

# Peppermint Oil

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Peppermint leaf and peppermint oil have a long history of use for digestive disorders. Recent evidence suggests that enteric-coated peppermint oil may be effective in relieving some of the symptoms of irritable bowel syndrome. A combination product including peppermint oil and caraway oil seems to be moderately effective in the treatment of non-ulcer dyspepsia. Topical application of peppermint oil may be effective in the treatment of tension headache. Because of its relaxing effects on smooth muscle, peppermint oil given via enema has been modestly effective for relief of colonic spasm in patients undergoing barium enemas. Peppermint oil is well tolerated at the commonly recommended dosage, but it may cause significant adverse effects at higher dosages. (*Am Fam Physician* 2007;75:1027-30. Copyright © 2007 American Academy of Family Physicians.)

**P**eppermint (*Mentha x piperita*) is a perennial flowering member of the mint family, which grows widely in Europe and North America. The medicinal use of peppermint and other mint plants probably dates back to the herbal pharmacopoeia of ancient Greece, where peppermint leaf traditionally was used internally as a digestive aid and for management of gallbladder disease; it also was used in inhaled form for upper respiratory symptoms and cough. Peppermint oil, which is extracted from the stem, leaves, and flowers of the plant, has become popular as a treatment for a variety of conditions, including irritable bowel syndrome (IBS), headache, and non-ulcer dyspepsia (*Table 1*). Extracts of peppermint are widely used as flavoring (rather than for their medicinal properties) in many products, including toothpastes, mouthwashes, and over-the-counter gastrointestinal (GI) products. Menthol, which is extracted from peppermint, is a common ingredient in over-the-counter topical products used for respiratory congestion, headache, and muscle pain.

## Pharmacology

The active constituents in peppermint oil, which is prepared through distillation of the ground parts of the peppermint plant, include menthol, menthone, cineol, and several other volatile oils.<sup>1</sup> In vitro research shows peppermint oil to be effective in relaxing GI smooth muscle, possibly through an antagonistic

effect on calcium channels in the gut.<sup>2</sup> Peppermint oil also has been shown to relax the lower esophageal sphincter, which can result in gastroesophageal reflux.<sup>3</sup> This finding has led to the popularity of enteric-coated peppermint formulations, which bypass the upper GI tract unmetabolized, thereby facilitating its effect in the lower GI tract without effects in the upper tract.

## Uses and Effectiveness

Peppermint oil has been studied most extensively in the treatment of IBS. Combinations of peppermint oil and other botanical medicines also have been studied as treatments for non-ulcer dyspepsia. Applied topically, the oil also has been used as a treatment for tension headache.

### IBS

Because of the potential for peppermint oil to relax the lower esophageal sphincter and result in heartburn symptoms, most trials have tested enteric-coated preparations. Although results of studies on the use of this herb for the treatment of IBS symptoms have been mixed,<sup>4,5</sup> there seems to be a trend indicating mild effectiveness in the reduction of some IBS symptoms, especially flatulence and abdominal pain and distension. A meta-analysis including 175 patients in five trials found a statistically significant benefit of peppermint oil compared with placebo in the symptomatic treatment of IBS.<sup>6</sup> However, the quality of the included studies was variable,

**SORT: KEY RECOMMENDATIONS FOR PRACTICE**

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>
Peppermint oil seems to be a safe alternative for reducing symptoms of irritable bowel syndrome, although the evidence supporting this use is unclear.	B	4, 9
Peppermint oil given via enema can be used for reducing colonic spasm in patients undergoing barium enema.	B	10, 11
In combination with caraway oil, peppermint oil can be used for reducing symptoms of non-ulcer dyspepsia.	B	12, 13
Peppermint oil can be applied topically to relieve headache.	B	15, 16

*A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 957 or <http://www.aafp.org/afpsort.xml>.*

and most did not apply uniform criteria for the diagnosis of IBS.

Since the meta-analysis was performed, two additional trials—one in adults (n = 110)<sup>7</sup> and one in a pediatric population (n = 42)<sup>8</sup>—have shown a modest but statistically significant benefit. In the adult trial, 79 percent of treated patients experienced a reduction in the severity of abdominal pain, compared with 43 percent of control patients; 83 percent had less abdominal distension, compared with 29 percent of control patients; 83 percent had reduced stool frequency, compared with 32 percent of control patients; and 79 percent experienced

less flatulence, compared with 22 percent of control patients ( $P < .05$ ).<sup>7</sup> The pediatric study (in children eight to 17 years of age) found a significant reduction in pain but no significant change in other symptoms; these findings are particularly important given the lack of effective treatment options for children with IBS.<sup>8</sup> After two weeks, 76 percent of patients receiving enteric-coated peppermint reported a reduction in the severity of pain, compared with only 19 percent of control patients.<sup>8</sup> No studies have been done in children younger than eight years.

A more recent systematic review, which included 128 patients in four trials, found peppermint oil to be beneficial in reducing symptoms of IBS when compared with placebo (odds ratio = 2.7; 95% confidence interval, 1.56 to 4.76).<sup>9</sup> However, this analysis showed significant heterogeneity, which limits the interpretability of the results.

