

Essential Oils Smooth Gastric Functioning

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Plant essential oils that are derived from peppermint, dill, caraway, and fennel have been known for many centuries to be capable of relieving a variety of gastrointestinal symptoms.¹ The cyclical monoterpene content of essential oils is believed to exert pharmacologic effects, including modulation of gastrointestinal smooth muscle function.²⁻⁵ Essential oils are natural antispasmodic agents.² Peppermint oil has been used in a variety of formulations to treat symptoms, such as functional dyspepsia, abdominal colic, postoperative abdominal pain, and the troublesome manifestations of irritable bowel syndrome.^{4,6-11}

Peppermint and Fennel

Fennel (*Foeniculum Vulgare*)—which is commonly known as large, wild, or sweet fennel—is described in herbal literature as possessing stomachic, carminative, pectoral, diuretic, diaphoretic,

and aromatic properties for medicinal use. In 1994, Kloss described fennel as a “thoroughly tried” remedy for gas, acid stomach, gout, cramps, and colic. Ground fennel added to food has been demonstrated to prevent gas in both stomach and bowels and has been proposed as a remedy for childhood bowel colic.¹² The essential oil of fennel has carminative qualities that are at least as effective as the qualities of peppermint oil¹ and is described as an excellent treatment for obesity.¹² The effects of fennel on obesity are believed to be related to an appetite suppressant effect, but this area of efficacy remains underexplored.¹³

Peppermint (*Mentha x piperita* [Lamiaceae]) is known in herbal, homeopathic, and conventional medical practice to have aromatic, stimulant, stomachic, carminative, rubefacient, and short-lived local anesthetic effects. In 1994, Kloss described peppermint as an excellent remedy for chills, colic, fevers, dizziness, flatulence, nausea, vomiting, diarrhea, palpitations of the heart, other types of heart trouble, influenza, and even hysteria. In Russia and eastern Europe, peppermint derivatives have played a major role in cardiovascular disease therapy. This use derives from an effect of peppermint that is similar to widely used cardiovascular prescription medications that block calcium entry into cells, thereby exerting action on cardiac and smooth-muscle function. Products containing peppermint have enjoyed widespread use for the treatment of chest pain of cardiac origin, palpitations, gastrointestinal upset, and bronchitis in Russia for several decades. Of all the known symptomatic benefits of peppermint and fennel, the carminative action of these compounds is especially important.

Irritable Bowel Syndrome and Functional Gastrointestinal Disease

Patients frequently seek medical help for functional gastrointestinal diseases. In 1977, Fielding¹⁴ stated that “all bowels are irritable and all bowels are irritated.” Stimulation of the gut by a variety of means will cause an enhancement of movement in the tubular digestive tract. For example, when an individual eats, the motor activity in the intestines increases. This is the basis of the common “gastrocolic” reflex.

When normal stimuli produce inappropriate responses in the bowel, problems become apparent. Continuing irritability or irritation of the gut can produce a spectrum of distressing symptoms, including abdominal pain, altered bowel habit, gaseousness, nausea, vomiting, and related stress. When these symptoms occur alone—or in variable combinations—an individual is characterized as troubled with irritable bowel syndrome or functional gastrointestinal disease. Excluding organic disease of the gastrointestinal tract is important before the diagnosis of irritable bowel syndrome becomes tenable.

Carminative effects.

Peppermint and fennel oils have carminative effects that are documented. The term “carminative” was coined to describe the overall effect of several aromatic essential oils on digestive function. Peppermint oil is an example of an essential oil that has very specific effects in the relief of flatulence and associated dyspeptic complaints.¹⁵ Peppermint oil contains menthol, which is a cyclical monoterpene that is rapidly absorbed from the upper portions of the small intestine when taken orally. Because the action of most essential oils, including peppermint oil, occurs

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almost exclusively on a local basis, it is often necessary to deliver the carminative preparation in a delayed-release formulation. Delaying the release of essential oils in the gut results in maximum biopharmacologic effects on the lower portions of the intestine.⁴

The carminative effect of essential oils, such as peppermint, has been linked to the relief of flatulence.¹⁵ The mechanism whereby flatulence is relieved is not entirely understood, but it is related perhaps to a local "stimulatory" effect of essential oils on the gastrointestinal tract. This stimulatory effect is frequently followed by a mild degree of local anesthesia.¹⁵ In particular, essential oils are believed to be quite useful in the therapy of gastric bloating. Gastric bloating may be associated with disturbance of upper gastrointestinal motor function, such as delayed gastric emptying, but the relationship between disordered gastric emptying and functional dyspepsia is still not well defined.¹⁶

It is commonly observed that the relief of abdominal bloating is frequently associated with eructation or belching of gas. In the case of lower abdominal distention, relief is often associated with the passage of flatus. It has been proposed that the passage of gas from the upper or lower digestive tract is facilitated by the breaking up of intestinal foam that may form in the lumen of the gastrointestinal tract. In addition, essential oils may reverse spasm of the bowel that is associated with gaseous distention. The carminative effect of essential oils, such as peppermint or fennel oil, has been linked on a clinical basis to the expulsion of gastrointestinal gases.

