REVIEW article

Dietary and medicinal plant-based management of diarrhea: a mini review

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Abstract: Diarrhea continues to be a major global health concern, accounting for over 1.9 million fatalities each year, especially in children under five. Oral rehydration and antibiotics are part of the conventional treatment; nevertheless, phytotherapy, the use of plant-based treatments, and nutritional approaches provide an alternative or complementary solution, particularly in cases of antibiotic resistance or persistent diarrhea. This review explores the historical and scientific basis of phytotherapy and nutrition, as well as its pharmacological significance, clinical effectiveness, and potential integration with contemporary medicine. The growing interest in complementary therapies highlights the need for further study, despite some herbal remedies lacking solid clinical evidence. Through anti-inflammatory, anti-infectious, and gut-modulating processes, phytotherapy shows promise in reducing symptoms and improving gut health.

Introduction

Frequent, loose, or watery stools are the hallmark of diarrhea, a common gastrointestinal disorder [1, 2]. Infections, food intolerances, stress, drugs, or underlying digestive issues can all cause it. Inadequate nutritional management can result in dehydration, electrolyte imbalance, gastric discomfort, and malnutrition [3-7], especially in children and older adults, even though acute diarrhea most of the time resolves on its own [3]. Diarrhea can be controlled with a low-fiber diet [8]. A low-fiber diet may deviate from standard guidelines for a healthy diet by limiting certain fruits, vegetables, whole grains, nuts, and legumes. However, this natural method might be helpful for managing and preventing diarrhea in addition to conventional medical care. In many nations, the use of herbs and herbal medications to treat diarrhea is widespread (**Figure 1**). These naturally occurring plants are widely accepted by the public and function as less expensive substitutes for conventional medications [9]. Given this, it is necessary to look for and thoroughly record plants that have antidiarrheal effects. Evidence-based natural therapies, such as dietary modifications, hydration techniques, probiotics, herbal remedies, and lifestyle modifications, are discussed.

Understanding the underlying cause is essential for effective management. Diarrhea can be classified into: Acute diarrhea**,** usually caused by infections (viral, bacterial, or parasitic), *chronic diarrhea***,** often linked to conditions such as irritable bowel syndrome, inflammatory bowel disease [10], or food intolerance, *osmotic diarrhea***,** resulting from poor absorption of certain substances, and *secretory diarrhea***,** caused by excessive secretion of fluids into the intestine.

Nutritional management: The intestine's capacity to absorb nutrients and fluids is hampered by diarrhea. Maintaining energy levels, preventing dehydration, and promoting intestinal mucosa regeneration are all achieved by continuing to consume the right foods. Current dietary guidelines emphasize early and appropriate

feeding, in contrast to previous fasting practices [11, 12]. Probiotics aid in reestablishing the regular intestinal flora that was disturbed by diarrhea. Live culture yogurt and fermented foods can lessen the length and intensity of diarrhea, especially infectious and antibiotic-associated diarrhea [13]. Continuous feeding is crucial for infants and young children. During episodes of diarrhea, breastfeeding should continue. To ensure sufficient nutrition and a quicker recovery, age-appropriate soft foods should be served in small, frequent meals. The most critical aspect of dietary management is maintaining adequate hydration. Excessive loss of water and electrolytes can rapidly lead to dehydration. Recommended fluids include: Oral rehydration solution, rice water or barley water, coconut water, and clear soups and broths. Easily digestible, low-fat, and low-fiber foods are preferred during acute diarrhea. These foods reduce bowel irritation and help firm stools. Commonly recommended foods include: Bananas (rich in potassium and pectin), plain rice or rice porridge, applesauce, toast or dry crackers, and boiled potatoes. Certain foods can worsen diarrhea by increasing intestinal motility or osmotic load. That's why foods to be avoided include: Fried and fatty foods, spicy foods, High-fiber foods such as raw vegetables and whole grains, dairy products in cases of temporary lactose intolerance, and artificial sweeteners like sorbitol.

