EURASIAN EXPERIMENT JOURNAL OF PUBLIC HEALTH (EEJPH)

ISSN: 2992-4081 ©EEJPH Publications

Volume 6 Issue 2 2024

Assessing the Efficacy of Medicinal Plants in Diarrheal Disease Treatment

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ABSTRACT

Diarrheal diseases remain a significant global health challenge, particularly in developing countries where access to modern medicine is limited. Traditional medicinal plants have long been used as remedies for diarrhea, yet scientific validation of their efficacy remains incomplete. This review consolidates evidence on the historical use, pharmacological mechanisms, and clinical studies of medicinal plants in treating diarrheal diseases. It highlights the bioactive compounds responsible for antidiarrheal effects and evaluates their potential to develop new pharmacotherapeutic agents. Despite promising preliminary findings, a lack of standardized protocols for clinical studies and safety assessments persists. This review emphasizes the need for robust scientific approaches to validate traditional knowledge, paving the way for integrating medicinal plants into modern healthcare frameworks.

Keywords: Medicinal plants, Diarrheal diseases, Antidiarrheal effects, Traditional medicine, Pharmacological mechanisms.

INTRODUCTION

Diarrheal diseases have a high prevalence and still represent a major public health concern. Nevertheless, treatment is very limited. One of the ways to solve these problems is the use of plants. Unfortunately, it is not clear which ones can be effective enough for public use. Given this, the purpose of this search was to analyze scientific papers that assessed the efficacy of any herbal medicine used to treat diarrhea. This review is the primary article that details key aspects of the complete study data [1, 2]. One-fifth of deaths of children aged 5 and under were caused by diarrheal diseases in 2015. Despite having clear guidelines for the management of diarrhea, among over 900 listed medicinal products, there are very few herbal remedies. As the use of medicinal plants in the health system has undergone many changes during the last decades, there is a justified reason for a reassessment of potential herbal medicine properties. Plants that have been selected by numerous people for traditional treatment ensure a better impact. Only those that are proven to be effective keep their popularity for many generations. In many developing countries, especially in rural areas, herbal remedies are used for diarrheal diseases. Healthcare providers in primary health care delivery are more frequently prescribing medicinal plants where modern medicine resources are distant. Consequently, in recent studies, several plants that were proven to have antidiarrheal effects in traditional medicine were investigated. These plants are potentially a source for the development of new pharmacotherapy for diarrhea in the future [3, 4]. To ensure the safety and efficacy of herbal remedies, they should be subjected to scientific verification procedures. The primary aim of the studies is to validate that those remedies traditionally used for the treatment of diarrhea are effective. It is of great importance to provide more detailed results about the efficacy of medicinal plants in diarrheal management. Taking into account these details and close collaboration between traditional health practitioners or indigenous people and scientists, a perfect combination of cultural heritage and health care treatment can be achieved [5, 6].

Historical Use of Medicinal Plants in Diarrheal Disease Treatment

Since time immemorial, diverse cultures have used plants to address the symptoms of diarrheal diseases. Historical texts often describe medicinal plants and their applications in treating diarrhea. The use of medicinal plants was not limited to one region; diverse cultures across the globe treated it with plant-based medications. Mild drinks of barley or rice and herbs were used to treat the condition. Various cultures from different parts of the world incorporated plant-based medicines for various ailments, including diarrheal diseases. Traditional healers have always played a key role in managing diarrheal diseases for centuries, and even today they continue to treat such diseases. In KwaZulu-Natal, South Africa, traditional healers still use spinach as part of the herb mixture for treating diarrheal diseases; in Ghana, parts of Medicarnara scabrella are used in separate doses as a remedy for diarrhea in certain areas of the Volta region of Ghana [7, 8]. However, through centuries, these practices have been integrated from folklore into evidence-based medicine. The use of medicinal plants to manage diarrhea is slowly emerging onto the scientific research frontier. Modern-day treatments are a composite of the inherited teachings of bygone generations. One can study historical documents to track the historical use of medicinal plants for managing diarrhea. The Greek scholars compiled their findings about medicinal plants into writings which were followed by the Roman naturalist during the 1st century AD. However, the major breakthrough that historians have argued paved the way for Western knowledge about medicinal plants was the work of the scholars of the 'Middle Ages.' During this time, botanical knowledge was entangled with religion and spirituality. Simultaneously, in the East, the Chinese were examining plants to find the causes of diseases. Unlike the shamans of Africa, the Chinese sought to learn from nature without reference to any supernatural entity. It seems that the Chinese had at this time rejected the ancient teaching that diseases are caused by deities, which led to turning to plants as possible remedies; the knowledge that had already been passed through generations was normally used to make treatment decisions for their sick people. We obtain detailed information about the therapeutic applications of medicinal plants from the study of these texts. In Africa, as well as in many parts of the world, medicinal plants were primarily used to treat ailments and were used for symptomatic management of diseases attended by many clinicians and traditional healers, with plant-based therapy known to different communities. It is estimated that about 80% of Arab societies used herbal therapies, and accordingly, a veritable treasure of ethnobotanical knowledge was accumulated based on the empirical uses of the plants available to these communities [9, 10].

