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A Comprehensive Review on Triphala for Digestive Disorders

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Abstract

Triphala is a traditional Ayurvedic polyherbal formulation which is composed of three fruits name as Emblica officinalis, Terminalia chebula, and Terminalia bellirica widely used for gastrointestinal health. It exhibits the antioxidant, anti-inflammatory, antimicrobial, and mild laxative properties due to its rich content of polyphenols, flavonoids, and tannins. This review aims to evaluate the pharmacological properties, mechanisms of action, and clinical efficacy of Triphala in the treatment of digestive disorders such as Constipation, Irritable Bowel Syndrome, Dyspepsia, and Gastritis. Recent clinical studies also highlight its role in modulating gut microbiota and improving intestinal homeostasis. This review critically evaluates the pharmacological mechanisms, clinical evidence, and future perspectives of Triphala in digestive health.

Although Triphala has been used safely for many years, there is still need for well-structured clinical studies to confirm its effectiveness, establish standardized dosing guidelines, and evaluate its long-term safety. Overall, Triphala shows considerable potential as a natural therapeutic option for managing digestive disorders, effectively integrating traditional medicinal knowledge with contemporary scientific evidence.

Keywords: Ayurveda, Triphala, antimicrobial, Herbal medicine, Polyherbal formulation, Gastroprotective, immunomodulatory.

Introduction

In the Indian context, complementary and alternative or traditional Systems of Medicine as Ayurveda, Siddha and Unani Systems play a critical role in the healthcare management strategies [1]. Triphala is a drug widely used in many disorders due to its various pharmacological activities. Triphala is composed of the three myrobalans, Terminalia chebula Retz. (Haritaki), Terminalia bellerica Roxb. (Bibhitaki) and Emblica officinalis Gaertn. (Amalaki) and is one of the most commonly used Ayurvedic preparations. The formulation generally consists of equal proportions of pericarps of this myrobalans [2]. Triphala is classified as Tridosha shamaka and also Rasayana. It is Kapha Pittahara and heals Meha, Kushta, and Vishamajwara. It helps to improve vision, digestion, and taste perception [3] As both Ayurveda and Western medicine agree that health and disease begin in the gut, [4, 5] Triphala represents essential foundational formula as it promotes efficient digestion, absorption, elimination, and rejuvenation. Numerous references in well-respected Ayurvedic medical texts make clear that Triphala is revered as a multiuse therapeutic and perhaps even panacea historically. [4, 6] Triphala specifically promotes general health and longevity while reducing accumulated excess fat. [7] It has antimicrobial properties [8], immunomodulatory properties [9] etc. This formulation is effective against cardiovascular disease, cancers, digestive disorders, hypertension, and a variety of other diseases. [10] It has been further reported to be a vital drug and a good purgative as per Ayurvedic Scriptures [11]. The details on the composition, preparation, benefits and dosage of the formulation has been mentioned in traditional Ayurvedic formulations such as the Charak Samhita, Sushruta Samhita and has also been elaborated in the Ayurvedic Formulary of India [12, 13].

This review highlights the potential of Triphala in treating digestive disorders. Composed of Emblica officinalis, Terminalia chebula, and Terminalia bellirica, it exhibits antioxidant, anti-inflammatory, antimicrobial, and mild laxative properties. These actions help to improve the digestion, regulate bowel movements, and support the gut health, making Triphala an effective natural remedy for conditions like constipation, IBS, and dyspepsia.

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Fig 1: Amla (Emblica officinalis)

Fig 2: Haritaki (Terminalia chebula)

Fig 3: Bibhitaki (Terminalia bellirica)

Dravya guna or Ayurvedic pharmacology describes the attributes of herbs. The rasa or taste of Triphala is sweet, sour, pungent, bitter, and astringent; the only taste not contained within the formula is salty. The virya, or potency and action, is neutral, and the vipaka, or post digestive effect of the formula, is sweet. Triphala has a prabhav, meaning special action or trophism, for all doshas (energetics and mind–body types) and thus is balancing for all doshas and constitutions. The gunas, or qualities, of Amalaki are heavy and dry, and both Haritaki and Bibhitaki are considered light and dry [14].