Gastrointestinal actions.

In 1986, Mowrey, in his book on the scientific validation of herbal medicines,¹³

indicated that peppermint and fennel contain volatile oils and other constituents that absorb intestinal gas, calm an upset stomach, inhibit diarrhea or constipation, aid digestion, and prevent or remedy childhood colic. Two distinct ways in which peppermint relieves gastrointestinal problems have been described by Dr. Mowrey. These relate to resolution of biliary function and the normalization of intestinal activity. Essential oils may facilitate biliary function by stimulating contractile activity in the gallbladder, thereby allowing free flow of bile.^{17,18} In 1969, Demling and his colleagues drew attention to peppermint oil's ability to normalize gastrointestinal motor activity with the relief of both spasm and flaccidity in the intestines.

Peppermint oil has been found to inhibit or inactivate several microorganisms, that according to Dr. Mowrey could cause digestive problems,¹³ including influenza A virus, herpes simplex, mumps virus, *Streptococcus pyogenes*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Candida albicans*.¹⁹⁻²⁵

Dr. Mowrey said that "more than 30 pathogenic microorganisms have yielded to the influence of peppermint." The role of essential oils, such as peppermint and fennel, as treatment or preventive agents for infection of the gastrointestinal tract requires further investigation. The broad antimicrobial action of peppermint indicates possible uses in suppressing enteric microbes in several conditions, including travelers' diarrhea and opportunistic infections of the gastrointestinal tract in HIV disease (AIDS/ARC). Peppermint oil may also inhibit *Helicobacter pylori*, which is the most important cause of acid-related disease in the stomach. In his book, Dr. Mowrey reviewed the research of Maksimenko and Pasechnik (1966),¹³ in which

choleric, antiulcer, and antiinflammatory properties of peppermint were proposed. If peppermint oil has an antiulcer effect, it is possible that it exerts this effect by interference with the growth of *H. pylori*, which is the key focus of current treatment regimens to cure peptic ulcer disease.

Fennel contains aromatic or essential oils that are very similar in chemical structure and biologic effects to those of peppermint oil.^{12,13,26,27} Fennel was listed officially in the U.S. pharmacopoeia for many years and this herb is still officially recognized for its medicinal properties in more than twelve foreign pharmacopoeias worldwide.

Effects on gastrointestinal motor function.

Essential oils, such as peppermint oil, when instilled into the large bowel have

Herbal Effects

Stomachic herbs give strength and tone to the stomach, stimulate digestion, and improve the appetite.

Carminative herbs prevent gas from forming in the intestines and also assist in expulsion of gas.

Pectoral herbs relieve disorders of the chest and lungs and function as expectorants.

Diuretic herbs promote the production and secretion of urine.

Diaphoretic herbs promote perspiration.

Aromatic herbs provide a pleasant, fragrant scent and a pungent taste.

Stimulant herbs increase the activity or efficiency of a bodily system or an organ.

Rubefacient herbs redden the skin by increasing the circulation when rubbed on the skin surface.

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been shown to reduce colonic motility⁵ and spastic intestinal contractions.²⁸ It is believed that many of the symptoms of functional gastrointestinal disorders, including irritable bowel syndrome or gastroparesis, arise from alterations in gastrointestinal motor function. Studies have shown altered colonic motility in irritable bowel syndrome.^{29,30} Well-conducted clinical experiments have indicated that the administration of peppermint oil by the oral route results in a decrease in lower esophageal sphincter pressure. This effect occurs within 1–15 minutes following administration of peppermint oil, but lasts only for approximately 5 minutes.^{6,7} When 0.2 ml of peppermint oil is placed directly into the lumen of the colon, inhibition of colonic motor activity occurs within 2 minutes and lasts approximately for 12 minutes.⁵

