

# Therapeutic Plants for the Management of Diarrhoea

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## **Abstract:**

*Diarrhoea is one of the main water-borne diseases considered to be endemic in many regions of the world and brings the major health threats to the world populations, both in tropical and subtropical poor countries. Diarrhoea is a clinical symptom of gastrointestinal tract characterised by increased frequency of bowel movements and often in conjunction with changes in shape and consistency of stools. Diarrheal diseases is a major cause of mortality and morbidity throughout the world. Novel compounds have been discovered for their treatments . By investigating the biological activity of the extracts of such plants, their antispasmodic effects, delay intestinal transit, suppress gut motility, stimulate water adsorption or reduce electrolyte secretion, the antidiarrheal medicinal plants have been used traditionally. Psidiumguajava L. , Citruslimon (L.) , Menthaspicata L. ,Thea sinensis ,Curcuma longa L. are effectively used for the treatment of diarrhea. They are often used as a traditional medicine for the treatment of diarrhoea. Diarrhoea is the condition of having three or more loose or liquid bowel movements per day.The most common cause is gastroenteritis.*

**Key words:** , Diarrhoea, disease, escherichia coli, tannins,management

## **I. Introduction :**

Diarrhoeal diseases are amongst the most common infectious diseases worldwide resulting in 3.2% of all deaths killing about 1.8 million people globally each year. Annually, diarrhoeal diseases kill over 1.5 million children globally. Even though economic development and progress in health care delivery are expected to catalyze substantial improvements in infectious disease related morbidity and mortality by the year 2020, it is predicted that diarrhoea will remain a leading health problem . It affects mostly children in developing countries and can lead to dehydration and death and in survivors it may lead to impaired growth and malnutrition. In adults, while the impact is less severe, it nevertheless can lead to nutritional deficiencies especially in the case of persistent diarrhoea [1].

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### **The various types of diarrhoea :**

The types of diarrhea includes Osmotic diarrhea, Secretory diarrhea, Exudative diarrhoea, Inflammatory diarrhoea, and Motility related diarrhea [2]

Osmotic diarrhoea due to poorly absorbable, osmotically active substances as after ingestion of osmotic laxatives, in lactase deficiency and in malabsorption syndromes [3].

Secretory diarrhoea due to active ions secretion by the small intestinal epithelium.

Deranged intestinal motility due to irritable bowel syndrome thyrotoxicosis and diabetic neuropathy [4].

Allergic diarrhoea in food allergy. Altered mucosal morphology in viral gastroenteritis bacterial infection tissue invasion and radiation enteritis.

Miscellaneous types in neurological and endocrine diseases [5].

### **Drugs which cause diarrhoea:**

Antibacterials like

erythromycin

ampicillin

tetracyclines

Prostaglandin analogues

Anticholinesterases

Colchicine

Emetine

Lithium

Quinidine

Dihydroergotamine [6].

### **Non specific anti diarrhoeal agents:**

Absorbants -

Ispaghula, Psyllium, Methyl cellulose

Antisecretory -

Sulfasalazine, mesazaline, bismuth sub salicylate, atropine, octreotide

Antimotility -

Codeine, diphenoxylate atropine, loperamide [7].

### **Treatment of diarrhoea:**

It consists of :

Specific treatment

Treatment of dehydration

Symptomatic and protective treatment

Correction of dehydration and electrolyte disturbances [8].

Gastrointestinal protectives and adsorbents: bismuth salts, prepared chalk, light kaolin, pectin, activated wood charcoal. Gastrointestinal propulsion and secretion: opioids, loperamide, racecadotrel, atropine, prostaglandin inhibitors.

Miscellaneous: lactobacillus, berberine.[9].

Intravenous rehydration: it is needed when fluid loss is severe or the person is unable to take enough oral fluids due to weakness, stupor or vomiting. The recommended composition of intravenous fluid (Dhaka fluid) is :

NaCl (5g)

KCl(1g)

NaHCO<sub>3</sub>( 4g)

Oral rehydration: advent of oral rehydration therapy is considered a major advance of recent times. If the fluid loss is mild or moderate, this therapy can be instituted from the very beginning.[10]

### **Guava:**

Scientific name: Psidiumguajava L.

Botanical family: Myrtaceae / Other names: Guava, Guava Maroon, Guava of Peru

The guava is a shrub or small tree up to 7 m high, sparsely branched. It has aromatic leaves, opposite, entire, 4-8 cm long, with prominent veins on the underside, resembling ribs. White attractive flowers, grouping from 1 to 3; numerous stamens arranged on a width disk. The guava fruit is fleshy, variable in shape and size depending on the variety. Guava is native to tropical America. Cultivated and naturalized in the Old World tropics in rural and urban areas.

