

Original Research Article

A Review On Benefits Of Bael Fruit In Diarrhea

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Abstract

One of the earliest varieties of fruit trees that are native to India is the Bael. Diarrhea is a prevalent gastrointestinal issue affecting both children and adults, causing dehydration and death. It is caused by a balance imbalance between absorption and secretion in the small intestine. Diarrhealdisease is a major infection worldwide, with 1.5 to 2 billion deaths occurring annually. Symptoms include frequency, consistency, abdominal discomfort, dehydration, fever, urgency, nausea, vomiting, fatigue, and blood in stool. Diarrhea can be classified into acute, chronic, bloody, secretory, osmotic, inflammatory, motility, and exudative. Diarrheal is the second leading cause of child mortality and morbidity worldwide. To manage diarrhea, individuals can drink plenty of fluids, follow a BRAT diet, use antidiarrheal medications like loperamide, and use probiotics to restore gut bacteria balance. Avoiding irritants like caffeine, alcohol, fatty foods, and high-fiber foods is crucial. Bael fruits, used in Ayurvedic medicine, have a pharmacological action that includes absorption, distribution, metabolism, and excretion.

KeyPoints: -Diarrhea, Bael, Ayurvedic system, small intestine

INTRODUCTION

Diarrhea, a word derived from Greek (Dia, through) and Latin (rheem, to flow or run) According to the World Health Organization (WHO), diarrhea is defined as “the passage of three or more loose or liquid stools per day, or more frequently than is normal for the individual.”⁽¹⁾ The diarrhoea occurs when an imbalance between absorption and secretion in small intestine.⁽²⁾

Diarrhoea is usually caused by a virus, or sometimes contaminated food. A drug or dietary Fiber forming agent that relieves symptoms of Diarrhoea. Diarrhoeal disease is amongst the most common infection diseases worldwide. the pandemic sickness outbreak In India, shamanic medications are becoming more common. As diarrhoea is regarded as a common gastrointestinal problem that both young children and adult’s encounter.⁽³⁾ It affects mostly children in developing countries and can

lead to dehydration and death. One of the allopathic drugs is contraindicated in paediatric patients less than 2 years of age due to the risk of respiratory depression and serious cardiac adverse reactions. ⁽⁴⁾ Every year there are about 1.5 to 2 billion death of diarrheal disease occurs. Diarrhea is the second leading cause of child mortality and morbidity in the world. One in 5* children die of diarrhea every year in India. ⁽⁵⁾

1.1 CAUSES OF DIARRHEA

- 1) **Digestive infection:** - Diarrhea can be brought on by bacterial, viral, or parasitic infections. Norovirus, rotavirus, E. coli, and Salmonella are typical offenders.
- 2) **Food Poisoning:** - Drinking polluted water or eating contaminated food can cause diarrhea and other associated symptoms.
- 3) **Drug Side Effects:** - Antibiotics, for example, might upset the balance of intestinal bacteria and result in diarrhea.
- 4) **Food Intolerances:** - Diarrhea can result from lactose intolerance, gluten sensitivity, and other food intolerances.
- 5) **Digestive Disorders:** - irritable bowel syndrome (IBS), Crohn's disease, and ulcerative colitis are a few conditions that might result in persistent diarrhea
- 6) **Traveler's diarrhea** can be brought on by variations in the water and food consumed while travelling.
- 7) **Tension:** - Emotional tension may have an adverse effect on digestion and cause diarrhea.
- 8) **Underlying Medical illnesses:** - Hyperthyroidism and celiac disease are two examples of illnesses that might result in persistent diarrhea.

1.2 GENERAL SYMPTOMS

- 1) **Frequency:** - Stool passing more frequently than usual is referred to as diarrhoea and can occur up to three times per day. ⁽⁶⁾
- 2) **Consistency:** - Stools are normally loose or watery, might vary in colour, and may contain food particles that have not yet been digested.
- 3) **Abdominal Discomfort:** - People who have diarrhoea frequently feel bloated or cramped in their abdomens.
- 4) **Dehydration:** - Dehydration and fluid loss are two effects of diarrhoea. Dry mouth, increased thirst, dark urine, and dizziness are symptoms of dehydration.
- 5) **Fever:** - Sometimes, especially in cases of illness, diarrhoea may be accompanied by a fever.
- 6) **Urgency:** - It can be challenging to manage the want to go to the toilet urgently.
- 7) **Nausea and Vomiting:** - People may also feel sick to their stomach and vomit in addition to diarrhoea.
- 8) **Fatigue:** - Fatigue and weakness can result from dehydration and nutritional loss.
- 9) **Blood in stool:** - In some situations, blood or mucus may be present in the stools along with the diarrhoea, which may point to a more serious underlying problem.
- 10) **Duration:** - If symptoms remain for more than a few days or become severe, it is imperative to seek medical assistance. Acute diarrhoea typically lasts a few days and is frequently caused by infection.

