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# CURCUMA XANTHORRHIZA ROXB. IN DIGESTIVE HEALTH MANAGEMENT: A SYSTEMATIC REVIEW OF PHARMACOLOGICAL AND ETHNOMEDICAL EVIDENCE

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***Abstract***
*Curcuma xanthorrhiza* Roxb. (commonly known as Temulawak) is a traditional Indonesian medicinal plant widely used for managing digestive disorders. This systematic review aims to critically evaluate the pharmacological mechanisms, clinical relevance, and ethnomedicinal applications of Curcuma xanthorrhiza in digestive health. Literature was obtained from PubMed, ScienceDirect, Scopus, Google Scholar, and Garuda from 2013 to 2023, using keywords including "Curcuma xanthorrhiza," "digestive health," "gastrointestinal disorders," "curcuminoids," and "xanthorrhizol." The included studies reveal that bioactive compounds such as curcuminoids (1.6%–2.2%) and xanthorrhizol (1.48%–1.63%) exert hepatoprotective, anti-inflammatory, antimicrobial, and carminative effects. Traditional forms include fresh herbal decoctions, powdered simplisia, and polyherbal formulas, while modern preparations involve standardized extracts. Curcuma xanthorrhiza demonstrates promising efficacy and safety for improving digestive function and modulating gastrointestinal metabolism. Its integration into clinical phytotherapy and public health strategies could provide a culturally relevant, evidence-based alternative to conventional therapy.
***Keywords:*** *Curcuma xanthorrhiza, digestive disorders, traditional medicine, curcuminoid, xanthorrhizol*

## INTRODUCTION

Digestive disorders, including gastritis, irritable bowel syndrome (IBS), and inflammatory bowel disease (IBD), are increasingly recognized as public health concerns with multifactorial etiologies. Modern dietary habits characterized by high intake of saturated fats, low fiber, excessive sugar, and processed foods, compounded by sedentary behavior and psychological stress, have significantly altered the landscape of gastrointestinal health worldwide.[1,2] In both developed and developing countries, gastrointestinal complaints are among the leading causes of outpatient visits, leading to substantial direct and indirect healthcare costs.[3]

Parallel to the limitations of conventional therapies—which may cause side effects such as gastrointestinal bleeding, microbial resistance, and hepatic toxicity—there is growing public and scientific interest in botanical alternatives.[4] Medicinal plants offer a rich repository of bioactive compounds with potential multi-target effects, safety profiles, and cultural acceptability. Among these, *Curcuma xanthorrhiza* Roxb. (Temulawak), endemic to Indonesia and widely used in Southeast Asian traditional medicine, has emerged as a promising candidate for integrative digestive care.[5]

This rhizomatous plant is traditionally used for hepatobiliary conditions, indigestion, and inflammatory disorders. Its major constituents, particularly curcuminoids and xanthorrhizol, exhibit a broad spectrum of pharmacological

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activities.[6] Recent scientific evidence suggests that these compounds not only support liver function and bile secretion but also contribute to gut microbiota balance, mucosal defense, and systemic anti-inflammatory pathways.[7,8] However, despite its long-standing ethnomedicinal application, a systematic synthesis bridging empirical practice with biomedical validation remains underdeveloped. This review addresses this gap by compiling and critically analyzing recent literature on *Curcuma xanthorrhiza*'s role in gastrointestinal health.

## METHODS

A systematic literature review was conducted using PRISMA guidelines. Articles were sourced from PubMed, Scopus, ScienceDirect, Google Scholar, and Garuda between 2013 and 2023. Search terms included: "*Curcuma xanthorrhiza*," "Temulawak," "gastrointestinal health," "curcuminoids," "xanthorrhizol," and their combinations in both English and Bahasa Indonesia. Inclusion criteria were: (1) original research or review articles, (2) clinical or preclinical studies on digestive health, and (3) English or Indonesian language. Exclusion criteria were: (1) inaccessible full texts, (2) irrelevant outcomes, and (3) non-peer-reviewed sources. Selected studies were assessed for quality using the JBI Critical Appraisal Checklist.

