



A comprehensive review on *curcuma Longa*

Deepika Chauhan¹, Renu Tiwari², Aman Tripathi³,
Sumit Kumar⁴, Vivek kumar⁵

1,2 Assistant professor of Innovative college of pharmacy, Greater Noida

3,4,5 Scholar of Innovative college of pharmacy, Greater Noida

ABSTRACT

Turmeric, a widely used spice globally, exhibits anti-inflammatory, antimicrobial, antioxidant, and anti-cancer properties. Research indicates that curcumin, an active compound in turmeric, holds promise for treating various skin conditions. A systematic review delved into clinical studies from PubMed and Embase, focusing on the impact of turmeric and curcumin-containing products on skin health. Among 234 articles, 18 met the criteria, assessing ingestion, topical application, or both. These studies covered conditions such as acne, alopecia, atopic dermatitis, photoaging, oral lichen planus, pruritus, psoriasis, radiodermatitis, and vitiligo. Ten studies reported significant improvements in skin conditions with turmeric/curcumin treatments compared to controls. This early evidence suggests potential therapeutic benefits from oral and topical turmeric/curcumin products. However, the existing studies are limited, highlighting the need for further research to comprehensively evaluate their effectiveness and underlying mechanism.[1]

KEYWORDS - Key terms: skin conditions; curcumin; turmeric; review article; acne; eczema; atopic dermatitis; psoriasis; vitiligo; itching.

INTRODUCTION

Turmeric, renowned both in scientific circles and culinary realms, is a rhizomatous herbaceous perennial plant (*Curcuma longa*) belonging to the ginger family.[2]

While its medicinal properties, predominantly sourced from curcumin, have been acknowledged for millennia, recent investigations have focused on unraveling its precise mechanisms of action and identifying bioactive constituents. Curcumin, also known as diferuloylmethane, serves as the primary natural polyphenol found in *Curcuma longa*'s rhizome and other *Curcuma* species. Across Asian cultures, *Curcuma longa* has been a traditional medicinal herb, valued for its antioxidant, anti-inflammatory, antimicrobial, and anticancer attributes.[3]

This polyphenolic compound, curcumin, exhibits a multifaceted approach by targeting various signaling

molecules and displaying cellular-level activity, contributing to its array of health advantages. Its documented benefits encompass alleviating inflammatory conditions, aiding in metabolic syndrome and pain management, and supporting inflammatory and degenerative eye conditions.[3]



FIGURE: 1

While curcumin supplementation presents a multitude of therapeutic prospects, its primary mechanisms lie in its antioxidant and anti-inflammatory effects [3].

ORIGIN

Turmeric, scientifically labeled as *Curcuma longa*, has its roots in Southeast Asia, notably in India, where it has thrived for millennia. Cultivated and integrated into diverse cultural customs, especially in traditional Indian medicine (Ayurveda), turmeric belongs to the ginger family (Zingiberaceae). Flourishing in tropical climates with abundant warmth and rainfall, this plant remains predominantly cultivated in regions with these specific conditions. India stands as a key global producer and exporter of turmeric, underscoring its profound historical and cultural importance within the country.[4]

