



# The Role of Medicinal Plants in Promoting Gut Health and Reducing Diarrhea Incidence

Otieno Karanja J.

Faculty of Medicine Kampala International University Uganda

## ABSTRACT

Gut health plays a crucial role in overall well-being, yet the rising incidence of gut-related disorders, including diarrhea, has become a significant global health concern. Conventional treatments, such as antibiotics and anti-diarrheal drugs, often pose adverse effects and contribute to antibiotic resistance. Medicinal plants have been traditionally used across cultures to manage gut health and alleviate digestive ailments. This review examines the historical and contemporary use of medicinal plants in promoting gut health, preventing dysbiosis, and reducing diarrhea incidence. It highlights bioactive compounds such as flavonoids, terpenoids, and essential oils, which exhibit anti-inflammatory, antimicrobial, and gut-modulatory properties. Additionally, the mechanisms of action of these plant-based remedies are examined, including their effects on gut microbiota, mucosal integrity, and immune function. While clinical evidence supports the therapeutic potential of certain medicinal plants, further rigorous research is required to establish standardized usage guidelines. Integrating traditional herbal medicine with modern healthcare practices may offer sustainable solutions for improving gut health and managing diarrhea.

**Keywords:** Medicinal plants, Gut health, Diarrhea, Microbiome, Herbal medicine, Bioactive compounds.

## INTRODUCTION

Amid the mental health concerns, another set of phenomena with people is on the rise—the outbreak of gut-related issues. The rise in the number of people with gut-related problems, such as chronic bloating, irritable bowel syndrome, inflammatory bowel disease, and diarrhea has shot up dramatically. Among all, diarrhea with profuse dehydration and rapid weight loss is a notable contributing factor to mortality. As allopathy has considerable ill effects due to heavy doses of antibiotics, anti-diarrheals cause stagnation of toxins and unreliable outcomes. Many communities around the world are still struggling to find better alternatives to manage their gut health and diarrhea. History has it that the medicinal use of plants is considered the oldest known system of healthcare. Several ancient societies have recorded the remains of early civilizations unveiling lists of plant uses for remedying countless ailments. Plant-based remedies remain at the core of many healthcare traditions, as well as many alternative medical systems. The use of natural remedies varies, from being backed by religious belief to socio-economic adaptation. Objectives: This paper aims to put forth research carried out in the past few years, showcasing the various medicinal plants and their formulations that have imparted overall gut health benefits, reduced the specific therapeutic use of antibiotics, controlled and managed diarrhea progression in oral rehydration processes, and increased the production of vital intracellular enzymes for overall weight maintenance. Insights on the use of bioactive compounds, their stability, exempting pathogens, and the cycle of consumption are also dealt with. The starting part deals with the historical and recent perspective of the traditional use of medicinal plants. There is a growing interest due to recommendations about claiming health through the usage of medicinal plants and increasing attention to lifestyle disorder management. The investigators identified that Indigenous communities in various landscapes use many medicinal plants to heal abdominal pains and plug the diarrhea flow, among many others. These leads are backed by the findings and reports [1, 2].

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### **Understanding Gut Health**

Gut Health: A State of Well-Being Gut health is the condition of the digestive system at a given period which is continually changing in response to internal and external factors. It has been defined as a state of physical and mental well-being in the absence of digestive diseases or disorders. This is a subtle way of suggesting that gut health is not necessarily the same as disease-free gut function since a person with severe bowel disease may still be experiencing a good quality of life. Another more helpful way of understanding gut health is to note that it is frequently described as a state of homeostasis, that is, balance or harmony among the internal physical and biochemical forces of the gut. Even better perhaps, is to see gut health as a state of eubiosis, meaning an absence of any form of altered relationship among the gut microbiota leading to a detrimental health outcome for that person [3, 4]. The Gut and Diarrhea A significant factor affecting gut health is diet. A balanced diet consisting principally of a range of plant-based foodstuffs helps the gut maintain a diverse assemblage of gut microbes. Diet will also affect the host in terms of the quality and quantity of nutrients that can be used to maintain health and to keep the ecosystem of the gut microbiota in good working order. Other well-documented lifestyle and environmental influences on gut health are, of course, pre- and perinatal events, as well as a pet-filled upbringing, living on a farm, or multiple antibiotic exposures in infancy. Even if the gut contains an imbalance of a diverse range of microbial inhabitants, how could it possibly influence our susceptibility to other parts of the body to move us closer to depression, cancer, or stroke? The list of possible mechanisms underlying microbiota–gut–brain communications is very long indeed and includes synchronized electrical signaling, bacterial metabolite signaling, entero–endocrine signaling, and selective oligosaccharide actions such as TLR agnostic effectors of the mucosal immune system. The relationship between these organs is extremely complex, which means that issues around mindful practices should be given at least as much attention as phenolic compounds about gut health [5, 6].