1.3 TYPES OF DIARRHEA ^(7,8,9)

On the basis of Duration: - Acute Diarrhea

Chronic Diarrhea

On the basis of Bloody Diarrhea: - Acute Watery Diarrhea

Acute Bloody Diarrhea

On the basis of physiology: - Secretory Diarrhea
Osmotic Diarrhea Inflammatory Diarrhea Motility Diarrhea Exudative Diarrhea

1.4 SPREAD OF DIARRHEA: - ^(7,9)

Virus: -Rotavirus, Enteric adenovirus, Astrovirus

Bacteria: - salmonella, shigella, Campylobacter, Clostridium difficile

Protozoa: - Isospora belli, Balantidium coli, Microsporidia

Various contaminated food: - Eggs – Salmonella species

Vegetable – Aeromonas species and C perfringers

Sea food -Vibro species

Artificial sweetener: - Some healthy persons may get diarrhoea after consuming the artificial sweeteners sorbitol, erythritol, and mannitol, which are nonabsorbable sugars found in chewing gum and other sugar-free goods.

Malabsorption and maldigestive diarrhea: - First, there are a problem with nutrient absorption, and second, there is a problem with digestive function. Example: - celiac illness.

1.5 PATHOPHYSIOLOGY OF DIARRHEA

The human gut processes vast amounts of water, electrolytes, and minerals during the course of a typical day. Endogenous gastrointestinal secretions provide for the vast bulk of the fluid entering the upper small intestine, with oral intake accounting for a very tiny portion. Although there is a dearth of information about the quantitative management of water and electrolytes in the small intestines of babies and children, it is likely to follow the same pattern as in adults ⁽¹⁰⁾

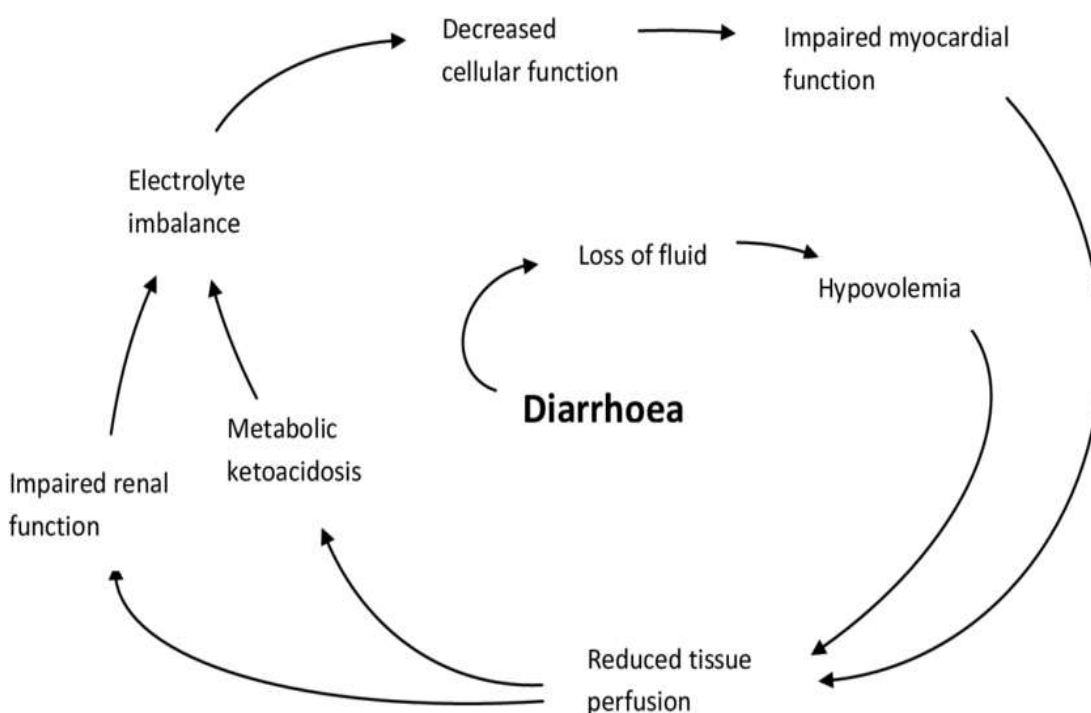


Fig: -1.5 Pathophysiology of Diarrhea

1.6 RELIEF & MANAGEMENT:

- 1) Hydration: Dehydration brought on by diarrhea should be avoided at all costs. Drink lots of fluids, such as water, clear broths, and oral rehydration treatments.
- 2) BRAT Diet: Bananas, rice, applesauce, and toast can help firm up stools and provide gentle nourishment.
- 3) Antidiarrheal Medications: Over-the-counter options like loperamide (Imodium) can help slow bowel movements. However, they should be used cautiously and under the guidance of a healthcare professional.
- 4) Probiotics: These can assist in recuperation by reestablishing the balance of healthy gut bacteria. (11)
- 5) Avoid Irritants: Stay away from caffeine, alcohol, fatty foods, and high-fibre foods until symptoms improve.
- 6) Rest: Give your body time to recover by getting adequate rest.
- 7) Medical Attention: If diarrhea is severe, accompanied by high fever, blood in stool, or persists for more than a couple of days, seek medical help.