#### Content and active ingredients:

It is known the presence of gallic acid, ellagic acid, catechin, epicatechin, rutin and quercetin.

Pentacyclic triterpene, guajanoico acid and B-sitosterol, uvaol, olenólico acid and ursolic acid.

Guava leaves contain an essential oil rich in caryophyllene, nerolidiol, beta bisabolene, aromandreno, p-selinene. Also contain flavonoids, beta sitosterol, titerpenoides, leucocyanidins and about 10% of tannins.

#### Guava benefits - Medicinal properties

The high presence of tannins give to Guava antidiarrheal properties, also have demonstrated pharmacological activity as antibacterial, antioxidant, antispasmodic, anti-inflammatory, anti-anemic, hemostatic and sedative.

It is indicated in cases of dyspepsia, edema, swelling, dizziness, diarrhea, nausea, nervousness, HIV, skin conditions.

Guava is a fruit prized for their nutritional value and high in various vitamins. It antiscorbutic because they are high in vitamin C. In naturally has many nutritional and preventative properties in diseases like anemia.

The fundamental action of guava leaves is as antidiarrheal and which preparation is carried out as follows:

Decoction: boil for 3 minutes 10 to 20 g of fresh leaves in a quart of water. Ingest 120 mL, 6 times a day. The preparation of the decoction should be daily.

Antibiotic properties are attributed to the decoction or infusion of guava leaves.

#### **Lemon:**

Scientific name: Citrus limon (L.)

Botanical family: Rutaceae

The lemon is a small tree with irregular branches armed with thick spines, stiff and sharp. Leaves of 5 to 7.5 cm long. White flowers 2 cm long. Fruit round from 3 to 6 cm, greenish yellow, with plenty of acid pulp, small white seeds shaped oval.

Among the health benefits of lemon highlights its value as antiscorbutic, benefits blood circulation, capillary protector, antihypertensive, antispasmodic, diuretic, applied to the skin and mucous membranes is antibacterial and antifungal.

#### **Content of lemon:**

Essential oil of complex composition: limonene, pinene, citral, citronellal, terpineol, camphene, phellandrene, coumarins, flavonoids, vitamin C, carotenoids, mucilages, calcium oxalate. Abundant pectin, sugar, citric acid, malic acid, flavonoids.

### **Uses of lemon**

#### **lemon flowers**

Lemon juice is used in topical application for healing wounds, herpes and other skin conditions.

The boiled lemonade is used against colds and as sweat increaser. The lemon juice in water is used against dyspepsia alkaline and pure juice against catarrhal angina.

The compress of juice applied to the upper stomach stops the vomiting. It's also used against chronic obstructions of liver and spleen.

Methods of preparation: Boil for 5 minutes 5-12 g of fresh lemon leaves or the bark of fruit. Drinking 300-500 ml per day divided in 2-3 doses. The same decoction is applied topically to the affected parts 2-3 times a day. Lemon seeds boiled in cow milk have vermicide effect. The fruit is used in cooking and soft drinks. For stabilizing the blood pressure must be taken the juice of 2 lemons in a glass of water, 2 or 3 times a day. The essential oil or those parts of lemon plant that contain it, can cause dermatitis. Do not expose to sun the body parts treated with products of this plant. Topically not be used for more than 3 weeks.

### **Mint:**

Scientific name: *Mentha spicata* L.

Other names: Spearmint, mint

Botanical Family: Lamiaceae (Labiatae)

Mint is a perennial herb, creeping, with angular branches, glabrous or slightly pubescent, leaves opposite, oblong, rough surface and serrated margin, shortly petiolate.

Its name is also known by *Mentha x piperita* which is a triple hybrid: *Mentha longifolia* x *M. rotundifolia* (*M. spicata*) x *M. Aquatica*, having similar effects.

It is likely that its origin is from the Mediterranean region and naturalized throughout Europe and North America.

Content of Mint

The Mint's used parts are leaves, which contain essential oil (1-3%) , rich in menthol, flavonoids (timonina), caffeic acid derivatives including some amounts Romárico acid.

The principal active ingredient are Mint L-carvone (responsible for odor), limonene, including some amounts of betaburboneno, cis and transCarvil acetate, caryophyllene, 1-8 cineole, trans dihirocarvol and sabinene hydrate.

### **Tea:**

Scientific name: *Thea sinensis*

Other names: *Camellia sinensis*, green tea.

Family: Theaceae.