### **The Microbiome and Its Importance**

The microbiome is an extremely sophisticated ecosystem consisting of a range of microorganisms, such as bacteria, fungi, and protozoa, comprising hundreds of species. The majority of microorganisms live in the colon and provide vital functions for the host. These include digestion and fermentation of carbohydrates, the synthesis of vitamins, supporting immune function, and the metabolism of bile acids. The colonization of bacteria imparts numerous benefits, not least of which is the production of short-chain fatty acids. These fatty acids can provide a valuable source of energy and serve as an important fuel for one of the key cell types involved in maintaining the wall of the colon and supporting its integrity. Consequently, damage to a healthy microbiome may contribute to an increased susceptibility to diarrhea. The overall composition of the microbiota remaining in a 'healthy' host is referred to as eubiosis, whereas 'dysbiosis' reflects an imbalance in the microbiota, which can trigger both local and systemic health issues [7, 8]. Antibiotics disrupt the microbiota by altering the growth and turnover of eubiotic and dysbiotic microbiota. Such imbalances can lead to an increased adherence of certain bacterial pathogens in pigs. Medicinal plants can help maintain a healthy balance of microbiota in the gut by favoring the growth of beneficial bacteria and can help the pig fight diarrheal diseases due to their ability to increase a pig's immunity. This part of the review aims to demonstrate the potential role of medicinal plants in promoting the pig's gut health by taking a detailed look at the studies carried out on this approach with specific plant species [9, 10].

### **Medicinal Plants and Their Therapeutic Properties**

The gut is very sensitive to several environmental factors such as diet dysregulation and taking certain medications. This has resulted in a high incidence of gut-related disorders, particularly diarrhea. Synthetic drugs used for the treatment of these disorders have been reported to possess some side effects such as the development of microbial resistance, ulcers, and allergic reactions. For many years, herbalists and traditional medicine practitioners have treated and managed several health disorders of the human body, including gastrointestinal-related disorders, using medicinal plants. There is a wide array of medicinal plants reported in many communities, which are well documented to be used in various gut and digestive-related conditions. These medicinal plants contain bioactive compounds that contribute to their therapeutic properties [11, 12]. Medicinal plants are natural sources with diverse biologically active compounds and pharmacological effects that can be used to alleviate symptoms of many diseases. In terms of phytochemistry, the therapeutic properties of these medicinal plants are attributed to various bioactive compounds such as phenols, flavonoids, terpenoids, glutathione, fatty acids, and essential oils, among others. The actions of these bioactive compounds include anti-inflammatory, antimicrobial, antioxidant, antispasmodic, antinociceptive, astringent, spasmolytic, antidiarrheal, antiemetic, and gastroprotective effects. The majority of these plants have been indicated to have immunomodulatory effects on the cells of

**This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.**

the immune system by modulating inflammatory responses, apoptosis, and the establishment of immune mediators, which makes them a perfect approach in the treatment of diseases that are majorly related to gut health. The use of medicinal plants may open up new avenues to ameliorate several gut-related diseases and promote gut health. Pharmacologically, medicinal plants have shown importance in the alleviation of gastrointestinal disorders. However, it is important to note that the majority of gastrointestinal disorders are self-limiting without any treatment [13, 14].