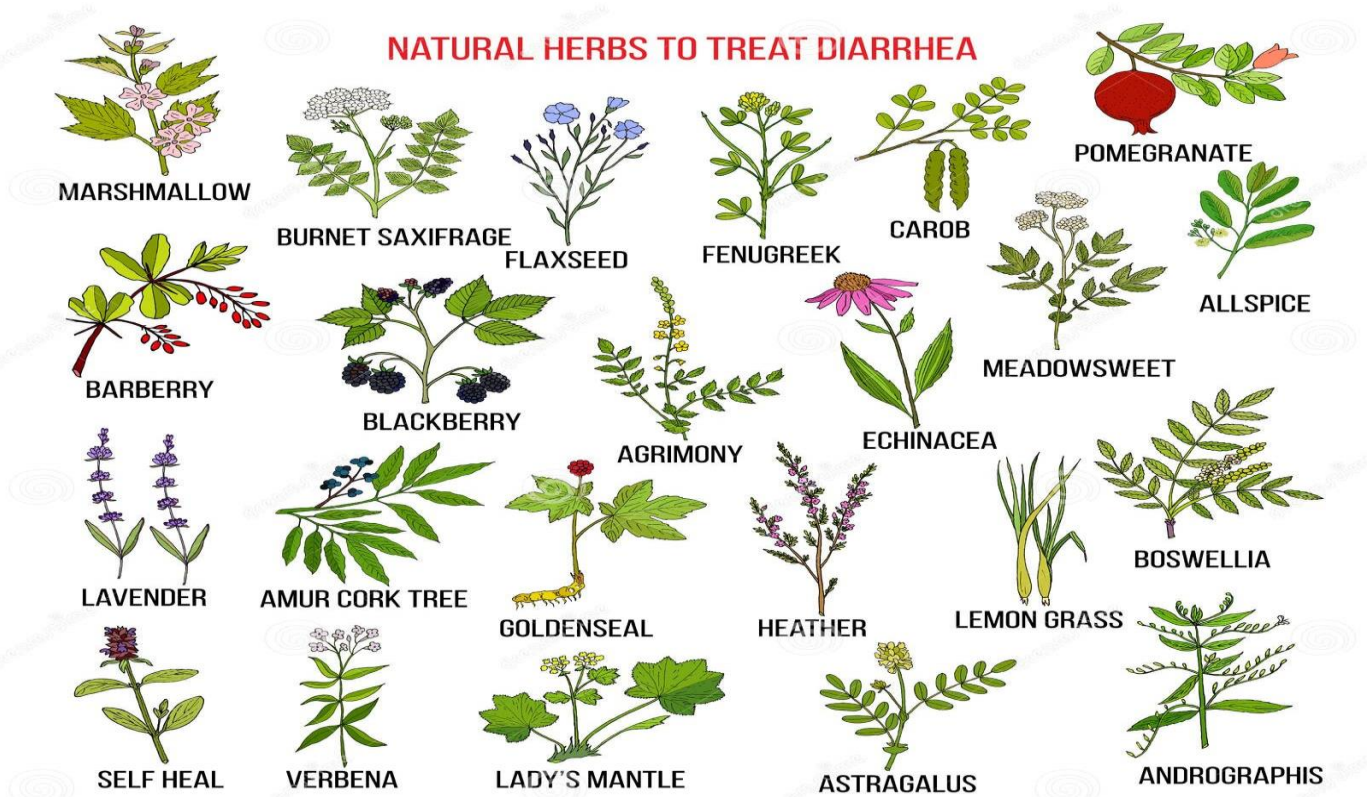

Figure 1: Medicinal herbs can be used against diarrhea

Medicinal plant-based remedy: Rapid evacuation of liquid, semi-solid, or soft stools is known as diarrhea, and it is a common sign of many underlying illnesses [14]. Many cultures throughout the world have traditionally treated lots of health problems with herbal medicines [15-17]. Certain distilled extracts and medications are now regarded as contemporary herbal remedies by a number of systems. Substances that are not derived from herbs are not included in this review. Chamomile, peppermint, and other medications with anti-diarrheal properties have been extensively studied and sold; nevertheless, keep in mind that there are few clinical findings when using herbal medicine for diarrhea [18]. Polyphenols, as a group, are often found in the majority of herbal medications that have an impact [19]. However, alkaloids, flavonoids, glycosides, and essential oils do not seem to be predictive for clinical anti-diarrheal action as a group, despite their excellent *in vitro* activity [20]. Many herbal remedies, particularly the anti-inflammatory ones, are likely to affect intracellular stress signaling pathways in the gut [21, 22].

Worldwide, diarrhea is a major contributor to both high morbidity and mortality. Herbal remedies for acute or chronic diarrhea are widely used in traditional medicine (**Table 1**). Several herbal plants are used to treat diarrhea in traditional medicine. A few studies have reportedly verified the efficacy of herbal plants in treating diarrhea. Although there are many different types of herbal treatments for treating acute or chronic diarrhea, they are frequently made as infusions or decoctions. Some people still use traditional remedies to manage their health because of their religious, spiritual, and sociocultural beliefs, even if modern technology has made it possible to incorporate plant extracts into biomedicine to improve patients' quality of life [23-26]. Because they believe these natural medicines are helpful and have no negative side effects, some people continue to use them. Other variables, such as how the particular herbal treatment is used to treat diarrhea, can affect the suggested dosage. When used in combination, the dosage is typically reduced. There are many different dosage forms, such as tea, powdered dry extracts, herbal remedies, and perhaps even a fluid extract. Adverse effects have been linked to long-term or excessive use of some herbal products. Recommendations for babies might vary greatly by region [27, 28].

Table 1: Common medicinal plants used in the treatment of diarrhea

Medicinal plant	Part used	Active constituents	Effect
