



**“A REVIEW ON PREPARATION OF HERBAL ANTI-DIARRHEAL FORMULATIONS”**

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Article Received on 20/12/2018

Article Revised on 10/01/2019

Article Accepted on 31/01/2019

**ABSTRACT**

Diarrhea Disease is caused by multi-pathogens and multi-factors. Diarrhea Disease is widespread all over the world, not only threatens human health but also greatly affects society and economy. The fatality rate by Diarrhea Disease highly ranks fourth among all the diseases. Diarrhea Disease is a common symptom, patient with Diarrhea Disease defecates more frequently than in normal time, and stool is loose and there is more water. Diarrhea caused by bacteria, virus, parasite, fungi and some uncertain pathogens were all called “infantile enteritis”. Herbal medicine has gained a rapid growth in the past years, in the field of medicine worldwide. Diarrhoea is the passage of loose or watery stools, liquidity of stool increases and is usually related with ascended stool weight. Plants and their products have been used by humans for treatments of numerous diseases for thousands of years. Traditional medicine (also known as indigenous or folk medicine) comprises knowledge that developed over generations within various societies before the era of modern medicine. Natural products derived from medicinal plants have proven to be an abundant source of biologically active compounds. The main focus of this review paper to develop alternate natural eco-friendly herbal formulations to treat diarrhea

**KEYWORDS:** Anti Diarrheal methods, Herbal plants, MIC, MBC.

**INTRODUCTION**

Diarrhea is a clinical symptom marked by rapid and frequent passage of semisolid or liquid fecal material through the gastrointestinal tract. Secretory diarrhea occurs when an imbalance between absorption and secretion in the small intestine occurs. Various causes can explain this condition including virus, parasites and bacteria. Secretory diarrhea is predominantly a result of active secretion of chloride and bicarbonate ions. Secretion of these electrolytes leads to an osmosis-driven water movement into the intestines. Supportive care with replacement of intestinal fluid losses using oral rehydration solutions or isotonic intravenous fluids is the primary treatment.<sup>[1]</sup> Overall, decreasing the chloride secretion into the gastrointestinal tract presumably results in decreased stool weight and frequency, bringing symptomatic relief of diarrhea. ETEC is the most frequently isolated enteropathogen, accounting for approximately 200 million diarrhea episodes and about 380,000 deaths annually.<sup>[2]</sup> Gastrointestinal infections with enterotoxigenic *Escherichia coli* (ETEC) pose a major health problem among children younger than five years old in developing countries.<sup>[3]</sup> ETEC is also the leading cause of travellers' diarrhea affecting annually over 10 million travellers to developing countries. Moreover, ETEC infections constitute a substantial problem in farm animals especially in newborn and early-weaned piglets.<sup>[4]</sup> Compared to other mechanisms

of diarrheal disease, the hypersecretion related to ETEC enterotoxin activity is not associated with severe intestinal histopathological changes.<sup>[5]</sup> There are certain antibiotics available in the market that can be used for treatment of diarrhea however this ought to cause hike in the cases of microbial resistance. Antibiotic therapy is commonly not indicated even if a bacterial cause is doubtful because the maximum no of cases of acute diarrhea are self-limited and not curtailed by antibiotics. Besides, antibiotics may cause harm. This is observed that the use of antibiotic increases the risk of hemolytic uremic syndrome from *E. coli* infections. This is found in the study done by Mc Farland where he found a antibiotic associated diarrhea and he reached to the conclusion that probiotics can be safe and positive treatment for diarrheal patients.<sup>[6-7]</sup> Diarrhea is a leading cause of morbidity and mortality globally. As improvements in treatment lead to decreases in diarrhea mortality, it is important to understand the substantial impact of diarrhea morbidity in disability among children and adults worldwide.<sup>[11]</sup> Among children diarrhea is responsible for 1.236 million deaths annually and is the second leading cause of death. Data from UNICEF shows that diarrhea is responsible for 14% of in children 1-4 years death in age group 1 and 24% of deaths and is overall responsible for 2.5 million deaths per year.<sup>[8]</sup> Plants and their products have been used by humans for treatments of numerous diseases for thousands of years.