Triphala is an ayurvedic herbal formulation of dried fruits from three herbal plants in equal proportions: Terminalia chebula (black myrobalan), Terminalia bellerica (bastard myrobalan) and Phyllantus emblica (emblic myrobalan or Indian gooseberry) [15, 16]. Fruits of T. Chebula, that are harvested in the spring, are a rich source of tannins (30–40%), e.g. chebulic acid, chebulinic acid, neochebulinic acid, corilagin, chebulagic acid, gallic acid, ellagic acid, punicalagin, terchebin and terfavin. T. Chebula fruits additionally contain flavonoids (luteolin, rutins and quercetin), and other phytochemicals (anthraquinones, saponins, β-d-glucogallin, 1, 3, 6-trigalloyl glucose, and 1, 2, 3, 4, 6-penta-O-galloyl), starches, amino acids (aspartic acid, glutamic acid, arginine, proline and lysine), fructose, succinic acid, β-sitosterol [17] and fatty acids [18, 19]. So far, T. Chebula fruits have been utilized in conventional pharmaceuticals to battle ailments of the upper respiratory tract, GI tract, urinary tract and skin [20]. Terminalia bellerica fruits contain mainly proteins (40%) and oils (35%), including omega-3 and -6 fatty acids (e.g. linoleic acid). Because of the high proportion of fatty acids, this plant may influence cholesterol level i.e. increase the level of HDL and decrease LDL, and simultaneously be useful in the treatment of coronary artery disease [21]. The major phytoconstituent of T. bellerica, T. chebula and P. emblica fruits is gallic acid, which is known to have a wide range of therapeutic activity, e.g. anti-atherosclerotic, hepatoprotective, cardioprotective, cytoprotective, cardiotonic, antimutagenic and antifungal [22, 23–25]

Mechanism of Action

Antimicrobial Activity: Triphala is known to exert antibacterial action against a variety of Gram-positive and Gram-negative bacteria—e.g. Streptococcus mutans, a gram positive, anaerobic bacterium mostly found between adjacent teeth or in the deep crevices on occlusal of teeth, or Helicobacter pylori, the principal cause of inflammation in the gastric mucosa [26–28]. Inability to eliminate bacteria from the gastric mucosa, the bacteria-generated symptoms reach beyond the stomach and very include abdominal pain, heartburn, belching or/and fatulence; the bacteria also affect lower GI motility and consequently result in constipation [27, 29]

Antioxidant Activity: The alcoholic concentrate of T. Chebula and T. Bellerica extracts induce the production of ROS in macrophages mainly through the pro-phagocytic activity of gallic acid [30, 31, 32]. Similar results were reported in studies with P. Emblica (amla) fruit extract [61]. Of note, amla is rich in antioxidants: Flavonoid, carotenoids and vitamin C (in fact, it is considered as one of the richest sources of vitamin C) as proved in both *in vitro* and *in vivo* studies [33, 34]. The antioxidant effect of amla was assessed in rodents by measuring the activity of oxidative free radical scavenging enzymes, including the superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPX), as well as lipid peroxidation [35].

Anti-cancer Activity: The major phytoconstituent of TLP—gallic acid, is believed to have a great impact on the anticancer properties of the polyherbal formulation of Ayurveda, as it inhibits cancer cell proliferation [36, 37]. Hence, it may be considered as a major determinant of antimutagenic and cytotoxic activity of TLP [36, 38]. In human colon cancer cells (HCT116) and stem cells (HCCSCs) the methanolic extracts of TLP exerted a dose-dependent antiproliferative properties and proapoptotic action independently of p53 status of the cells [38]. Moreover, treatment with TLP extract induced apoptosis via elevation of Bax/Bcl-2 ratio and suppressed c-Myc/cyclin D1 expression and therefore decreased cell

proliferation and colony formation [39].

Antibacterial Activity: Srikumar *et al*. Confirmed the antibacterial activities of aqueous and ethanol extracts of Triphala and its individual components against Pseudomonas aeruginosa, Klebsiella pneumoniae, Shigella sonnei, Shigella flexneri, Staphylococcus aureus, Vibrio cholerae, Salmonella paratyphi-B, Escherichia coli, Enterococcus faecalis and Salmonella typhi isolated from human immunodeficiency virus (HIV) infected patients [40].

Immunomodulatory Effect: Study by Srikumar *et al*. Have shown that administration of Triphala enhanced the phagocytosis, phagocytic index, antioxidant activities and decreased corticosterone levels in animals exposed to noise stress [41].

Antiaging Effects: Triphala extract exerted highly protective antiaging effects on human skin cells *in vitro*. Triphala extract affects gene expression of human skin cells, stimulating collagen-1and elastin-synthesizing genes and antioxidant genes responsible for the cellular antioxidant, SOD-2. Triphala extract was found to inhibit melanin production and hyperpigmentation due to the presence of protective phytochemicals. Furthermore, Triphala extract exhibited significant free radical scavenging activity on hydrogen peroxide induced cell damage and senescence [42].