Common Medicinal Plants Used for Diarrheal Disease

Medicinal plants are a potential source of many drugs. More than 80% of the population predominantly uses traditional medicine for primary health care. Consequently, numerous investigations have been carried out to identify new medicinal plants with useful biological activities. Several medicinal plants are documented scientifically for the treatment of D&C in ancient medicinal literature. Medicinal plants and their bioactive compounds are safer and useful for the treatment of infections caused by D&C. In developing countries, modern medicine has not approached them due to economic barriers or because the members of the community still have access to traditional medicinal herbs [11, 12]. Despite the various studies on the antibacterial properties of plants, there have been few clinical trials on their antiparasitic properties. Accordingly, in this paper, the antiprotozoal data that come from clinical trials are presented whenever possible, and the special case of those traditional antiparasitic plants with proven clinical efficacy is included. On the phytochemical front, several chemical and biological investigations of the isolated compounds of each herbal remedy have been conducted. The included references tend to rely on older material, often seeing the light of day as 19th-century journal articles and, in a few cases, more credible work from the early to mid-20th century. Medicinal plants used in diarrheal therapy are potential sources of new drug candidates for the treatment of diarrhea, either alone or in combination with standard medications. In the case of plant-derived formulations, so-called phytomedicines, it is essential to utilize products from sustainably managed herbal resources. A few of the medicinal plants have been the subject of randomized controlled clinical trials, which provide a conclusive and more evidence-based analysis of the clinical efficacy of these plant treatments. However, within the context of encouraging results, the possible therapeutic use against diarrhea of these plants is documented, usually from the phytochemical, antimicrobial, and traditional medicine perspectives, mainly in the regions where these plants grow, usually locally scattered from the Caribbean through tropical South America, Africa, India, Malaysia, Australia, and the Pacific islands [13, 14].

Pharmacological Mechanisms of Medicinal Plants in Diarrheal Disease Treatment

Medicinal plants are rich sources of compounds. These compounds are either directly or indirectly involved in the metabolic pathways of biological systems, justifying their therapeutic uses. Due to the complexity of the multiple chemical components of medicinal plants, several bioactive compounds responsible for antibacterial activity interact synergistically or antagonistically with different body systems, thereby curing ailments. The pharmacologic evaluation of the role of bioactive compounds in medicinal plants shows that they can elicit several activities, such as antisecretory, anti-inflammatory, and antimicrobial effects, as these are indicated in the pharmacological profile of classical drugs used for diarrhea [15, 16]. With one or more effective mechanisms of these bioactive compounds, the extensive literature regarding the mode of activity of anti-diarrheal medicinal plants shows a broad range of activities. The active compounds responsible for therapeutic use were investigated through the isolation from the medicinal plant, and their mechanism of action was also studied. This was investigated through in vitro and in vivo research. Biochemical studies are used to find out the mechanism of isolates in vitro experiments; the monolayer of intestinal and cecum tissues from laboratory mammals was used in these different studies. Through this, the mechanism of the isolates was investigated to determine how they may elicit the activity of an anti-diarrheal drug. The isolation of the active compounds from herbal medicine, their pharmacological evaluation, and their mechanism of action performed under scientific parameters will support the results obtained by screening the trial extract isolated from the medicinal plant and could bridge the gap between the indigenous uses of a plant and its action [17, 18].

Clinical Studies and Evidence on The Efficacy of Medicinal Plants in Diarrheal Disease Treatment

The clinical evidence on the efficacy of medicinal plants in the treatment of diarrhea has also been reviewed in different parts of the world. Studies have looked into in vitro and in vivo antidiarrheal activity on small laboratory animals or other animals; some have conducted similar studies on healthy human subjects who are not suffering from disease. The in vivo antidiarrheal activity on experimentally induced diarrhea has been attempted only during the process of screening medicinal plants against diarrhea and primarily looking at inhibition of induced bowel frequency. Thus, the most promising studies are reviews and primary clinical studies in which patients are treated for diarrhea in comparison with modern antidiarrheal drugs. Several studies have been conducted in such a way that they randomly allocated their samples to either the herbal or the non-herbal healing options by using randomized controlled trial techniques. Studies that have used non-randomized controlled trials or observational studies are not too promising as the quality of evidence for these would not be too good. Furthermore, until now no meta-analysis of randomized controlled trials from different locations has been attempted. The lack of standardized protocols for clinical studies for diarrhea has to be regarded as the most limiting factor preventing conclusions from being drawn based on such clinical trials. There is a great need for more and better clinical trials in this field to guide practitioners. Clinical trials with medicinal plants for diarrhea mostly lack this important pharmacological information. However, a general conclusion from almost all the clinical trials is that more studies on the safety and doses of these plants need to be conducted to use them in modern allopathic medicine for diarrhea [19, 20].

CONCLUSION

Medicinal plants offer a promising avenue for addressing diarrheal diseases, particularly in resource-limited settings where access to conventional therapies is restricted. Their historical use underscores their therapeutic potential, and scientific investigations have identified bioactive compounds with significant antidiarrheal properties. However, further research is needed to establish standardized clinical protocols and evaluate safety profiles to bridge the gap between traditional medicine and evidence-based healthcare. Strengthening collaborations between scientists, traditional healers, and policymakers is crucial to harness the full potential of these natural remedies. A rigorous, science-backed approach will ensure the sustainable integration of medicinal plants into global health strategies, improving outcomes for those most affected by diarrheal diseases.

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CITE AS: Odile Patrick Thalia. (2024). Assessing the Efficacy of Medicinal Plants in Diarrheal Disease Treatment. EURASIAN EXPERIMENT JOURNAL OF PUBLIC HEALTH, 6(2):17-21.