PERSPECTIVE

Herbal approaches to treat pediatric functional abdominal pain

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ABSTRACT

One of the most frequent issues that pediatricians and pediatric gastroenterologists encounter is chronic abdominal pain. Children with persistent and recurring stomach pain who match certain clinical criteria are diagnosed with abdominal-pain-related functional gastrointestinal disorders (AP-FGIDs).

Rome IV's criteria are a set of standards. AP-FGIDs, which include functional dyspepsia (FD), irritable bowel syndrome (IBS), functional abdominal pain (FAP), and abdominal migraine, impact about 20% of children globally. 45% of pediatric AP-FGIDs are caused by IBS.

Functional abdominal pain is caused by a pathophysiology that is a result of a complex interaction of early life experiences, genetics, psychosocial influences, and physiological factors such as visceral sensitivity, motility disturbance, altered mucosal immune function, and altered central nervous system processing. Depending on the multiple facets of the condition and the specific patient's needs, treatment techniques can include nutritional, pharmaceutical, alternative medicine, and psychosocial support therapies. Both patients, medical professionals, and families have a keen interest in alternative and integrative medicine approaches to pediatric pain. We address several well-known herbal remedies for treating pediatric AP-FGIDs in this article, including peppermint oil, Iberogast®, *cannabis,* fennel, and licorice.

Key Words: *Abdominal pain; Herbal treatment; Cannabis; Peppermint oil*

INTRODUCTION

One of the most typical gastrointestinal complaints observed by both pediatricians and pediatric gastroenterologists is chronic abdominal pain. Children with persistent and recurring abdominal pain who match the clinical requirements specified in the Rome IV criteria are diagnosed with abdominal-pain-related functional gastrointestinal disorders (AP-FGIDs). Around 20% of children worldwide are thought to be affected by AP-FGIDs, which can manifest as functional abdominal pain (FAP), functional dyspepsia (FD), abdominal migraine, and irritable bowel syndrome (IBS). IBS makes up 45% of pediatric AP-FGID cases.

The pathophysiology of functional abdominal pain involves an interplay of multiple factors including early life experiences, genetics, psychosocial influences, and physiologic factors of visceral sensitivity with altered central nervous system processing, abnormal motility, and abnormal mucosal immunity. Treatment strategies vary and might involve dietary, pharmaceutical, alternative medicine, and psychosocial support interventions depending on the complexity of the illness and the specific patient's needs.

HERBAL TREATMENT APPROACHES

1. **Peppermint Oil**

   Menthol is the main component of peppermint oil (PMO), which is produced by steam-distilling fresh peppermint leaves . PMO acts at many levels of the microbiome-gut-brain axis and has therapeutic effects in people with functional gastrointestinal disorders. It reduces calcium influx by inhibiting L-type Ca2+ channels and decreases acetylcholine release from enteric nerves by acting on nicotinic receptors in the GI tract to have a spasmolytic impact on smooth muscle cells. Numerous research has looked into the usage of PMO for children with FGID. Kline et al. conducted a randomized, double-blind controlled experiment to evaluate the effectiveness of 50 kids who were given pH-dependent, enteric-coated PMO pills to alleviate their IBS symptoms (8–17 years of age). Colpermin®, which contains 187 mg of peppermint oil, was administered to kids with IBS for two weeks as either a placebo (an arachis oil capsule) or a pH-dependent, enteric-coated PMO capsule. Patients who weighed 45 kg or more were given either two PMO capsules or a placebo three times each day. One capsule was given to kids weighing between 30 kg and 45 kg three times per day. 75% of the 42 kids who finished the research said their abdominal discomfort was significantly better after receiving PMO compared to the other 25%. 19% (p 0.001) in the placebo group. A randomized controlled trial conducted by Asgarshirazi et al. with 120 kids (4–13 years old) who had functional stomach pain, functional abdominal pain syndrome, functional dyspepsia, and IBS similarly had similar outcomes . For one month, children were randomly assigned to receive Lactol® capsules (Bacillus coagulans plus fructooligosaccharide), PMO (Colpermin®—187 mg of peppermint oil), or a placebo (folic acid). This trial used the same dose regimen as the Kline study stated above.

