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Curcuma longa L. (Turmeric): A Literature Review on its Phytotherapeutic Effects and Therapeutic Potential

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Abstract

Curcuma longa L., commonly known as turmeric, is a plant of the Zingiberaceae family widely used in traditional Asian and Indian medicine. Its main bioactive compound, curcumin, is responsible for several pharmacological effects, including anti-inflammatory, antioxidant, antimicrobial, and antitumor properties. This study aims to review recent scientific literature on the phytotherapeutic effects of turmeric, highlighting its mechanisms of action and potential therapeutic applications. Studies published between 2010 and 2025 were analyzed from the PubMed, Scielo, and ScienceDirect databases. The results indicate that turmeric exhibits high therapeutic potential and a broad spectrum of clinical applications, although challenges related to the bioavailability of curcumin still limit its efficacy in conventional pharmaceutical formulations.

Keywords: *Curcuma longa*, curcumin, phytotherapy, medicinal plants, natural pharmacology.

Introduction

Curcuma longa L. is a perennial herbaceous plant native to Southeast Asia, widely used as a spice and therapeutic agent. Its use dates back more than 4,000 years in Ayurvedic and Chinese medicine, where it has traditionally been employed to treat inflammation, digestive disorders, and skin diseases.

In recent decades, turmeric has attracted increasing scientific interest due to the presence of curcumin, a yellow polyphenol with well-documented biological activities. Modern studies demonstrate that curcumin modulates molecular pathways involved in inflammatory, oxidative, and proliferative processes, suggesting potential therapeutic applications in chronic diseases such as arthritis, cancer, diabetes, and neurodegenerative disorders.

Given this context, the present study aims to review recent scientific evidence on the phytotherapeutic and pharmacological effects of *Curcuma longa* L., emphasizing its mechanisms of action and challenges for clinical use.

Methodology

This is a narrative literature review based on articles published between 2010 and 2025 in the PubMed, Scielo, and ScienceDirect databases. The following descriptors were used: “*Curcuma longa*”, “curcumin”, “therapeutic effects”, “phytotherapy”, and “medicinal plants”.

Inclusion criteria

- Original articles, reviews, and clinical studies addressing the therapeutic effects of turmeric.
- Publications in English, Portuguese, or Spanish.

Exclusion criteria

- Studies with no therapeutic relevance or those focused exclusively on culinary or agro-industrial aspects.

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Results and Discussion

Bioactive Compounds of Turmeric

The main active substance of turmeric is curcumin, along with demethoxycurcumin and bisdemethoxycurcumin. These compounds belong to the curcuminoid group and are responsible for the plant's characteristic yellow color.

In addition, turmeric contains essential oils (such as turmerone, atlantone, and zingiberene) that contribute to its therapeutic properties.

Anti-inflammatory and Antioxidant Effects

Several studies have shown that curcumin inhibits inflammatory mediators such as TNF- α , IL-6, and COX-2, while enhancing the activity of endogenous antioxidant enzymes. This action makes it promising for the treatment of chronic inflammatory diseases such as rheumatoid arthritis and ulcerative colitis.

Antimicrobial Activity

Turmeric exhibits bactericidal and antifungal activity, being effective against *Staphylococcus aureus*, *Escherichia coli*, and *Candida albicans*. This activity supports its traditional use in wound healing and skin infections.

Antitumor Effects

Preclinical studies show that curcumin interferes with cell proliferation and induces apoptosis in tumor cells. It acts by modulating pathways such as NF- κ B, PI3K/Akt, and p53. These findings suggest potential use as an adjuvant in oncological therapies.

Bioavailability and Challenges

The main limitation of curcumin's therapeutic use is its low oral bioavailability due to rapid hepatic metabolism and poor intestinal absorption. Strategies such as combination with piperine (from black pepper) and the use of lipid-based nanoparticles have shown promising results in enhancing absorption.

Conclusion

Curcuma longa L. stands out as one of the most promising medicinal plants for the development of modern phytotherapeutic products. Curcumin and its derivatives demonstrate a wide range of therapeutic effects, particularly in anti-inflammatory, antioxidant, and antitumor areas.

Nevertheless, the limitation of its bioavailability remains a major challenge for effective clinical application. Future research should focus on developing formulations that improve curcumin's stability and absorption, thereby expanding its use in integrative medicine and natural pharmacology.

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