How Essential Oils Act on Gastrointestinal Function

The proposed mechanism of action of carminative oils involves several physiologic changes, including an antifoam action, an antispasmodic effect, and a local anesthetic effect. The effects of essential oils, such as fennel and peppermint, are localized in the gastrointestinal tract. In contrast to other antispasmodic medications that are used to treat functional gastrointestinal disturbance, peppermint exerts a local gastrointestinal effect, whereas synthetic compounds exert pharmacologic effects as a consequence of their systemic bioavailability and activity. Synthetic pharmaceuticals with spasmolytic effects exert different actions on gastrointestinal autonomic function. Mebeverine exerts a papaverine-like effect and dicyclomine exerts an atropine-

like effect, but unlike essential oils, these effects are not confined to the gastrointestinal tract. The general systemic effects of antispasmodic medications, such as mebeverine or dicyclomine, may limit their use and cause adverse effects.

The study of the pharmacodynamic effects of essential oils is difficult. The active constituents of peppermint and fennel oils, namely the monoterpenes, are rapidly and completely metabolized following their prompt absorption from the upper gastrointestinal tract. Pharmacokinetic studies of the monoterpene contents of peppermint (menthol) use indirect assay methods because of the rapid elimination of conjugated menthol in the urine. Menthol is excreted from the body mainly as a glucuronide conjugate in the urine.

It has been hypothesized that the carminative effect of essential oils may be related, in part, to their action on intestinal foam. Peppermint, cinnamon, orange, dill, and caraway oils have been shown to be highly effective in disrupting gastrointestinal foam as a consequence of the stimulation of gastric and intestinal secretion.⁹ Foam is generally found in the upper gastrointestinal tract and it is not perceived to be generally a problem in the large intestine. It is believed that the disruption of the bubbles in gastrointestinal foam may lead to a collapse of the foam resulting in the release of gas that can then be eliminated by eructation or the passage of flatus. The buildup of foam and its retention in the lumen of the gastrointestinal tract is believed to give rise to abdominal discomfort due to intestinal spasm and colic.⁹ This gas buildup may give rise to dyspepsia or lower abdominal pain. It has been well recognized that antifoaming agents are useful in the facilitation of the passage of gas from the

gastrointestinal tract and they are associated with general relief of the symptoms of functional gastrointestinal disease.

There are at least two components that may contribute to the action of essential oils in the relief of the spastic contractions in the tubular-digestive tract. Essential oils are lipophilic and exert a local anesthetic effect that occurs as a consequence of a change in the membranes of sensory cells. This local anesthetic effect has been postulated to contribute to the interruption of the cycle of gastrointestinal irritation, which may precipitate spasm through intrinsic reflexes in the gastrointestinal tract. Essential oils, such as peppermint oil, can be demonstrated to exert a significant smooth-muscle-relaxant effect, which is believed to relate to inhibition of cellular calcium entry (calcium channel blocking).³¹

Peppermint oil and menthol alone are known to block the carbachol (acetylcholine-like) induced influx of calcium ions into cells. Thus, essential oils appear to be calcium channel blockers and exert local pharmacologic effects similar to those observed with current prescription medications such as nifedipine or diltiazem, which are calcium channel antagonists. Calcium channel blocking drugs, such as nifedipine or diltiazem, are known to exert effects on upper gastrointestinal motor function, including inhibition of esophageal peristalsis, and a reduction of the lower esophageal sphincter pressure in the absence of any major effects on gastric motor function.³²

Clinical Studies

Several clinical studies have shown the beneficial effects of essential oils, especially peppermint oil, on a variety of gas-

The patients considered peppermint oil to be better than placebo in relieving abdominal symptoms.

trointestinal disorders.^{11,33-35} Rees et al. (1979) undertook a double-blinded crossover trial of the effects of peppermint oil on the relief of symptoms in the irritable bowel syndrome. In this multicenter study, there was a significant improvement in the relief of symptoms of the irritable bowel syndrome compared to placebo. These results were confirmed in a further multicenter trial, performed by Dew et al. (1979), where 29 patients from 7 hospital centers entered into a double-blinded crossover study to examine the effects of peppermint oil on symptoms of irritable bowel syndrome.

In the study by Dew et al. (1984), patients received either peppermint oil or placebo capsules and, during each treatment period of two weeks, patients were requested to record the severity of abdominal symptoms, stool frequency, and side effects of the medication on a daily basis. The overall assessment of the patients showed that the patients' symptoms improved significantly while taking peppermint oil capsules as compared to placebo and that the patients considered peppermint oil to be better than placebo in relieving abdominal symptoms. Patients who received peppermint oil had a much lower daily symptom score than those receiving placebo. No demonstrable effect occurred on the number of daily bowel actions. It was concluded by Dew et al. (1984) that peppermint oil was a potent agent for the relaxation of gastrointestinal smooth muscle. This latter study confirmed the earlier findings of Rees et al. (1979) and clearly demonstrated the benefit of peppermint oil in treatment of irritable bowel syndrome in a multicenter, controlled clinical trial.

