reduced bacteriuria when compared with taking an unreported dose of fosfomycin for 2 days (103783). The validity of this study is limited by its observational nature and a lack of information on the severity of UTI at baseline. Also, it is unclear if these effects are due to *Boswellia serrata*, other ingredients, or the combination.

More evidence is needed to rate *Boswellia serrata* for these uses.

## Dosing & Administration

- **Adult**

*Oral.*

Boswellia serrata extracts have most often been used in doses of 100-250 mg daily for up to 6 months (100713,102089,103785). Doses up to 1600 mg daily have been used for 30 days (102092). See [Effectiveness](#) section for condition-specific information.

#### *Other routes of administration:*

For information on the topical or inhaled use of Boswellia serrata, see the [Frankincense](#) monograph.

#### • Children

##### *Oral:*

Research is limited; typical dosing is unavailable. See [Effectiveness](#) section for condition-specific information.

#### • Standardization & Formulation

Boswellia serrata extracts are typically standardized to boswellic acid content. Products used in clinical research have been standardized to contain up to 80% boswellic acid (21152).

One specific Boswellia serrata extract product (BosPure, Arjuna Natural Extracts Ltd.) has been standardized to contain 75% boswellic acids and 10% 3-O-acetyl-11-keto-beta-boswellic acid (AKBA) (89719). Another specific Boswellia serrata extract (5-Loxin) is standardized to 30% AKBA and 20% other natural boswellic acids (17948,17949,21157). The Boswellia serrata extract Apresflex (formerly Aflapin) is standardized to 20% AKBA (17949,21145). Another specific product (Wokvel, Pharmanza India) containing Boswellia serrata extract is standardized to contain 65% organic acids or a minimum of 40% total boswellic acids (12432,103784). A specific solid lipid Boswellia serrata particle product (Wokvida, Rahul Pharma) contains 11-keto-beta-boswellic acid 0.63%, AKBA 0.7%, and acetyl-beta-boswellic acid/beta-boswellic acid 1.5% (1708). A different Boswellia serrata extract (Boswellin, Sabinsa Corp.) has been standardized to contain at least 50% boswellic acids, with at least 30% AKBA (100699). Another specific Boswellia serrata extract (K-Vie, Kondor Pharma) is standardized to contain 40% boswellic acids (109567). A lecithin-based formulation of Boswellia serrata extract (Casperome, Indena S.p.A.) is standardized to contain at least 25% triterpenoid acids (109568).

## ↗ Interactions with Drugs

### CYTOCHROME P450 1A2 (CYP1A2) SUBSTRATES

[Interaction Rating](#) = **Moderate** Be cautious with this combination.

[Severity](#) = Moderate • [Occurrence](#) = Possible • [Level of Evidence](#) = D

Theoretically, Boswellia serrata might increase the levels of CYP1A2 substrates.

#### ^ Details

In vitro research shows that Boswellia serrata gum resin inhibits CYP1A2 enzymes (21178).

### CYTOCHROME P450 2C19 (CYP2C19) SUBSTRATES

[Interaction Rating](#) = **Moderate** Be cautious with this combination.

[Severity](#) = Moderate • [Occurrence](#) = Possible • [Level of Evidence](#) = D

Theoretically, Boswellia serrata might increase the levels of CYP2C19 substrates.

#### ^ Details

In vitro research shows that Boswellia serrata gum resin inhibits CYP2C19 enzymes (21178).

### CYTOCHROME P450 2C9 (CYP2C9) SUBSTRATES

[Interaction Rating](#) = **Moderate** Be cautious with this combination.

[Severity](#) = Moderate • [Occurrence](#) = Possible • [Level of Evidence](#) = D

Theoretically, Boswellia serrata might increase the levels of CYP2C9 substrates.

#### ^ Details

In vitro research shows that Boswellia serrata gum resin inhibits CYP2C9 enzymes (21178).

### CYTOCHROME P450 2D6 (CYP2D6) SUBSTRATES

[Interaction Rating](#) = **Moderate** Be cautious with this combination.