2.0 ANTIDIARRHEAL ACTIVITY OF BAEL FRUIT

In the Ayurvedic system of medicine, Bael fruits are considered as an excellent remedy for diarrhea⁽¹²⁾(13).

2.0.1 BAEL FRUIT:-⁽¹⁴⁾

1) **Botanical name:** - *Aegle marmelos correa*

2) **Common name:** - Bal, Bael, Bel Giri, Wood Apple, Bili Patra

3) **Family name:** - *Rutaceae*

4) **Chemical Constituents:** - Bael fruit is used in improved varieties, propagation techniques, planting systems, canopy management, water and nutrient management, quality management, pest and disease management, physiological disorders, marketing and export.^{(14), (17)}

5) **Geographical source:** - The Bael fruit is grows in India, Sri Lanka⁽¹⁸⁾, Pakistan, Bangladesh, Thailand and most of South Asian countries.⁽¹⁹⁾

6) **Parts of plant are used:** - Fruit, leaf, root, Bark⁽²⁰⁾

7) **Morphological characteristics:** - the Bael fruit might be spherical, pyriform, oval, or oblong. The fruits have a diameter of 5 to 20 cm. A firm central core with 8 to 20 barely discernible triangular segments with thin, dark-orange walls can be found inside the fruit. They include pulp that is fragrant, pale orange in colour, pasty, sweet, resinous, and astringent Bael fruits have a hard, smooth woody shell, a soft rind, and a crust that changes colour from Gray -green to yellowish or orange at ripening. They come in various shapes and sizes, and should be graded accordingly to fetch better prices. Currently, they are packed in gunny bags, baskets, or wooden crates, and sometimes transported without packaging. Bael fruits are used in ayurvedic medicine to cure vata and kappa distribution in the body.^(19,33,45)

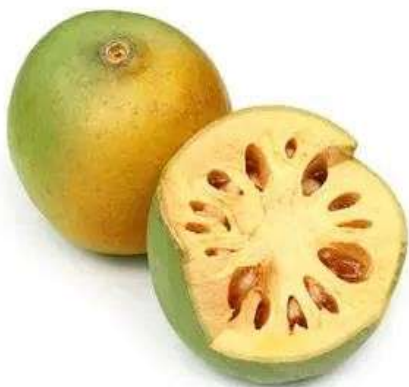


Fig:2.0.1 Bael Fruit

(8)Pharmacological action: - Absorption Following intake, the digestive system breaks down the Bael fruit's bioactive compounds, which are then mostly absorbed in the small intestine as flavonoids and tannins. **Distribution** The bloodstream is where the absorb chemical is disseminated to various organs and tissue. **Metabolism** Bael fruit may go through metabolic change mostly in the liver. These compounds' chemical structure can be altered by an enzyme in the liver, which can have an impact on their bioavailability and biological function. **Excretion** Both the metabolised substance and its by product finally leave the body through various channels. Some substances are removed through the urine. ⁽⁵¹⁾

(9)Therapeutic activity of Bael: - Ripe fruit is scrumptious, aromatic, a refreshing alternative, and healthful. Aegle marmelos fruit aqueous extract has been found to affect the outer membrane protein C of enteropathogenic Escherichia coli to provide an antidiarrheal effect. ⁽²¹⁾

(10)Medicinal properties of Bael: - Decoction of Bael fruit could have an impact on bacterial metabolism. The fact that LT (e choli heat labile toxins) and CT (cholera toxin) bonding with GM1 (ganglioside mono salic acid) is delayed may be evidence for this. They may connect with a shared antigenic moiety found in the toxin, or by directly inhibiting GM1, they may prevent the binding receptor from activating. It should be mentioned that CT output is down. Chloroform extract of Bael root can be just as effective as ciprofloxacin ⁽²²⁾, according to in vitro experiment. ETEC is the most commonly identified enteropathogenic, causing around 200 million cases of diarrhea. The main source of bacterial diarrhea in both people and agriculture animal is ETEC. The extract also had an impact on LT and CT binding to GM1 (ganglioside monosalic acid), as well as CT production. Aegle marmelos fruit and leaf extract effectively prevents castor oil-induced diarrhea. ⁽²³⁾

CONCLUSION

Diarrhea is a most common disease worldwide. Diarrhea is a prevalent infection affecting children in developing countries, causing dehydration and death. It is the second leading cause of child mortality worldwide and can be caused by gastrointestinal infections, food poisoning, medication side effects, food intolerances, digestive disorders, traveller's diarrhea, stress, and medical conditions. Diarrhea can be classified into acute, chronic, bloody, secretory, osmotic, inflammatory, motility, and exudative diarrhea. Bael fruit, a medicinal plant used in the Ayurvedic system, has

been found to treat diarrhea by affecting the outer membrane protein C of enteropathogenic *Escherichia coli*. Its chloroform extract can be as effective as ciprofloxacin, the main source of bacterial diarrhea in humans and animals. Bael fruit is used in diarrheal infection.

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