## RESULTS

Botanical and Phytochemical Profile *Curcuma xanthorrhiza* is a Zingiberaceae family member characterized by large rhizomes rich in curcuminoids (1.6–2.2%), xanthorrhizol (1.48–1.63%), and essential oils (3–12%) such as camphor, ar-curcumene, and germacrone. It thrives in tropical climates and has been extensively documented in Indonesian ethnomedicine. Pharmacological Activities Curcuminoids exert hepatoprotective effects via antioxidant pathways and liver enzyme regulation. Xanthorrhizol offers mucosal protection and antimicrobial properties. Combined, these compounds modulate bile flow, reduce gut inflammation, and enhance digestive function. Traditional and Modern UsageTraditional applications include decoctions of fresh rhizomes (15–25g) and dry powders (3–9g). Contemporary formulations consist of standardized extracts in capsules, syrups, or tablets. These are increasingly integrated into phytopharmaceutical products. Clinical and Preclinical Evidence Multiple studies affirm the efficacy of Curcuma xanthorrhiza in managing dyspepsia, liver dysfunction, and gastrointestinal inflammation. Martinez et al. (2022) reviewed 45 trials, confirming its benefits in chronic digestive disorders. Safety profiles indicate low toxicity at recommended doses.

## DISCUSSION

The therapeutic efficacy of *Curcuma xanthorrhiza* in digestive health can be understood through an integrated lens of phytochemistry, pharmacodynamics, and ethnomedicine. Curcuminoids modulate key inflammatory markers such as TNF-α and NF-κB[9], while enhancing hepatic glutathione levels, thereby exerting a dual role in detoxification and inflammation control.[10] Xanthorrhizol, as a sesquiterpenoid, demonstrates selective antimicrobial effects, particularly against Helicobacter pylori and opportunistic intestinal pathogens, which are implicated in

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ulcer formation and dysbiosis.[11]

Bile secretion stimulated by xanthorrhizol and curcuminoids enhances emulsification and digestion of dietary fats, contributing to symptom relief in dyspeptic individuals.[12] Additionally, preclinical studies have shown that *Curcuma xanthorrhiza* modulates gut microbiota composition, promoting beneficial species such as Lactobacillus and Bifidobacterium while suppressing pathogenic strains.[13] This prebiotic effect has far-reaching implications, given the gut-brain axis's role in not only digestion but also in mood regulation and immune function.[14]

Moreover, the anti-ulcerogenic properties of *Curcuma xanthorrhiza* are supported by its capacity to enhance mucin secretion, inhibit gastric acid hypersecretion, and protect epithelial integrity.[15] These effects collectively position the plant as a viable option for functional gastrointestinal disorders, which are increasingly linked to gut barrier dysfunction and low-grade inflammation.[16]

From a translational perspective, however, challenges remain. Variability in phytochemical content due to differences in cultivation, harvest, and processing methods hampers standardization.[17] Furthermore, the bioavailability of curcuminoids is intrinsically low, necessitating formulation strategies such as nanoparticle encapsulation, phospholipid complexes, or adjuvant use (e.g., piperine).[18]

In terms of clinical adoption, while several trials suggest benefits, large-scale randomized controlled trials (RCTs) with standardized preparations and validated outcome measures are still limited.[19] Regulatory frameworks in many countries also lack specific monographs or quality benchmarks for Curcuma xanthorrhiza, unlike its more globally recognized counterpart, Curcuma longa.[20]

## CONCLUSION

*Curcuma xanthorrhiza* represents a viable natural intervention for digestive disorders, backed by traditional use and modern evidence. Its pharmacological actions and favorable safety profile justify its inclusion in integrative medicine frameworks. Continued research and policy support are essential to realize its full clinical and commercial potential.

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