Traditional medicine (also known as indigenous or folk medicine) comprises knowledge that developed over generations within various societies before the era of modern medicine.<sup>[9]</sup> The plants that showed healing powers are referred as medicinal. Historically, these treatments would cure or relieve symptoms. However, poisonings also occur at a high rate. Dating back to prehistory, people of all continents have used infusions and poultices probably of thousand plants. Neanderthals, 60,000 years ago, used plants such as hollyhock for disease treatment that are still used today in many countries.<sup>[10]</sup> For example, Ayurveda, the science of life, a comprehensive medical system described by ancient herbalists almost 6000 years ago is still exploited by local Indian people for treatment of illnesses. In fact, about 80% of the population of the developing countries still uses traditional medicines for their health care.<sup>[11]</sup> One of the reasons explaining this situation is the cost and limited access to modern therapies. In western countries, alternative or complementary medicine refers to traditional medicine used outside its traditional culture. Today, many plant compounds are readily available as over-the-counter self-medication. These preparations are relatively unregulated and as a result, herbal suppliers and natural food stores provide the customers with variable amounts of active substances of more or less controlled purity.

#### **Antibacterial Activities against Diarrhea**

Although 25%–50% of the current pharmaceuticals are derived from plants, none are presently used as antimicrobials. Thus, screening for antibacterial activities may yield candidate compounds as potential new antimicrobial drugs. Over the last 20 years, numerous studies have been conducted on plants (using water and organic solvent extractions) including essential oils of what is known as medicinal plants. Although traditional medicine have associated certain plant products with healing of disease including gastrointestinal disorders, the mechanism accounting for antibacterial activities against enterobacteria which some are responsible for causing diarrhea are not thoroughly understood. *In vitro* tests (disk diffusion and broth dilution methods) were conducted in search for effective treatment of diarrheal disease causing bacteria. In addition, plants with significant activity against enteropathogens could offer alternative methods to treat drug resistant enteric infections.<sup>[12]</sup> Plants have the capacity to synthesize an almost limitless number of aromatic compounds. A large proportion is constituted of phenols, or their oxygen-substituted derivatives.<sup>[13]</sup> Most of these compounds are secondary metabolites serving in many cases as plant defense mechanisms against predation by herbivores, insects, bacteria, fungi and viruses. Some of these substances are terpenoids responsible for the characteristic plant odors, other are plant pigments (quinones and tannins). Herbs and spices used by humans as food seasoning are also used as medicinal compounds as we will see later.<sup>[14]</sup> With increasing concerns over the use of in-feed antibiotics and metals,

the weaning period of farm animals becomes more difficult to manage. There is thus a growing interest in natural products that could reduce enteric infections in animals. Any kind of agent targeting bacterial viability can be expected to impose selective pressure on the development of antimicrobial resistance. In contrast, repression by natural compounds of bacterial virulence factors that do not affect bacterial growth has advantages such as preserving the host indigenous microflora with less selective pressure on the development of bacterial resistance.<sup>[15]</sup>

#### **Zingiber Officinale (Zingiberaceae)**

Ginger is *Zingiber Officinale* (Zingiberaceae) the one of the most useful herbal supplement. It native of South East Asia, but it is cultivated in Caribbean island, Africa, Australia, Mauritius, Taiwan and India. More than 30% of production in India. Ginger consists of volatile oil, starch, fat, fibre, inorganic material, residual moisture.<sup>[16]</sup> Ginger oil contains monoterpene, hydrocarbons, sesquiterpene hydrocarbons, oxygenated mono and sesquiterpenes. Ginger is used as stomachic, an aromatic, a carminative, stimulant, flavouring agent. It is used to treat nausea, vomiting, diarrhoea.<sup>[17]</sup>