Meyrick Thomas et al. (1988) undertook a double-blinded clinical trial that com-

pared peppermint oil and placebo in the prevention of abdominal pain, distention, or colic following appendectomy. This small clinical trial showed a benefit for peppermint oil in reduction of postoperative pain, but this study was complicated by problems that occur in the investigation of the prevention of the symptom that affects a small and unpredictable minority of patients in the postoperative period.¹⁰ However, Meyrick Thomas et al. (1988) concluded that peppermint oil may prove useful for the prophylaxis of postoperative pain if groups of patients at risk for postoperative pain could be identified.

Other uses of essential oils have been proposed, including the relief of spasm during endoscopy of the gastrointestinal tract especially for the relief of spasm during colonoscopy. Other maneuvers that may induce spasm may be just as amenable to pretreatment with essential oils, such as the application of essential oil prior to administration of colonic "washouts" or enemas. Peppermint and fennel oils are useful adjuncts to ease colonic "washout" programs performed by some alternative practitioners.

McKenzie and Gallacher in 1989³⁶ reported the successful use of peppermint oil in assisting patients to accept colostomy. These authors cited the problems that patients experienced with odor that occurs from the procedure. McKenzie and Gallacher³⁶ found that peppermint oil in enteric coated capsules was highly effective in masking the fecal odor that is a common problem for patients with colostomies. In this study, 14 of the 20 patients found that odor from colostomy was improved, and 15 of the 20 colostomy patients found colostomy much more acceptable. It was noted in this patient group that the consistency of fecal matter

Essential Oils

How They Are Made and Who They Help

The aromatic substances found in plants are their essences. These essences are a combination of various alcohols, hydrocarbons, phenols, aldehydes, esters, and ketones that occur naturally in plants. Volatile oils, or essences, in aromatic plants, combine to give a plant its particular smell. The range of aromatic or essential oils is very large; each essence has unique properties. Although the substances resemble oils, they are light and nongreasy. They are so powerfully aromatic that simply brushing against the plant releases its fragrance.

Essential oils are removed from the plant via expression, distillation, or solvent extraction. Expression works well for citrus fruits; distillation is the most common method of removal. For delicate flower essences, such as jasmine and carnation, solvent extraction must be used.

Essential oils may be located in various parts of plants. Ginger has the oil in roots; cinnamon bark bears oil; and wood gives the essential oil for cedar and sandalwood. Essential oils are useful to plant development. As medicaments they have been observed to be useful as antibacterials.

Essential oils, such as peppermint and fennel oil, can help patients with intestinal gas, spasm, colic, dyspepsia from colic, and altered bowel habit caused by irritable bowel syndrome; colostomy patients; and patients undergoing instrumentation of the gastrointestinal tract, such as lower endoscopy, enema administration, detoxification programs using colonic "washouts," and contrast radiology of the lower gastrointestinal tract, such as barium enema examination. Essential oils can offer a natural, effective, and safe alternative to prescription medications for the management of functional disease of the gastrointestinal tract.

in the colostomy and frequency of bag changing appeared to be improved.

Essential oils are very safe and they are ubiquitous in foods. Peppermint is used as a flavoring in a variety of beverages and foods. No systemic toxicity of peppermint oil or fennel oil is known despite many years of use of these natural agents. Peppermint can reduce lower esophageal sphincter pressure and, on occasion, patients who have gastroesophageal reflux as a consequence of low esophageal sphincter pressure may have a short-lived exacerbation of reflux symptoms. This may result in heartburn or acid reflux. This side effect may occasionally lead to discontinuation of the medication, but the effects on lower esophageal function only last about 15 minutes. Essential oils are believed by many practitioners to exert a general sedating effect and may assist in relieving anxiety and stress via a general "calming" effect.³⁷ There are no known significant toxicities of essential oils when taken in recommended therapeutic doses.

If further studies can confirm the benefit of essential oils in a delayed-release format, then those natural products will be very useful first line, nontoxic options for many people affected by functional gastrointestinal symptoms, in the absence of organic gastrointestinal disease. The authors recommend that all self-medication occur with the guidance of a health care professional. □

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