[Severity](#) = Moderate • [Occurrence](#) = Possible • [Level of Evidence](#) = D

Theoretically, Boswellia serrata might increase the levels of CYP2D6 substrates.

#### ^ Details

In vitro research shows that Boswellia serrata gum resin inhibits CYP2D6 enzymes (21178).

### CYTOCHROME P450 3A4 (CYP3A4) SUBSTRATES

[Interaction Rating](#) = **Moderate** Be cautious with this combination.

[Severity](#) = Moderate • [Occurrence](#) = Possible • [Level of Evidence](#) = D

Theoretically, Boswellia serrata might increase the levels of CYP3A4 substrates.

#### ^ Details

In vitro research shows that Boswellia serrata gum resin inhibits CYP3A4 enzymes (21178).

### IMMUNOSUPPRESSANTS

[Interaction Rating](#) = **Moderate** Be cautious with this combination.

[Severity](#) = High • [Occurrence](#) = Possible • [Level of Evidence](#) = D

Theoretically, Boswellia serrata might alter the effects of immunosuppressive drugs.

#### ^ Details

Some in vitro research suggests that Boswellia serrata extracts might inhibit mediators of autoimmune disorders such as leukotrienes and reduce production of antibodies and cell-mediated immunity (12432,12435,12437,12438). However, other in vitro research suggests that, when coupled with calcium ions, boswellic acids containing the keto group have immunostimulant properties within specific cell signaling pathways (21180).



## Interactions with Supplements

None known.

## Interactions with Conditions

None known.

## Interactions with Lab Tests

None known.

## Overdose

There is insufficient reliable information available about the presentation or treatment of overdose with *Boswellia serrata*.

## Commercial Products Containing: *Boswellia Serrata*

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[NSF Contents Certified Products](#)



[NSF Certified for Sport Products](#)

## Pharmacokinetics

**Absorption:** In humans, ingesting a dry extract from *Boswellia serrata* gum resin (BSE-018) resulted in poor bioavailability of boswellic acids; however, intake with a high-fat meal seems to improve the absorption and bioavailability (36896). Additionally, a specific *Boswellia serrata* extract (Wokvida), formulated in solid lipid particles seems to have enhanced bioavailability (109562). Following the ingestion of a *Boswellia serrata* gum resin extract (H15) 4200 mg, boswellic acids reach a peak after 1-2 hours, and plateau at 2 hours. Steady state levels of alpha-boswellic acid, beta-boswellic acid, 3-O-acetyl-11-keto-beta-boswellic acid (AKBA), and 11-keto-beta-boswellic acid (KBA) ranged broadly from 6.5 ng/mL to 11949 ng/mL. AKBA and KBA, which each contain a keto group, are generally present in much lower levels in the plasma (21149,36905,36928). Ingestion of a different *Boswellia serrata* extract (Wokvel) 333 mg resulted in peak plasma levels of KBA approximately 4.5 hours after ingestion (12441). Peak plasma levels of KBA and AKBA were reported at 2.3 hours and 1.5 hours, respectively, in individuals taking 333 mg of a solid lipid particle formulation of *Boswellia serrata* extract (Wokvida) (109562).

**Distributions:** A specific *Boswellia serrata* extract (Wok Vel) 333 mg was shown to have an apparent volume of distribution of about 143 liters (12441).

**Metabolism:** According to laboratory research, oxidation to hydroxylated metabolites is the principal metabolic route for some boswellic acids, such as KBA (36917).

**Excretion:** A specific *Boswellia serrata* extract (Wokvel) 333 mg has an elimination half-life of approximately 6 hours and a plasma clearance of about 296 mL/min (12441). Another specific *Boswellia serrata* extract (Wokvida) 333 mg has an elimination half-life of around 2.5 and 6.8 hours for the constituents KBA and AKBA, respectively (109562).