Tea is a shrub that grows up to four meters high, evergreen, alternate leaves, elliptic, pointed, toothed and coriaceous leaves, six to eight inches long and three inches wide. It has white flowers, axillary and with peduncle, capsular fruit, globose habit, with three blackish seeds. The parts used are leaves which take different names according to the treatment they experience: Green Tea or Black Tea.

Tea was originally grown in China over 1000 years ago. Today it is cultivated in India, China, Sri Lanka, Japan, Indonesia, Kenya, Turkey, Pakistan, Malawi and Argentina.

Active ingredients and content of tea

The major active ingredient of the tea plant are the xanthic bases: caffeine, theophylline, theobromine (whose content depends on the development stage of leaves), adenine and xanthine, caffeine predominates with 3 to 4%.

It also contains catechic tannins that may be combined with the xanthic bases.

Tea also contains abundant flavonoids, phenolcarboxylic acids, mineral salts (high amounts of fluorides 130-160 mg / kg), vitamins and small amounts of terpenes (theafoliasaponins).

### **Turmeric:**

Scientific name: *Curcuma longa* L.

Description:

Turmeric is a perennial herb with aromatic rhizomes bright yellow color in the inside, is used as a seasoning (curry) and is attributed anticancer properties. The part used of the turmeric is the rhizome whose color is due to curcuminoids Curcumins, it also contains from 3 to 5% of an essential oil rich in terpene and

sesquiterpene ketones (tumerone). The main benefits of turmeric is as hepatoprotective, but also has choleric actions, lipid lowering and spasmolytic. Turmeric is also attributed the actions as antiplatelet so it can be preventive of thrombosis and atherosclerosis.

It is indicated in the hepatobiliary dyskinesia, cholecystitis, hepatitis and hyposecretion dyspepsia. Prepare a decoction by boiling the grated tuber for 10 min in half-litter of water.

Another interesting use of turmeric: can be used as an indicator since it changes its color from yellow to brownish red in the presence of alkali.[11]

### **Traditional Medicinal Plants used in the Treatment of Diarrhoea: Modes of Action and Effects on Intestinal Function:**

Traditional medicinal plants used in India. The roots of *Jatropha curcus* (Euphorbiaceae) are used traditionally in the western coastal areas of India to control dysentery and diarrhoea. Methanol extracts have exhibited dose-dependent inhibition of castor oil-induced diarrhoea and intraluminal fluid accumulation, as well as small intestinal transit. The extracts may act by inhibiting prostaglandins and reducing small intestinal propulsive movement. In a similar manner, Chitme et al. (2003) have investigated the medicinal plant *Calotropis gigantea* (Asclepiadaceae). A water:ethanol (50:50) extract produced a statistically significant reduction in the severity and frequency of diarrhoea produced by castor oil. In addition, both castor oil-induced intestinal fluid accumulation and intestinal volume content were inhibited significantly. Numerous phytochemicals, including sugars, flavonoids, flavonol glycosides and terpenes, have been identified in this plant and these may mediate the antidiarrhoeal properties, although the active component has not been defined. An ethanol extract of the root of *Trichodesma indicum* (Boraginaceae), another Indian medicinal plant used to treat diarrhoea, has been found to reduce castor oil-induced enteropooling and the propulsion of a charcoal meal in experimental animals (Perianayagam et al., 2005). Similarly, a chloroform extract of the roots of *Aegle marmelos* (Correa), a medicinal plant used in India, Burma and Sri Lanka for a variety of ailments, including diarrhoea, displayed significant activity against castor oil-induced diarrhoea which was comparable to the antidiarrhoeal agent, loperamide.[12]

### **Interactions between plant medicines and prescription drugs.:**

As herbal medicines are often used in conjunction with prescription drugs, a relevant health and safety concern is the potential interaction between plant extracts and drugs. Given that herbal medicines contain many active ingredients, the large number of pharmacologically active compounds increases the likelihood of interactions taking place. For example, flavonoids exhibit a range of biological activities and have the ability to modulate several enzymes or cell receptors, mainly as a result of their antioxidant properties. In contrast, synthetic drugs usually contain single chemical entities making drug–drug interactions less likely. This highlights the need to identify and possibly purify active components from medicinal plant preparations as the potential for adverse interactions with purified compounds is less likely. A number of phytochemicals, including piperine, flavonoids, triterpenoids, anthraquinones, polyphenols and alkaloids (some of which are present in antidiarrhoeal preparations) interact with and inhibit cytochrome P450 systems.[13][14]