#### **Curcuma Longa (Zingiberaceae)**

*Curcuma longa* belongs to family Zingiberaceae commonly known as turmeric have been used for the culinary properties in Indian curries and used as remedy against ageing. Turmeric is cultivated for its rhizome in India, China, Sri Lanka, Indonesia, Jamaica. Turmeric contains volatile oil, resins, starch grains and yellow color substances known as curcuminoids. The chief component of curcuminoids is known as curcumin. Curcumin, a natural compound present in the rhizomes of plant *Curcuma longa*, demonstrated its anti-inflammatory action.<sup>[18]</sup> It is used in wound healing, hepatoprotection and neuroprotection etc. It has antimutagenic, antispasmodic, antimicrobial and anticancer activities. Rhizome of *Curcuma longa* possess antibacterial activity against diarrhea.

#### **Lawsonia Inermis**

*Lawsonia inermis* (Linn), belongs to family Lythraceae it is a plant used all over the world. This plant is commonly known as Henna or Mhendi and abundantly available in tropical and subtropical areas. Ancient history of India describes its diverse uses and also plays appreciable role in Ayurvedic or natural herbal medicines. Henna has been used cosmetically and medicinally for over 9,000 years. Traditionally in India, henna is applied to hands and feet. Henna symbolizes fertility. Its use became popular in India because of its cooling effect in the hot Indian summers. Henna leaves, flowers, seeds, stem bark and roots are used in traditional medicine to treat a variety of ailments as rheumatoid arthritis, headache, ulcers, diarrhoea, leprosy, fever, leucorrhoea, diabetes, cardiac disease, hepatoprotective and colouring agent.

### Piper Nigrum

*Piper longum* L. belonging to the family Piperaceae, Black pepper is indigenous and cultivated in South India. It is also cultivated in Indonesia, Brazil, Malaysia and Shrilanka. India ranks first in the cultivation of this drug. Piper contains an alkaloid piperine, volatile oil, pungent resins, piperidine and starch. It is used as a aromatic, stimulant, stomachic and carminative. It increases the secretion of gastric juices. It also increases the bio-availability of certain drugs and antidiarrheal.<sup>[19]</sup>

### ANTIBACTERIAL ACTIVITY OF ESSENTIAL OILS

Essential oils of *Cyperus rotundus* are according to possess anti-microorganism activity. The anti-microorganism activity was performed by inhibition zone technique. The minimum repressing concentration and minimum antiseptic concentration for every microorganism were calculable. The protecting role of *Cyperus rotundus* could also be because of the presence of flavonoids united of their constituents. The oil of *Cyperus rotundus* showed a noteworthy activity against gram-positive bacterium *Cocci aureus* and *Enterococcus faecalis*.<sup>[20, 21]</sup> The major mode of infection transmission in hospital acquired infections is thought to be through

hand carrying of pathogens from staff to patient, and from patient to patient and a relationship between hand hygiene and reduced transmission of infections been reported.<sup>[22]</sup> Most antiseptic agents can damage the skin, leading to a change in microbial flora, and an increased shedding of the original protective bacterial flora of the hand leads to an increased risk of transmission of pathogenic microorganisms. Studies have reported use of formulations containing tea tree essential oil (TTO) does not lead to dermatological problems, nor affect the original protective bacterial flora of the skin so the antibacterial activity of some skin-wash formulas containing TTO as well as pure TTO was evaluated against *Staphylococcus aureus*, *Acinetobacter baumannii*, *Escherichia coli* and *Pseudomonas aeruginosa* causative agent of Diarrhea. The potential of essential oils as antibacterial agents is well established. Cinnamon oil is obtained from the bark of the plant *Cinnamomum zeylanicum* Blume (Lauraceae). The bark yields 0.35% oil containing cinnamaldehyde and eugenol as major constituents. Presence of cinnamylacetate, linalool, 1,8 cineol, p-cymene, cuminaldehyde is also reported. The oil is carminative, stimulant, aromatic, powerful germicide, antidiarrheal and an active fungicide.<sup>[23]</sup>