#### **Common Medicinal Plants Used for Gut Health**

Several medicinal plants have traditionally been employed to maintain and enhance gut health. Only a few of these will be reviewed here, but many additional options exist. Every person is unique, and these herbs can be used individually or in combination, typically having a synergistic effect. Peppermint has a long history of use dating back to ancient times. Currently, peppermint relieves digestive complaints with a particular affinity for irritable bowel syndrome. Peppermint is an excellent carrier herb, leaving other gut-friendly botanicals in the therapeutic gut where they can optimally relieve or aid in the improvement of diarrhea. Peppermint can be enjoyed as a hot or cold tea, applied topically as an essential oil diluted in a carrier oil, or used internally as a tincture or liquid extract [15, 16]. Ginger has a long history of use both for spice and medicine. Originally from Southeast Asia, it is now cultivated in many tropical and subtropical countries. Renowned for being a gut-soothing herb to relieve nausea and vomiting, ginger also contains anti-inflammatory and analgesic properties. It reduces diarrhea by decreasing the frequency of essential contractions and the time of intestinal transit. Like peppermint, ginger is also useful in helping the body better tolerate an additional botanical. Ginger can be ingested as a liquid extract or tincture, in a root form as a culinary spice, as a warm or cold tea or the essential oil can be topically applied and diluted. Although ginger is well tolerated, excessive ginger can cause heartburn, bloating, and gas, and might interact with some medications, so caution must be taken. It is also not safe for everyone, and it is contraindicated in people with inflammatory bowel disease [17, 18].

#### **Mechanisms Of Action in Promoting Gut Health**

The precise mechanisms of action of medicinal plants in gut health, as well as during diarrhea, are diverse and quite complex to decipher. These mechanisms are likely to involve or include, but not be limited to, antibacterial, immune-modulatory, and antiviral effects, cytotoxicity to release absorbed fluids and electrolytes, and anti-diarrheal activities of the essential oils, such as being antispasmodic and antisecretory to partially impair gut motility and reduce secretion, respectively. Modulatory effects on gut microbiota are likely crucial to some of these mechanisms of action [19, 20]. A significant number of medicinal plants have been shown to have notable antibacterial effects. Furthermore, these botanicals may have a positive impact on probing the gastrointestinal microbiota components, thus facilitating microbiota restoration. Presently, it is still not clear what the exact mechanism of action is, but especially a modulatory effect at the genomic level is suggested, impacting cellular metabolic pathways in a manner that results in the stabilization of the mucosal microbiota toward those that represent a "healthy" microbiota. From a scientific point of view, many of these studies regarding the modulation of risk factors have indeed focused on mucosal healing and not on actual diarrhea, which is at least in part because antibiotic treatments are frequently restricted by current guidelines and protocols due to issues with multi-drug resistance. This should be taken into account when interpreting these results. However, data point out the potential of plant-based therapies, in that they are potentially able to manipulate the immune responses associated with environmental enteric dysfunction. Also, by using the whole plant or extracts, one does not only benefit from effects induced by some single isolated compounds, which may be changed by other constituents of the complex botanical extract. Thus, identifying a range of such medicinal plants can be considered an important next step [21, 22].

#### **Clinical Studies and Evidence of Efficacy**

Several studies have been conducted showing the ability of traditional and commercially processed medicinal plants to improve gut health. An overview of research studies showing whether medicinal plants are having any effect in the ways that herbalists and vendors claim is presented. Interestingly, most RCTs and observational cohorts are of poor methodological quality, and many contain a high risk of bias. In general, not all studies support the therapeutic claims made for these plants; there are conflicting conclusions and limited differences between treatment and control groups, and the reported effect sizes are not strong. Variability in study designs precludes the ability to draw an overarching conclusion about the effect of herbal medicine on improving gut health. The limitations of currently published clinical trials warrant more rigorous research to demonstrate the impact of individual medicinal plants on diarrhea incidence and gut microbiota composition. Furthermore, there is an urgent need to agree on standard guidelines that can recommend the correct dosage, frequency of administration, and optimal duration of

**This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.**

use of the plants for a specific health disorder, reflecting the art and science of combinatorial use of medicinal plants. Initially, a joint program that involves traditional healers and modern scientists is desired to develop innovative ways of understanding this art science and practice. Even though the lack of methodologically sound research on medicinal plants, gut health, and diarrhea is evident, it has not deterred the growing interest in this subject, nor has it suppressed the number of medicinal plant-related studies being conducted. In conclusion, there is a growing number of studies showing the potential to integrate evidence-based traditional and herbal medicines into mainstream global healthcare practice, especially by utilizing them to treat diarrhea. Additionally, in an era where diarrheal disease and lack of good gut health are major worldwide burdens, policies and health-seeking options that can improve overall gut health are drawing more public attention [23, 24, 25, 26].