Psidium guajava L. (Guava)	Leaves, bark	Tannins, flavonoids (quercetin)	Antimicrobial activity; tannins reduce intestinal secretions and motility
Aegle marmelos L. Corrêa (Bael)	Fruits, leaves	Tannins, marmelosin, alkaloids	Antisecretory and antispasmodic effects
Punica granatum L. (Pomegranate)	Fruit peel and bark	Punicalagin, ellagic acid, tannins	Astringent effect; inhibits intestinal pathogens
Zingiber officinale Roscoe (Ginger)	Rhizome	Gingerols, shogaols	Antispasmodic, stomachic and anti-inflammatory effects
Camellia sinensis (L.) Kuntze (Tea)	Leaves	Catechins, tannins	Reduces intestinal secretion; antimicrobial
Berberis aristata	Root, stem bark	Berberine	Antimicrobial; inhibits intestinal motility

Herbal and traditional remedies: Several herbs have been traditionally used to manage diarrhea due to their antimicrobial, anti-inflammatory, or astringent properties [29, 30]. Common natural remedies include: Ginger, which supports digestion and reduces intestinal inflammation, Chamomile, known for its calming effect on the gastrointestinal tract, Psyllium husk, which absorbs excess water and adds bulk to stool, and Guava leaf, traditionally used in many cultures for acute diarrhea.

Clinical evidence: The majority of episodes of diarrhea are caused by an invasive illness, making it a serious public health concern and a major cause of death worldwide. Historically, a number of natural items have been utilized to treat diarrhea and manage its symptoms. Numerous studies show that a number of plant extracts are beneficial [31]. Thus, the purpose was to critically assess the published literature about the efficacy and clinical data pertaining to the use of phytodrugs in the treatment of various types of diarrheas [32, 33]. Phytotherapy has been shown to be equally successful in treating nursing infants as it is in treating patients with acute diarrhea. However, when using medications to treat chronic functional disorders, patients perceive a better improvement in their symptomatology [34]. The ideal option in a clinical trial is a control group that receives a placebo, parallel clinical trials with active controls may also be required. The safety and efficacy profile of two or more herbal medicines or traditional medicines can really be examined in the same trial by employing a pertinent comparator. In this manner, ethical issues pertaining to the use of placebos in clinical trials can be resolved, and the study findings can provide comfort regarding the effectiveness of the herbal cure. Regulations covering traditional medicines, phytodrugs, and herbal remedies have been established since not all traditional medicines are safe ,and certain herbal remedies have strong pharmacological effects [35, 36].