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2. **Fennel**

One of the earliest plants used in traditional medicine is fennel, also known by the scientific name *Foeniculum vulgare*. It has astringent, antispasmodic, anti-inflammatory, and antioxidant effects. Fennel oil's anethole, which enhances gastric emptying and gastric accommodation in rats, may have positive effects on FD . Given its many benefits, fennel has been used in a variety of ways for gastrointestinal complaints over the years.

Although fennel tea has been investigated for the treatment of baby colic, there aren't many pediatric trials evaluating the effectiveness of fennel for FGIDs. Fennel tea was utilized by almost 77% of mothers in descriptive research evaluating the use of herbal remedies in Turkey to treat their children's gas pain and constipation.

3. **Licorice**

Licorice root (*Glycyrrhiza glabra*) has the potential as apediatric FGID therapy. The triterpenoid saponin glycyrrhizin, also known asglycyrrhizic acid or glycyrrhizinic acid, is the primary component of licoriceroot and is typically present in concentrations between 6% and 10%. Accordingto some theories, the intestinal flora hydrolyzes glycyrrhizin to produce a glyconemolecule (glycyrrhetinic acid) and a sugar moiety, both of which are absorbed.Flavonoids are the parts of DGL that are active. Other active components oflicorice include triterpenoids, chalcones, coumarins (such as umbelliferone,herniarin), isoflavonoids (such as isoflavonol, kumatakenin, licoricone, andglabrol), as well as sterols, lignins, amino acids, amines, gums, and volatileoils.Due to its anti-inflammatory, antibacterial, and antiviral pharmacologicactivities, deglycyrrhizinated licorice (DGL), a processed licorice extractprepared by eliminating the glycyrrhizin molecule to reduce itsmineralocorticoid characteristics, has been utilized for numerousgastrointestinal problems. In cases of stomach hyperacidity and functionaldyspepsia, DGL is also employed. However, DGL increases the normal defensivemechanisms that prevent ulcer formation and aid in mucosal healing by raisingblood supply and mucus production instead of preventing the acid release.The dose of licorice forclinical use is based on the content of glycyrrhetinic acid. The standarddosage for DGL in adults is two to four 380 mg chewable tablets 20 min beforemeals.

4. **Iberogast**

Iberogast® contains extracts of bitter candytuft (Iberis amara), angelica root (Angelica radix), milk thistle (Silybi mariani fructus), celandine herb (Chelidonium majus), caraway fruit (carvi fructus), licorice root (Liquiritiae radix), peppermint (Menthae piperitae folium), lemon balm leaves (Melissa folium (Matricariae flos). I. amara, a bitter candytuft, preferentially prevents binding to muscarinic M3 receptors, while licorice root, chamomile, and celandine extracts prevent binding to 5-HT3 receptors and 5-HT4 receptors, respectively. (The effects of licorice on the GI tract are covered in Section 4, "Licorice," while the effects of peppermint oil are covered in Section 2, "Peppermint Oil.") It is unclear, yet, how much each component's method of action contributes to the overall outcomes of using STW5.

It has been shown that STW5 has a number of gastrointestinal effects that are helpful for FGID symptoms to improve. These include regulating gastrointestinal motility, visceral hypersensitivity, and accommodation of the stomach. When STW5 was given orally to rats, the jejunal afferents' sensitivity to mechanical distension, serotonin, and bradykinin was decreased. Patients with functional dyspepsia and IBS may have improved as a result of STW5's impact on visceral hypersensitivity. The gastric fundus and antrum are other organs where STW5 has particular effects. Functional dyspepsia can benefit from STW5's strong, dose-dependent muscular relaxant effect in the fundus, whereas STW5 also induces phasic contractility in the antrum.