### CONCLUSION

Medicinal plants have demonstrated significant potential in promoting gut health and mitigating diarrhea-related complications. Their bioactive compounds offer antimicrobial, anti-inflammatory, and gut-modulating properties that contribute to restoring microbiota balance and supporting digestive health. While traditional herbal medicine has long been used to manage gastrointestinal disorders, scientific validation and standardization of medicinal plant use remain essential for their integration into modern healthcare. Future research should focus on robust clinical trials to establish evidence-based guidelines regarding dosage, safety, and efficacy. By incorporating medicinal plants into preventive and therapeutic strategies, global health systems can develop more sustainable, natural, and effective approaches to addressing gut health challenges and reducing the burden of diarrhea.

### REFERENCES

1. Hasan ST, Das S, Faruque AS, Khan AI, Clemens JD, Ahmed T. Taking care of a diarrhea epidemic in an urban hospital in Bangladesh: Appraisal of putative causes, presentation, management, and deaths averted. *PLoS neglected tropical diseases*. 2021 Nov 15;15(11):e0009953. [plos.org](https://doi.org/10.1371/journal.pntd.1009953)
2. Hartman RM, Cohen AL, Antoni S, Mwenda J, Weldegebriel G, Biey J, Shaba K, De Oliveira L, Rey G, Ortiz C, Tereza M. Risk factors for mortality among children younger than age 5 years with severe diarrhea in low-and middle-income countries: Findings from the world health organization-coordinated global rotavirus and pediatric diarrhea surveillance networks. *Clinical Infectious Diseases*. 2023 Feb 1;76(3):e1047-53. [oup.com](https://doi.org/10.1093/cid/ciac001)
3. Seyoum Y, Baye K, Humblot C. Iron homeostasis in host and gut bacteria—a complex interrelationship. *Gut Microbes*. 2021 Jan 1;13(1):1874855.
4. Woźniak D, Cichy W, Przysławski J, Drzymała-Czyż S. The role of microbiota and enteroendocrine cells in maintaining homeostasis in the human digestive tract. *Advances in medical sciences*. 2021 Sep 1;66(2):284-92. [sciencedirect.com](https://doi.org/10.1016/j.amsc.2021.08.001)
5. Toribio-Mateas MA, Bester A, Klimenko N. Impact of plant-based meat alternatives on the gut microbiota of consumers: a real-world study. *Foods*. 2021 Aug 30;10(9):2040.
6. Nath H, Samtiya M, Dhewa T. Beneficial attributes and adverse effects of major plant-based foods anti-nutrients on health: A review. *Human Nutrition & Metabolism*. 2022 Jun 1;28:200147.
7. Du W, Wang X, Hu M, Hou J, Du Y, Si W, Yang L, Xu L, Xu Q. Modulating gastrointestinal microbiota to alleviate diarrhea in calves. *Frontiers in Microbiology*. 2023 Jun 8;14:1181545.
8. Qiao L, Dou X, Song X, Chang J, Yi H, Xu C. Targeting mitochondria with antioxidant nutrients for the prevention and treatment of postweaning diarrhea in piglets. *Animal Nutrition*. 2023 Oct 5.
9. Chen X, Pan S, Li F, Xu X, Xing H. Plant-derived bioactive compounds and potential health benefits: involvement of the gut microbiota and its metabolic activity. *Biomolecules*. 2022 Dec 13;12(12):1871.
10. Sudheer S, Gangwar P, Usmani Z, Sharma M, Sharma VK, Sana SS, Almeida F, Dubey NK, Singh DP, Dilbaghi N, Kashani HR. Shaping the gut microbiota by bioactive phytochemicals: An emerging approach for the prevention and treatment of human diseases. *Biochimie*. 2022 Feb 1;193:38-63. [\[HTML\]](#)
11. Lee M, Chang EB. Inflammatory bowel diseases (IBD) and the microbiome—searching the crime scene for clues. *Gastroenterology*. 2021 Jan 1;160(2):524-37.
12. Celebi Sozener Z, Ozdel Ozturk B, Cerci P, Turk M, Gorgulu Akin B, Akdis M, Altiner S, Ozbey U, Ogulur I, Mitamura Y, Yilmaz I. Epithelial barrier hypothesis: effect of the external exposome