## Mechanism of Action

**General:** The applicable part of *Boswellia serrata* is most commonly the gum resin. The bark, leaf, and other plant parts are also sometimes used in preparations. The gum resin is obtained by pulling away the bark of the *boswellia* tree. The principle constituents of *boswellia* are boswellic acid and alpha- and beta-boswellic acid (1706,17947). Commonly, *Boswellia serrata* is standardized to the 3-O-acetyl-11-keto-beta-boswellic acid (AKBA) constituent (17947). The gum resin also contains up to 16% essential oils including alpha-thujene and p-cymene (17951). Various phenyl propanoids, terpenoids, flavonoids, and other phenolic compounds have all been reported in the resin (91378).

**Anti-Alzheimer effects:** A clinical study in adults with Alzheimer disease shows that taking *Boswellia serrata* extract might reduce plasma levels of amyloid-beta (AB) 40, which is a biomarker of Alzheimer disease severity and is correlated with a poor prognosis when elevated. However, no difference was noted in levels of AB42 when compared with placebo. *Boswellia serrata* also seems to increase the ratio of AB42/AB40, which when reduced is an indicator of cerebral amyloid burden and increased Alzheimer disease risk. Additionally, *Boswellia serrata* may increase plasma transthyretin levels, which is thought to exert neuroprotective activity by binding to and clearing amyloid-beta from the brain (112807).

**Anti-arthritis effects:** *Boswellia serrata* is commonly used to treat pain and inflammation associated with arthritis. In preliminary research, some *Boswellia serrata* extracts show anti-inflammatory, analgesic, and anti-arthritis effects (12432). Boswellic acids, especially AKBA, inhibit 5-lipoxygenase and reduce leukotriene synthesis and inhibit leukocyte elastase, which are the likely mechanisms for its anti-inflammatory and analgesic properties (36900,36902,36938,36940). Boswellic acids also might

have disease modifying effect, decreasing glycosaminoglycan degradation and cartilage damage. Boswellic acids may also reduce levels of other enzymes involved in conditions such as arthritis, including glutamic pyruvic transaminase, glycohydrolase, and beta-glucuronidase (36933,36934,36935). However, not all boswellia-containing products seem to have these effects (12432).

**Anti-asthma effects:** Preliminary research suggests boswellic acids stabilize mast cells, which suggests usefulness for asthma (12439).

**Anticancer effects:** Boswellia serrata might be useful in treating cancer. Preliminary research suggests that boswellic acids, including AKBA, have an antiproliferative and apoptotic effect on cancer cells (12435,36885,36901,36908). Also, anti-cancer effects of Boswellia serrata have been shown in some human research (21149). Potential mechanisms may involve apoptosis and inhibition of invasion (36901).

**Anti-inflammatory effects:** Clinical research suggests that taking Boswellia serrata extract might reduce plasma levels of pro-inflammatory cytokines including interleukin-1-beta, interleukin-4, interleukin-6, interleukin-1-alpha, tumor necrosis factor-alpha, and prostaglandin E2. Researchers theorize that cytokines stimulate astrocytes and microglia, leading to increased production and aggregation of amyloid-beta oligomers and neuronal death (112807).

**Immunomodulatory effects:** Boswellia serrata might inhibit mediators of autoimmune disorders such as leukotrienes. It seems to reduce production of antibodies and cell-mediated immunity (12432,12435,12437,12438). However, other research suggests that low concentrations of boswellic acids coupled with a second stimulus within specific signaling pathways might have immunostimulant effects. In vitro research in human polymorphonuclear leukocytes suggest that, in the presence of calcium ions, boswellic acids containing a keto group might increase reactive oxygen species and increase the release and metabolism of arachidonic acid by 5-lipoxygenase (21180).

**Organ beneficial effects:** Preliminary research suggests that boswellic acids might prevent organ rejection and ischemia/reperfusion injury (12440).

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## Classifications

[Cytochrome P450 1A2 \(CYP1A2\) Inhibitors](#), [Cytochrome P450 2C19 \(CYP2C19\) Inhibitors](#), [Cytochrome P450 2C9 \(CYP2C9\) Inhibitors](#), [Cytochrome P450 2D6 \(CYP2D6\) Inhibitors](#), [Cytochrome P450 3A4 \(CYP3A4\) Inhibitors](#), [Immunomodulators](#), [Immunostimulants](#)

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## References

[See Monograph References](#)

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