Some pediatric clinical evidence supports the usage of STW5. Upper and lower gastrointestinal problems improved in a study of 980 kids who got STW5, 10–20 drops three times per day for seven days. 39 percent of kids said their symptoms had completely disappeared. In 94.8% of cases, STW5 was well tolerated, with only four moderate side effects. Iberogast® comes as liquid drops. The listed dose for children from 3 to 5 years is ten drops three times a day, for children 6 to 12 years 15 drops three times a day, and for adolescents and adults 20 drops three times a day. It is taken with a small amount of liquid before or during meals.

5. **Ginger**

Since its discovery in Chinese medicine in 400 BC, the rhizome of the ginger plant, *Zingiber officinale*, has been employed both as a food flavouring and a herbal remedy. Chemical analysis reveals that ginger contains over 400 different chemicals, with phenols like gingerol and shogaol and terpenes like zingiberene and bisabolene dominating the list.In double-blind research with 11 individuals, ginger was found physiologically to hasten stomach emptying by 24% at a dose of 1.2 g powdered ginger root in capsule form Although this shift was not connected to a reduction in GI symptoms as assessed by a visual analogue scale, it was associated with functional dyspepsia. Although they did not examine cholecystokinin levels, the investigators did not find any changes in motilin, ghrelin, or GLP-1 levels that would account for the rise in the emptying rate. In a study of 13 young adults who had previously experienced motion sickness, it was discovered that taking 1 or 2 grammes of powdered ginger root in the form of capsules 1 hour prior to spinning in a seated position reduced nausea scores by 30%, increased the time it took for nausea to start by up to 52%, and sped up the recovery process by up to 25%. Ginger pretreatment reduced tachygastric activity in a portion of this sample examined

with electrogastrography by up to 29%. The effects of ginger on chemotherapy-induced nausea and vomiting and for nausea and vomiting during pregnancy have been described in several studies, with a recent systematic review concluding that a divided daily dosage of 1500 mg of ginger is beneficial for the relief of nausea. However, there is little information on ginger's effectiveness as an antiemetic in kids.

6. Cannabis

Cannabis, sometimes known as marijuana, has both therapeutic and leisurely purposes. Cannabinoids are the main group of substances that the Cannabis sativa plant generates. *Cannabis*-cultivated plants produce enormous amounts of the main cannabinoids, delta-9-tetrahydrocannabinol (THC), and cannabidiol (CBD), which are used for their psychoactive and therapeutic effects.

Slightly more than 100 minor cannabinoids are found. The major receptors for cannabinoids, CB1 and CB2, are found in the endocannabinoid system, which is how they act. Additional receptors, such as the PPAR-alpha, PPAR-gamma, TRPV1, GPR55, and GPR119, may react to cannabinoids and modify the activation of CB receptors. Although THC is most well-known for its hallucinogenic properties, it is also frequently used to increase appetite, lessen motion sickness, soothe pain, and lessen anxiety. In the US, medical marijuana is not always permitted. The FDA has authorized a synthetic version of THC, for use in the adult population to treat nausea and vomiting brought on by cancer treatment as well as hunger stimulation in AIDS-related conditions. According to clinicaltrials.gov, there are no controlled trials of THC or dronabinol in children for the treatment of GI symptoms or abdominal pain. CBD does not have any psychotropic effects, in contrast to THC. It has been examined in children and adolescents for reasons such as spasticity, epilepsy, and behavioral abnormalities in the context of autism or intellectual disability, or it isbeing studied in this population right now. To treat GI symptoms or stomach pain, CBD hasn't been subjected to any controlled studies in kids. There are remarkably little data about the use of cannabis for the management of abdominal pain, particularly in the setting of functional disorders rather than in inflammatory bowel disease.

CONCLUSION

A variety of herbal medications are available that may help pediatric FGID patients with pain-related symptoms. Although the majority of the information currently accessible relates to the usage of peppermint oil, there are currently very few pediatric studies to evaluate their effectiveness, dose, safety, and acceptability. There is more information on the use of herbal substances in adults, although many of these studies have been small, observational, have used formulations or preparations that are not readily available commercially, or have not yet been reproduced to corroborate their results. As a result, there are few clinical trials accessible, and reporting on the quality of the data presented in each study is not done.