Lifestyle and habit: The incidence and recurrence of diarrhea can be significantly decreased by adopting preventive measures and changing one's lifestyle [37]. Diarrhea is a gastrointestinal disorder that is mostly avoidable. One of the best ways to stop the spread of diarrheal pathogens is to practice hand and oral hygiene, especially frequent hand washing with soap and clean water before meals and after defecation. Waterborne infections are greatly decreased by having access to clean drinking water and by using boiled, filtered, or treated water. Food hygiene is equally important; eating freshly made meals, washing fruits and vegetables well, avoiding contaminated or improperly stored food, and keeping cooking utensils clean all help to prevent gastrointestinal infections [38-41]. Maintaining a clean-living environment, using sanitary latrines, and disposing of waste properly are all examples of adequate sanitation practices that further stop the spread of illness. A balanced diet, regular meals, stress reduction, and abstaining from excessive alcohol and caffeine are examples of healthy lifestyle practices that promote optimal digestive function and lessen the risk of diarrhea. Preventive measures for infants and young children include timely immunization, safe complementary feeding practices, and exclusive breastfeeding for the first six months of life. When taken as a whole, these lifestyle and preventive measures not only shield people from diarrheal illness but also enhance public health and lessen the burden of disease in the community [42, 43]. Prevention of diarrhea also requires collective efforts. Key measures might include: Health education programs, Improved water supply systems, initiation of infrastructure development, and surveillance and early management of outbreaks [44].

Conclusion: Phytotherapy has great potential for treating diarrhea since it provides a safe, natural alternative, especially for individuals with chronic forms of the illness or those who are resistant to traditional treatments. The broad-spectrum pharmacological actions of plant-based therapies are what give them their therapeutic potential. Although there is still little clinical research on herbal antidiarrheal medications, the increasing amount of data and their historical application point to a supplementary function in contemporary medicine. The article examines the scientific and historical foundation of phytotherapy and nutrition, as well as its pharmacological importance, clinical efficacy, and potential integration with modern medicine.

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الإدارة الغذائية والطبية للإسهال: مراجعة مصغرة

انتظار الحق

قسم الكيمياء الحيوية، جامعة غادجاه مادا، يوجياكرتا، إندونيسيا

الملخص: لا يزال الإسهال يشكل مشكلة صحية عالمية رئيسية، إذ يتسبب في أكثر من 1.9 مليون حالة وفاة سنويًا، وخاصة بين الأطفال دون سن الخامسة. يُعدّ الجفاف الفموي والمضادات الحيوية جزءًا من العلاج التقليدي؛ ومع ذلك، يوفر العلاج بالأعشاب، واستخدام العلاجات النباتية، والنهج الغذائية حلولًا بديلة أو تكميلية، لا سيما في حالات مقاومة المضادات الحيوية أو الإسهال المزمن. تستكشف هذه المراجعة الأسس التاريخية والعلمية للعلاج بالأعشاب والتغذية، فضلًا عن أهميتهما الدوائية، وفعاليتهما السريرية، وإمكانية دمجهما مع الطب الحديث. يُبرز الاهتمام المتزايد بالعلاجات التكميلية الحاجة إلى مزيد من الدراسات، على الرغم من افتقار بعض العلاجات العشبية إلى أدلة سريرية قوية. من خلال عمليات مضادة للالتهابات، ومضادة للعدوى، ومعدلة لوظائف الأمعاء، يُظهر العلاج بالأعشاب نتائج واعدة في تخفيف الأعراض وتحسين صحة الأمعاء.