**REDUCTION OF COLONIC SPASM DURING GI PROCEDURES**

As a consequence of its relaxing properties on smooth muscle, peppermint oil given via enema has been examined in two trials as a means to reduce symptoms of gastrointestinal spasm during administration of barium enema and possibly during colonoscopy.<sup>10,11</sup> In a randomized controlled trial (RCT) of 383 patients undergoing barium enemas, 37 to 41 percent of those who received peppermint oil experienced a non-spasm examination, compared with 13.4 percent of those who received placebo ( $P < .001$ ).<sup>10</sup> In an RCT of 141 patients undergoing barium enemas, no residual spasm was evident in 60 percent

**Table 1. Key Points About Peppermint Oil**

Effectiveness	Irritable bowel syndrome symptoms: probably effective Non-ulcer dyspepsia: probably effective Reducing spasm during gastrointestinal procedures: probably effective Tension headache: probably effective
Adverse effects	Common: allergic reactions, heartburn, perianal burning, blurred vision, nausea, and vomiting Rare: interstitial nephritis, acute renal failure
Interactions	May inhibit the cytochrome P450 1A2 system
Contraindications	Hiatal hernia, severe gastroesophageal reflux, gallbladder disorders; use with caution in pregnant and lactating women
Dosage	Adults: 0.2 to 0.4 mL of oil three times daily in enteric-coated capsules Children older than eight years: 0.1 to 0.2 mL three times daily
Cost	\$24 to \$32 for one-month supply
Bottom line	Safe at proper dosages and moderately effective in patients with functional gastrointestinal conditions

of the treated group, compared with 35 percent of the control group ( $P < .001$ ).<sup>11</sup>

#### NON-ULCER DYSPEPSIA

A combination of enteric-coated peppermint oil and caraway oil has been shown in several clinical trials to reduce symptoms of non-ulcer dyspepsia (e.g., fullness, bloating, gastrointestinal spasm),<sup>12,13</sup> but the specific preparation used in these trials is not available in the U.S. A meta-analysis of several trials of a preparation containing peppermint and caraway oils plus other herbal extracts (Iberogast) found it to be effective in the treatment of functional dyspepsia.<sup>14</sup> This benefit may be the result of the preparation's relaxing effect on the lower esophageal sphincter, with concomitant equalization of pressure between stomach and esophagus and reduced sensation of bloating and abdominal pressure. However, this effect theoretically could result in reflux symptoms in patients predisposed to gastroesophageal reflux. Because multiple herbs were used in these trials, it is difficult to draw definitive conclusions about the specific effects of peppermint in this condition.

#### TENSION HEADACHE

Two trials have shown that topical application of peppermint oil is effective in reducing symptoms of tension headache.<sup>15,16</sup> In one RCT, 32 patients were tested using a variety of topical herbal preparations.<sup>15</sup> Compared with persons who received placebo, there was a significant analgesic effect in patients who applied a peppermint and ethanol preparation. A second RCT that compared the effectiveness of topical peppermint oil and acetaminophen on 164 headaches in 41 patients found that a 10% peppermint oil preparation significantly reduced headache intensity after 15 minutes.<sup>16</sup> There was no significant difference in effectiveness between peppermint oil and acetaminophen, and no adverse effects were reported.

#### Contraindications, Adverse Effects, and Interactions

Like many essential oils, peppermint oil can be toxic and even lethal at excessive

dosages; it has been associated with interstitial nephritis and acute renal failure.<sup>17</sup> It may have a choleric effect and is contraindicated in patients with cholelithiasis or cholecystitis. Peppermint oil is relatively contraindicated in patients with hiatal hernia or significant gastroesophageal reflux disease, because its effect on the lower esophageal sphincter can lead to exacerbation of symptoms.

Peppermint oil has been used to trigger menstruation and should be avoided during pregnancy. There are insufficient data to assess its safety during lactation. Peppermint oil should not be used internally or on or near the face in infants and young children because of its potential to cause bronchospasm, tongue spasms, and, possibly, respiratory arrest.<sup>1</sup> However, the amount of peppermint in over-the-counter medications, topical preparations, and herbal teas is likely safe in pregnant and lactating women and in young children.

Common adverse effects reported in clinical trials include allergic reactions, heartburn, perianal burning, blurred vision, nausea, and vomiting.<sup>6</sup> Preliminary evidence from laboratory studies suggests that peppermint leaf and peppermint oil may inhibit the cytochrome P450 1A2 system,<sup>18</sup> which theoretically could lead to increased serum levels of drugs such as amitriptyline, cyclosporine (Sandimmune), and haloperidol (Haldol) in patients who regularly consume large amounts of peppermint leaf or peppermint oil. However, this interaction has not been proven to occur in humans. Peppermint oil has been reported to raise serum levels of simvastatin (Zocor) and felodipine (Plendil) in at least one case report.<sup>19</sup>

#### Dosage

The therapeutic dosage range studied in most IBS trials was 0.2 to 0.4 mL of peppermint oil taken three times daily in enteric-coated capsules. The dosage used in the single clinical trial in children was 0.1 mL three times daily for children weighing less than 45 kg (99 lb, 3 oz).<sup>8</sup> The trials for dyspepsia used a dose of 90 mg of peppermint oil in combination with 50 mg of caraway oil

in a specific standardized preparation that is not currently available in the United States.

**Bottom Line**

Although results from clinical trials are mixed, the majority of evidence indicates that enteric-coated peppermint oil may be modestly effective in reducing some of the common symptoms of IBS. In combination with caraway oil, it also may be effective in treating non-ulcer dyspepsia. Limited data show a modest effect at reducing colonic spasm during barium enema. Topical peppermint oil also may be helpful for treatment of tension headache. Peppermint oil should only be used at the recommended doses because significant toxicity can occur at higher doses. Even the recommended medicinal doses of peppermint oil should not be used in infants or very young children, or in women who are pregnant or lactating.

Members of various family medicine departments develop articles for "Complementary and Alternative Medicine." This is one in a series coordinated by Sumi Sexton, M.D.

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