

## *Use of Triphala in Gastrointestinal Disorders*

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### **ABSTRACT**

*Triphala—a traditional Ayurvedic combination of Terminalia chebula, Terminalia bellirica and Phyllanthus emblica—is increasingly investigated for gastrointestinal (GI) applications. Pre-clinical data show mucosal protection, antioxidation and antimicrobial activity, while early-phase clinical studies suggest benefits in functional constipation, irritable bowel syndrome (IBS), dyspepsia and Helicobacter pylori infection. This narrative review synthesises pharmacological mechanisms, animal and human evidence and safety considerations, highlighting research gaps and future directions.*

**KEYWORDS:** *Triphala; Ayurveda; gastrointestinal disorders; irritable bowel syndrome; Helicobacter pylori; gut microbiota modulation*

### **INTRODUCTION**

The global prevalence of gastrointestinal (GI) disorders such as constipation, irritable bowel syndrome (IBS), functional dyspepsia, and gastritis is on a steep rise, driven by changing dietary habits, sedentary lifestyles, stress, and overuse of antibiotics. These conditions, though often not fatal, severely impair quality of life and contribute to economic and healthcare burdens. While modern medicine offers symptom-targeted treatments—such as laxatives, antispasmodics, and proton pump inhibitors—they frequently produce side effects, dependency, or offer incomplete relief, prompting interest in complementary therapies.

In traditional Ayurvedic medicine, the concept of digestion (Agni) is central to maintaining systemic health. Triphala, an ancient herbal formulation consisting of three dried fruits—*Terminalia chebula* (Haritaki), *Terminalia bellirica* (Bibhitaki), and *Phyllanthus emblica* (Amalaki)—has long been revered for its broad-spectrum gastrointestinal benefits. The word “Triphala” itself translates to “three fruits,” each contributing unique properties that synergistically support the GI tract.

Historically used as a rasayana (rejuvenative) and mild laxative, Triphala has gained attention not only for its detoxifying and bowel-regulating actions, but also for its role in modulating gut microbiota, protecting mucosal integrity, and reducing systemic inflammation. Scientific validation of these traditional claims is rapidly expanding, driven by increased interest in plant-based and polyherbal therapies that exhibit multi-targeted biological actions.

This paper explores the pharmacognostic profile and pharmacological actions of Triphala, emphasizing its relevance in GI disorders. It further reviews experimental and clinical studies supporting its role in managing common gastrointestinal ailments, and outlines potential mechanisms of action, safety considerations, and future directions for integrative care.

## PHARMACOGNOSY AND PHARMACODYNAMICS

Triphala is composed of equal parts of the dried pericarps of three medicinal fruits:

***Terminalia chebula* Retz. (Haritaki)** – Known as the “king of medicines” in Ayurveda, Haritaki is revered for its laxative, astringent, and digestive properties. It is rich in chebulinic acid, chebulagic acid, tannins, and flavonoids.

***Terminalia bellirica* Roxb. (Bibhitaki)** – Traditionally used to treat respiratory and digestive conditions, Bibhitaki contains gallic acid, ellagic acid, and  $\beta$ -sitosterol. It is known for its anti-inflammatory, antimicrobial, and detoxifying effects.

***Phyllanthus emblica* L. (Amalaki or Amla)** – A potent antioxidant and rejuvenator, Amla is one of the richest natural sources of vitamin C. It also contains gallic acid, ellagic acid, emblicanin A and B, and other polyphenols.

The synergistic blend of these three components results in a formulation that is greater than the sum of its parts. Triphala works on multiple levels within the gastrointestinal tract:

### **1. Antioxidant Activity**

All three fruits contain abundant polyphenols and tannins that scavenge reactive oxygen species (ROS). This antioxidant activity helps protect the gut mucosa from oxidative damage, which is particularly important in conditions like ulcers, gastritis, and colitis. Emblicanin A and B from *Phyllanthus emblica* are especially potent free radical neutralizers.

### **2. Anti-inflammatory Effects**

Triphala downregulates pro-inflammatory cytokines such as TNF- $\alpha$ , IL-6, and IL-1 $\beta$ . This occurs through inhibition of the NF- $\kappa$ B pathway, a major regulator of inflammation. Experimental studies have shown that Triphala administration reduces colon inflammation in animal models of colitis, making it a potential natural anti-inflammatory agent for GI disorders.

### **3. Gastroprotective Actions**

Tannins from *Terminalia chebula* and *Terminalia bellirica* help form a protective layer over the gastric mucosa, shielding it from the erosive effects of gastric acid and pepsin. This mucosal coating action is beneficial in preventing and healing gastric and duodenal ulcers.

### **4. Laxative and Prokinetic Effects**

Triphala exerts a gentle laxative effect by promoting peristalsis and increasing intestinal water content. This is particularly attributed to anthraquinones and sorbitol in *T. chebula*, which stimulate bowel movement without causing dependency, unlike chemical laxatives.

### **5. Antimicrobial and Antibiofilm Properties**

In vitro studies show that Triphala exhibits antimicrobial activity against a wide range of pathogens, including *Helicobacter pylori*, *Escherichia coli*, and *Candida albicans*. It also inhibits biofilm formation, a key factor in chronic infection persistence. This suggests a potential role in treating infections of the GI tract.