Role in Specific Digestive Disorders

i). **Constipation:** Triphala acts as a mild laxative by stimulating intestinal peristalsis and increasing stool bulk and water content, thereby facilitating easy bowel movement without causing dependency [43].

ii). **Irritable Bowel Syndrome:** Irritable Bowel Syndrome (IBS) is a common functional gastrointestinal disorder characterized by chronic abdominal pain, bloating, and altered bowel habits such as constipation, diarrhea, or both. The exact cause of IBS is multifactorial, involving disturbances in gut motility, visceral hypersensitivity, altered gut microbiota, and dysfunction of the gut–brain axis [44] Triphala also exhibits anti-inflammatory and antioxidant effects, which help reduce intestinal inflammation and oxidative stress associated with IBS [45]. Additionally, it plays a role in modulating gut microbiota, promoting beneficial bacteria and restoring microbial balance, which is crucial in IBS management [46]

iii). **Gastric Ulcers:** Gastric ulcers are lesions in the stomach lining caused by an imbalance between aggressive factors (gastric acid, pepsin, Helicobacter pylori) and protective factors (mucus, bicarbonate, and mucosal integrity). Common causes include NSAID use, stress, alcohol consumption, and infection. Symptoms include abdominal pain, nausea, and indigestion [47] Experimental studies have shown that Triphala significantly reduces ulcer index and protects against NSAID-induced and stress-induced gastric ulcers [48]

iv). **Dyspepsia:** Dyspepsia (indigestion) is a common gastrointestinal disorder characterized by symptoms such as epigastric discomfort, bloating, early satiety, nausea, and excessive gas. It may result from impaired gastric motility, delayed gastric emptying, or increased gastric acid secretion [49] Triphala, composed of Emblica officinalis, Terminalia chebula, and Terminalia bellirica, has been traditionally used to improve digestion and relieve symptoms of dyspepsia. It enhances digestive function by stimulating secretion of digestive enzymes and improving gastric motility, thereby facilitating better digestion and nutrient absorption [43]

v). **Diarrhea:** Diarrhea is a gastrointestinal disorder characterized by frequent, loose, or watery stools, often caused by infections, inflammation, or disturbances in intestinal absorption and secretion. It may lead to dehydration, electrolyte imbalance, and weakness if not properly managed [50]. The tannins present, especially in Terminalia bellirica, exert an astringent effect, which helps reduce intestinal secretions and control stool frequency. Additionally, Triphala inhibits the growth of pathogenic microorganisms such as Escherichia coli, thereby helping manage infectious diarrhea [43, 51]

vi). **Hemorrhoids (Piles):** Hemorrhoids (piles) are swollen and inflamed veins in the rectal and anal region, commonly associated with chronic constipation, straining during defecation, and increased intra-abdominal pressure. Symptoms include pain, bleeding, itching, and discomfort during bowel movements [52].

vii). Triphala, composed of Emblica officinalis, Terminalia chebula, and Terminalia bellirica, is beneficial in managing hemorrhoids primarily due to its mild laxative, anti-inflammatory, and antioxidant properties [43].

viii). **Gut Microbiota Imbalance (Dysbiosis):** Gut microbiota imbalance (dysbiosis) refers to a disruption in the composition and function of intestinal microorganisms, which can lead to digestive disorders such as IBS, diarrhea, inflammation, and metabolic disturbances. Dysbiosis is often associated with reduced beneficial bacteria and increased pathogenic microbes, impairing gut barrier function and immune response [53]. The polyphenols and tannins present in Triphala are metabolized by gut microbes, leading to the production of bioactive metabolites that enhance microbial diversity and gut health. Additionally, Triphala exhibits antimicrobial activity against harmful pathogens, helping restore microbial balance. [46, 45]

Conclusion

Triphala, is a classical Ayurvedic formulation which is composed of Emblica officinalis, Terminalia chebula, and Terminalia bellirica, demonstrates significant therapeutic potential in the management of a wide range of the digestive disorders. Its rich phytochemical profile, including polyphenols, tannins, and flavonoids, contributes to its multiple pharmacological actions such as antioxidant, anti-inflammatory, antimicrobial, and mild laxative effects.

Triphala effectively improves the gut motility, enhances digestion, protects the gastric mucosa, and helps restore balance in the gut microbiota. These combined actions make it beneficial in conditions such as constipation, irritable bowel syndrome, dyspepsia, gastric ulcers, diarrhea, hemorrhoids, and dysbiosis.

Despite strong traditional use and promising experimental evidence, there remains a need for well-designed, large-scale clinical studies to validate its efficacy, standardize dosage, and ensure long-term safety. Overall, Triphala represents a safe, cost-effective, and holistic approach to digestive health, bridging traditional Ayurvedic knowledge with modern scientific research.

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