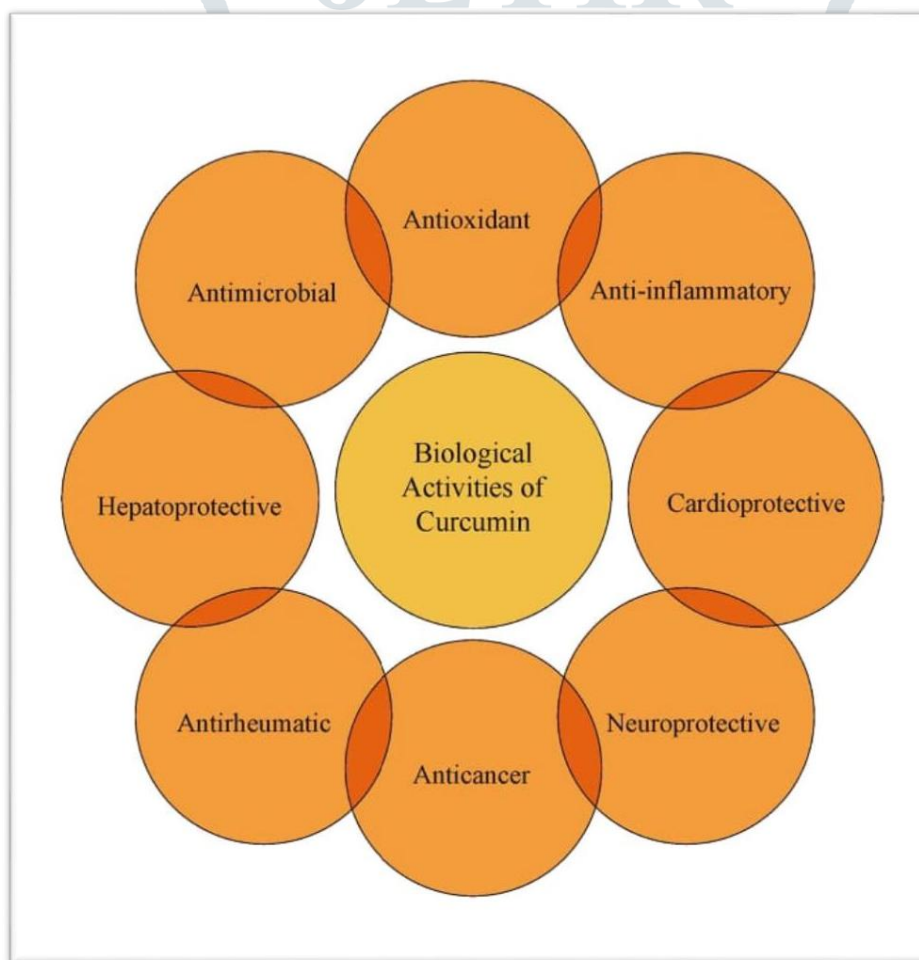
India boasts the most extensive range of *Curcuma* species, estimated at approximately 40 to 45 species, showcasing significant diversity in the genus. Thailand follows closely, hosting roughly 30 to 40 species of *Curcuma*. Several other tropical Asian countries also exhibit a substantial presence of wild *Curcuma* species.[4]

However, recent research has brought attention to the taxonomic complexities within *C. longa*, highlighting that only specimens originating from South India can be confidently identified as true

C. Longa. Establishing a clear understanding of the phylogeny, relationships, variations within and between species, and the accurate identity of various species and cultivars worldwide remains an ongoing challenge. Notably, many species labeled and traded as "turmeric" in different Asian regions actually belong to multiple visually similar taxa, often sharing common local names, contributing to taxonomic confusion.[4]

PHARMACOLOGICAL ACTIVITY

Studies have demonstrated that turmeric, whether in powder, extract, or isolated compound form, exhibits a wide array of pharmacological actions with minimal adverse effects. The diverse pharmacological effects of curcumin are largely attributed to the methoxy group on the phenyl ring, along with its phenolic and 1,3 diketone systems. Curcumin may also be applied to the skin to alleviate the symptoms of inflammatory skin disorders and allergies by reducing inflammation and irritation.



ANTIOXIDANT ACTIVITY

Turmeric, renowned for its principal compound, is often hailed as one of the most potent antioxidants. Its constituents, including curcumin, boast water and fat-soluble extracts that exhibit antioxidant abilities on par with vitamins C and E. The hepatoprotective benefits associated with turmeric stem from its ability to reduce the production of pro-inflammatory cytokines. Curcumin shields bodily cells from free radical harm by diminishing their oxygen levels. Although demethoxycurcumin and bisdemethoxycurcumin are less effective in scavenging superoxide anion compared to pure curcumin, they still contribute to the reduction of heart disease, glaucoma, cataracts, high blood pressure, macular degeneration, and high cholesterol.[5]

ANTIMICROBIAL ACTIVITY

The ethanolic extract of turmeric (*Curcuma longa*) displayed antimicrobial properties upon testing against various bacteria. It effectively inhibited all organisms assessed, demonstrating the most significant inhibition against *Shigella flexneri* and the least against *Staphylococcus epidermis*. Turmeric's ability to inhibit microbes is attributed to its diverse array of phytochemicals, including tannins, alkaloids, phenols, steroids, flavonoids, phlorotannin, cardiac glycosides, terpenoids, triterpenes, saponin, among others.[6]

USES OF TURMERIC

Contemporary in vitro investigations highlight turmeric's prowess as a robust antioxidant, anti-inflammatory, antimutagenic, antimicrobial, and anticancer substance. This versatile spice, commonly found in culinary practices and home remedies, showcases notable antioxidant capabilities operating at various levels. Within India, the turmeric leaf finds application in crafting unique sweet delicacies, such as patoleo. This involves layering rice flour and a blend of coconut and jaggery onto the leaf, followed by enclosing and steaming the ensemble within a distinct utensil. It is Present in numerous consumables like canned beverages, baked goods, dairy items, ice cream, yogurt, yellow cakes, orange juice, biscuits, popcorn, cereals, and sauces, turmeric serves as a prominent component. Additionally, it stands as a key element in curry powders. While commonly utilized in its dried and powdered state, turmeric is also employed fresh, resembling the usage of ginger. In Tamil Nadu and Andhra Pradesh, as a component of the Tamil–Telugu marriage custom, dried turmeric tubers, bound with string, are fashioned into a Thali necklace. In