## 6. Modulation of Gut Microbiota

Recent metagenomic studies indicate that Triphala supports a healthy balance of intestinal flora by enhancing beneficial bacteria like Bifidobacteria and Lactobacilli, while suppressing harmful species. Its polyphenols are fermented by gut microbes into short-chain fatty acids (SCFAs), which play a role in colonic health and systemic metabolism.

## 7. Detoxification and Hepatoprotection

Triphala enhances the liver's detoxification capacity by upregulating glutathione and cytochrome P450 enzymes. This contributes indirectly to gastrointestinal health by promoting proper digestion and elimination of waste products.

The pharmacognostic composition of Triphala provides a multi-targeted action profile that aligns well with the complex pathophysiology of gastrointestinal disorders. Its wide-ranging effects—antioxidant, anti-inflammatory, laxative, antimicrobial, and microbiota-modulating—make it a holistic solution in both preventive and therapeutic contexts.

## TARGET GI CONDITIONS

### Functional Constipation

An open-label exploratory trial (n = 40) reported a 64 % increase in weekly bowel movements after seven days of Triphala (5 g nightly) and 79 % after two weeks, with sustained improvement one week post-treatment. Adverse events were mild (transient abdominal cramping in 10 %).

### Irritable Bowel Syndrome

A systematic review identified reduced abdominal pain, bloating and stool frequency normalisation in IBS-C cohorts receiving 3–6 g/day Triphala for four to eight weeks, although heterogeneity and small sample sizes precluded meta-analysis. Larger placebo-controlled studies are in progress in India, Australia and Germany (ClinicalTrials.gov NCT06123489, NCT06211245).

**Peptic Ulcer & Dyspepsia**

Unequal Triphala formulations enriched in *P. emblica* significantly lowered ulcer indices in stress-ulcer rat models, paralleling reductions in malondialdehyde and hydroxyl radicals. Human data are presently limited to case series.

**Helicobacter pylori-Associated Gastritis**

In-vitro assays show minimum inhibitory concentrations of 80–320 µg/mL against reference and clinical *H. pylori* strains; Triphala down-regulated *ureA/B* and *cagA* expression and disrupted biofilm formation. These findings justify pilot eradication trials.

**MECHANISTIC INSIGHTS**

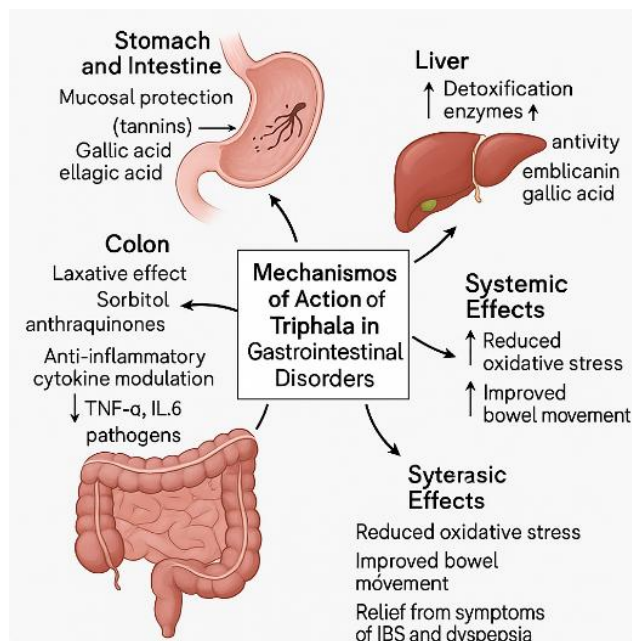
**Redox Homeostasis** – Gallic acid scavenges reactive oxygen species, preserving tight-junction proteins and mitochondrial integrity.

**Enteric Nervous System Modulation** – Chebulinic acid augments serotonin-induced peristalsis, potentially normalising gut–brain axis signalling in IBS.

**Bile-Salt Hydrolase Activity** – Metagenomic analyses reveal enrichment of bile-salt-transforming taxa post-Triphala, facilitating lipid digestion and motility.

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**Antimicrobial Synergy** – Low-pH-stable tannins synergise with standard bismuth quadruple therapy against *H. pylori* in vitro (fractional inhibitory concentration index < 0.5).



**Figure 1: Mechanisms of Action of Triphala in Gastrointestinal Disorders**

## SAFETY PROFILE

Across > 600 reported human exposures, adverse events are predominantly mild (loose stools, transient cramps, dizziness). No hepatotoxicity or nephrotoxicity signals have been documented with doses  $\leq 6$  g/day for up to three months. Drug–herb interactions remain theoretical but caution is advised with CYP3A4 substrates due to in-silico tannin binding.

## DISCUSSION

Cumulative evidence positions Triphala as a multi-target phytomedicine for functional and infectious GI disorders. Strengths include its balanced antioxidant/anti-inflammatory portfolio, microbiota-friendly polyphenols and historical safety. Limitations are the paucity of large, blinded RCTs, standardisation challenges (fruit ratio, extraction solvent, marker compounds) and under-representation of paediatric and geriatric cohorts. Future work should prioritise dose-response trials with validated symptom scores, pharmacokinetic profiling of key tannins and systems-biology mapping of host–microbe–metabolite networks.

## CONCLUSION

Triphala demonstrates promising efficacy signals in constipation, IBS, ulcer prophylaxis and *H. pylori* inhibition, underpinned by robust mechanistic plausibility and a favourable safety

record. High-quality, multicentre RCTs and harmonised quality-control standards are required before Triphala can be integrated into evidence-based gastroenterology practice.

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