- on the microbiome and epithelial barriers in allergic disease. *Allergy*. 2022 May;77(5):1418-49. [wiley.com](https://www.wiley.com)
13. Swain S, Rautray TR. Estimation of trace elements, antioxidants, and antibacterial agents of regularly consumed Indian medicinal plants. *Biological Trace Element Research*. 2021 Mar;199(3):1185-93.
  14. Kenda M, Kočevar Glavač N, Nagy M, Sollner Dolenc M. Medicinal plants used for anxiety, depression, or stress treatment: An update. *Molecules*. 2022 Sep 15;27(18):6021. [mdpi.com](https://www.mdpi.com)
  15. Mahboubi M. Caraway, peppermint and their essential oils in management of Irritable Bowel Syndrome (IBS). *Bulletin of Faculty of Pharmacy Cairo University*. 2022;60(2):3.
  16. Jani RK. Gastrointestinal Tract and Digestion Challenges in Chronic Diseases and Applications of Functional Foods and Nutraceuticals. In *Molecular Mechanisms of Action of Functional Foods and Nutraceuticals for Chronic Diseases* 2023 Apr 19 (pp. 307-364). CRC Press. [\[HTML\]](#)
  17. Pop D, Pop RS, Farcău D. The Use of Fibers, Herbal Medicines and Spices in Children with Irritable Bowel Syndrome: A Narrative Review. *Nutrients*. 2023 Oct 12;15(20):4351.
  18. Liu T, Asif IM, Bai C, Huang Y, Li B, Wang L. The effectiveness and safety of natural food and food-derived extract supplements for treating functional gastrointestinal disorders—Current perspectives. *Nutrition Reviews*. 2024 Jun 22:nuae047. Liu T, Asif IM, Bai C, Huang Y, Li B, Wang L. The effectiveness and safety of natural food and food-derived extract supplements for treating functional gastrointestinal disorders—Current perspectives. *Nutrition Reviews*. 2024 Jun 22:nuae047.
  19. Zhang HY, Tian JX, Lian FM, Li M, Liu WK, Zhen Z, Liao JQ, Tong XL. Therapeutic mechanisms of traditional Chinese medicine to improve metabolic diseases via the gut microbiota. *Biomedicine & Pharmacotherapy*. 2021 Jan 1;133:110857. [sciencedirect.com](https://www.sciencedirect.com)
  20. Zhao WX, Wang T, Zhang YN, Chen Q, Wang Y, Xing YQ, Zheng J, Duan CC, Chen LJ, Zhao HJ, Wang SJ. Molecular mechanism of polysaccharides extracted from Chinese medicine targeting gut microbiota for promoting health. *Chinese Journal of Integrative Medicine*. 2024 Feb;30(2):171-80. [\[HTML\]](#)
  21. Mukonowenzou NC, Adeshina KA, Donaldson J, Ibrahim KG, Usman D, Erlwanger KH. Medicinal plants, phytochemicals, and their Impacts on the maturation of the gastrointestinal Tract. *Frontiers in physiology*. 2021 Jul 30;12:684464. [frontiersin.org](https://www.frontiersin.org)
  22. Andersen-Civil AI, Arora P, Williams AR. Regulation of enteric infection and immunity by dietary proanthocyanidins. *Frontiers in immunology*. 2021 Feb 24;12:637603.
  23. Cheema HS, Singh MP. The use of medicinal plants in digestive system related disorders—a systematic review. *J. Ayurvedic Herb. Med*. 2021;7(3):182-7.
  24. Yin S, Sun C, Ji Y, Abdolmaleky H, Zhou JR. Herbal medicine WangShiBaoChiWan improves gastrointestinal health in mice via modulation of intestinal tight junctions and gut microbiota and inhibition of inflammation. *Biomedicine & Pharmacotherapy*. 2021 Jun 1;138:111426. [sciencedirect.com](https://www.sciencedirect.com)
  25. Nwodo Okwesili Fc, Joshua Parker, Ugwu Okechukwu PC (2014). Acute toxicity investigation and anti-diarrhoeal effect of the chloroform-methanol extract of the leaves of *Persea americana*. *Iranian Journal of Pharmaceutical Research: IJPR*, 13,(2), 651.
  26. Christian E Odo, Okwesili FC Nwodo, Parker E Joshua, Okechukwu PC Ugwu, Christopher C Okonkwo (2013). Acute toxicity investigation and anti-diarrhoeal effect of the chloroform-methanol extract of the seeds of *Persea americana* in albino rats. *Journal of pharmacy research*, 6, (3), 331-335.

**CITE AS: Otieno Karanja J. (2025). The Role of Medicinal Plants in Promoting Gut Health and Reducing Diarrhea Incidence. RESEARCH INVENTION JOURNAL OF BIOLOGICAL AND APPLIED SCIENCES 5(2):12-16. <https://doi.org/10.59298/RIJBAS/2025/521216>**