### POLYHERBAL FORMULATION USED AS AN ANTIDIARRHEAL

S. No.	Name Of Drug	Common Name	Family	Part Used	Uses
1.	<i>Zingiber officinale</i>	Ginger	Zingiberaceae	Rhizome	Anti diarrheal
2.	<i>Curcuma longa</i>	Turmeric	Zingiberaceae	Rhizome	Anti diarrheal
3.	<i>Camellia Sinensis</i>	Chai	Theaceae	Leaves and the Buds	Anti diarrheal
4.	<i>Ocimum sanctum</i>	Tulsi	Lamiaceae.	Leaves	Anti diarrheal
5.	<i>Catharanthus roseus</i> Linn	Old Maid	Apocyanaceae	Leaves	Anti diarrheal
6.	<i>Mangifera Indica</i>	Mango	Anacardiaceae	Seed	Anti diarrheal
7.	<i>Litsea Polyantha</i>	Meda	Lauraceae	Bark	Anti diarrheal
8.	<i>Lawsonia Inermis</i>	Hina	Lythraceae	Leaves	Anti diarrheal
9.	<i>Rumex maritimus</i>	Golden dock	Polygonaceae	Root	Anti diarrheal
10.	<i>Xylocarpus Moluccensis</i>	Cannonball	Meliaceae	Bark	Anti diarrheal

### Preparation of Poly-Herbal Formulation

Poly-herbal formulation was made by taking equal proportion of each powdered herbal drugs. All the procured and authenticated individual crude drug material was dried in shade and cleaned by hand sorting. The individual drugs are then pulverized and passed through mesh no.40. The individual powdered drugs are then subjected to the soxhlet extraction with suitable solvent. The concentrated and dried extract of individual plant drugs are weighed and mixed geometrically using a double cone blender. The mixed formulation was unloaded weighed and preserved in labeled glass bottle.<sup>[24]</sup>

Organoleptic Evaluation Organoleptic evaluation means conclusions drawn from studies resulted due to impressions on organs of senses. It refers to evaluation of poly herbal formulation by color, odour, taste, texture and touch.<sup>[25]</sup>

### Preliminary Phytochemical Analysis

The poly-herbal formulation was subjected to preliminary phytochemical screening for the detection of various plant constituents present in the plant drugs. In this preliminary phytochemical analysis various tests like i.e. Test for alkaloids, test for glycosides, test for carbohydrates, Test for steroids, Test for flavonoids, Test for terpenoids, and Test for proteins.<sup>[26]</sup>

### Physico-Chemical Evaluations

Physico-chemical investigations were carried out including determination of extractive values like Water soluble extractive, Alcohol soluble extractive, Ether soluble extractive and Hydroalcoholic soluble extractive values were determined. Then Ash values like Total ash, Water soluble ash and Acid insoluble ash was determined. In Physico-chemical evaluation determined the moisture content of the poly-herbal formulation by Loss on drying method at 105°C.<sup>[27]</sup>

Determination of Physical Characteristics of Poly-Herbal Formulation Physical characteristics like bulk density, tapped density, angle of repose, Hausner ratio and Carr's index were determined for poly-herbal formulation.<sup>[28]</sup>

## CONCLUSION

It is clear from this review paper that the medicinal plants play a vital role against diarrhea diseases. Various herbal plants and plants extract have significant anti-diarrheal activity. This review study shows that above mentioned medicinal plant can be used to treat diarrhea disease. A variety of botanical products have been reported to possess that activity. Traditional medicines have been a great source of health since pre-colonial times, and form the basis of many pharmaceutical products in the developed world. Therefore, it becomes imperative for local governments to incorporate these into the national health policy, and to make sure that certain standards are met and harmonised including the training and re-training of indigenous health practitioners. It could also be a good attempt to accommodate affordable local medicines and technologies in the prevention and/or treatment of diarrhoea.

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