### **Safety of commercially available antidiarrhoeal plant medicines:**

Plant-derived antidiarrhoeal medicines that are available commercially include Seirogan ,tormentil root , Zangrado and Kampo . Seirogan, which has been used throughout Asia for more than a century, has been assessed for safety in numerous studies. The active ingredient of this medication is wood creosote, an oily liquid obtained by the fractional distillation of beechwood tar that consists of many simple phenolic compounds . Oral doses (five doses of 45–225 mg every 2 h) of wood creosote were found to be safe and well tolerated with minimal side effects.[15][16]

### **Natural herbs for management of diarrhoea:**

Astragalus (*Astragalus membranaceus*)

Because of the astragalus anti-viral and antibacterial properties, it is considered a good natural remedy for diarrhoea. It contains polysaccharides which provide support for the immune system and stimulate the activity of phagocytes (white blood cells). It also raises the level of natural antibodies found in the bloodstream.[17][18][19]

Picrorhiza Kurroa (*Picrorhiza kurroa*)

This medicinal herb for diarrhea should be given only in low dosages. Higher doses can actually exacerbate diarrhea and cause flatulence in some people. As a bitter herb, it stimulates the digestive process. Picrorhiza stimulates the immune system including B and T cell activity and white blood cell activity. It can be used in the treatment of liver ailments and has antimalarial properties.[20][21]

Goldenseal (*Hydrastis Canadensis*)

Goldenseal has an intestinal antibiotic action and helps to reduce adhesive *E. coli* while it stimulates the immune system. One of the active ingredients in goldenseal is berberine. Berberine has been proven to increase the activity of macrophages which digest bacteria and viruses.[22]

Barberry (*Berberis Vulgaris*)

Barberry also contains berberine, which has anti protozoic properties. Protozoic diseases which cause diarrhea include giardia, dysentery, candida and cholera vibrio. Both berberine and palmatine are active ingredients in barberry and have antibacterial properties. Another component of barberry is berbamine. Berberine and berbamine are alkaloids and strong antibacterials which are believed to increase the production of white blood cells and platelets.

Echinacea (*Echinacea angustifolia*)

Echinacea is well-known as an immune stimulant. Its active ingredients are polysaccharides and alkaloids, which stimulate the body's immune responses. It also contains polyacetylenes which have antifungal, antibacterial and antiviral properties. Echinacea appears to interfere with the activity of the enzyme hyaluronidase. This enzyme breaks down the connective tissue and allows bacteria and other microbes to travel throughout the body.[23]



#### Agrimony (*Agrimoniaeupatoria*)

Agrimony has been used as an herbal remedy for treating diarrhea due to its high tannin content. Several clinical trials confirm this use and Commission E endorses agrimony for common diarrhoea.

#### Carob (*Ceratonia siliqua*)

Carob is very rich in tannins, which are astringent substances found in many plants, that have a binding effect on the mucous membranes of the intestinal tract. This makes its effectiveness high in adults with diarrhea, but even more so when used for children and infants experiencing diarrhea.

The primary chemical constituents are largely sugars and tannins found in the carob pods.

When the pods are consumed the gum-like stability acts as a thickening agent to aid the body in retaining water and fastening together watery stools.[24]

#### Psyllium (*Plantago ovata*, *Plantago afra*)

Psyllium is used as an herbal remedy for diarrhea and relieving constipation due to its high mucilage and fiber content. The husks of the seeds swell by absorbing water, thus adding bulk to stool.[25]

### **The Use of Herbal Remedies and Herbs for Diarrhoea:**

While these remedies do not have the same prophylactic qualities as a vaccine, they can give the body a better chance at remaining healthy. Simple effective measures that should always be taken, like washing hands often, not drinking from bottles whose seal has been broken and not eating raw foods that can't be peeled before consumption, will reduce exposure to potentially harmful organisms. Travelers should avoid eating foods purchased from street vendors. Hydration salts should be included in a traveler's first aid kit to combat the dehydration caused by diarrhea.

A doctor or healthcare provider should be consulted before taking any herbal supplements for the treatment of diarrhea. It is always possible that the underlying cause of the diarrhea is of serious nature in which case, the use of herbal remedies might worsen the condition. Although diarrhea is not harmful by nature, it is vital to seek medical attention if it is experienced for more than 5 days, or accompanied by abdominal or rectal pain, blood in stool, signs of dehydration or a high fever.[26][27][28]

## **II. Conclusion:**

Thus, various medicinal plants and herbs were studied under the category of antidiarrheal drugs to reduce the number of patients suffering day by day. The influence of the subinhibitory concentrations of bifidobacterial exometabolites on the capacity for inactivating lysozyme in pathogenic and opportunistic enterobacteria was determined. The anti-enterobacterial potential of ethnobotanically selected plants traditionally used in different parts of India for the treatment of gastrointestinal disorders such as diarrhea were evaluated.

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