

# Herbal Approaches to Ulcer Management: Mechanistic Pathways, Bioactive Constituents, and Clinical Outcomes

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**Abstract:** Peptic ulcer disease remains a pervasive clinical challenge, with complex etiologies involving *Helicobacter pylori* infection, NSAID use, oxidative stress, and impaired mucosal defense. This review synthesizes current evidence on herbal approaches for ulcer management, emphasizing mechanistic pathways, bioactive phytochemicals, and clinical outcomes. Herbal medicines demonstrate multi-targeted effects including inhibition of NF- $\kappa$ B/MAPK-driven inflammation, scavenging of reactive oxygen species, stimulation of prostaglandin and mucin production, angiogenesis, and acid secretion reduction, alongside direct anti-*H. pylori* activity. Phytochemicals such as flavonoids, alkaloids, terpenoids, curcuminoids, and phenolic acids mediate these benefits and promote mucosal healing. Clinical and preclinical studies reveal that herbal therapies offer efficacy comparable or superior to conventional drugs, with lower recurrence and favorable safety profiles. Integration of herbal with standard regimens may enhance healing and reduce recurrence rates. Continued research is warranted to standardize formulations, clarify pharmacokinetics, and support rational, evidence-based integration of herbal medicine in peptic ulcer management

**Keywords:** Phytochemicals, Flavonoids , Alkaloids, Curcumin , Anti-inflammatory mechanisms, Antioxidant activity, *Helicobacter pylori*, NF- $\kappa$ B signaling, MAPK pathway