Western and Coastal India, during Marathi and Konkani weddings, as well as ceremonies among Kannada Brahmins, couples fasten turmeric tubers to their wrists using strings in a ritual termed “Kankana Bandhana”. Additionally, in several Hindu communities, applying turmeric paste to the bride and groom is a customary pre-wedding practice known as the haldi ceremony.[7]

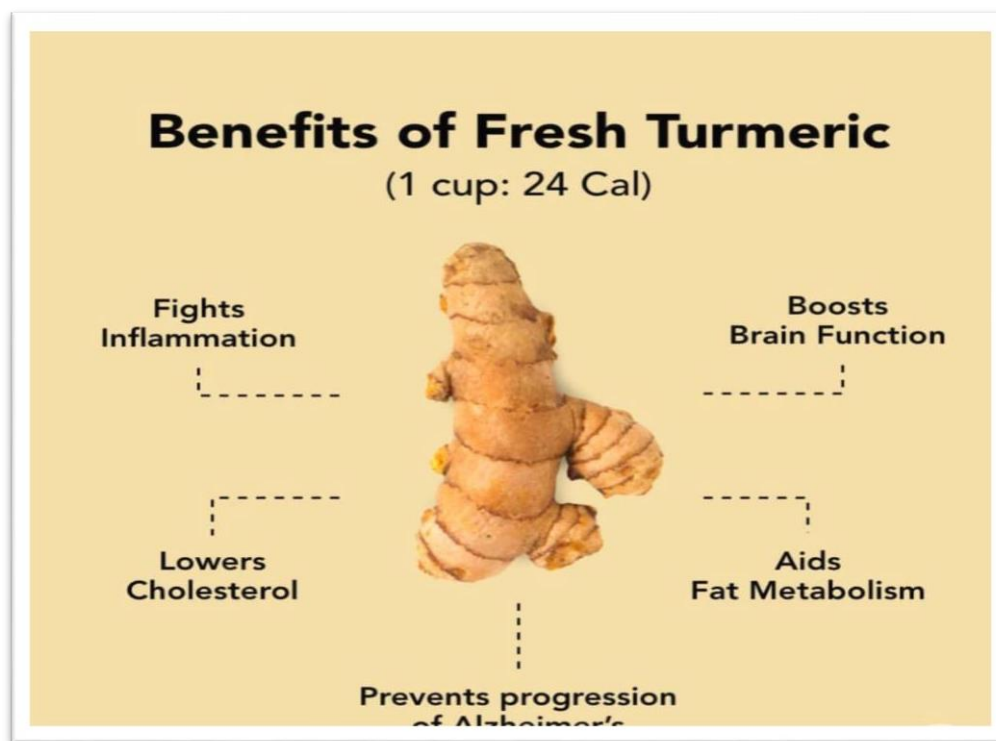


FIGURE: 2

Potential Defense Against Alzheimer's Disease

Several research studies indicate that curcumin holds promise in combating Alzheimer's disease. Primarily, it seems to hinder the formation and promote the disintegration of problematic protein known as beta-amyloid plaques. These plaques develop amidst the brain's nerve cells, disrupting their communication—a defining characteristic of Alzheimer's. Eventually, this leads to irreversible damage to nerve cells, severely impacting cognition. Notably, the latest pharmaceutical treatment for Alzheimer's, Aduhelm, operates similarly by diminishing amyloid plaques.[8]

Moreover, curcumin shows potential in clearing out another suspect protein called tau, which accumulates within neurons and is also associated with Alzheimer's disease.[8]

However, research outcomes vary. A small-scale clinical trial discovered that consuming turmeric orally did not demonstrate improvements in cognitive function or the slowing of cognitive decline among Alzheimer's patients.[8]

Improved Brain Health

Curcumin holds potential for benefiting the brain in more extensive capacities. Its antioxidant and anti-

inflammatory attributes, as a polyphenol, might aid in averting or alleviating symptoms associated with additional neurodegenerative conditions such as dementia, Huntington's disease, multiple sclerosis, and Parkinson's disease.[9]

Potential Improvement in Mood

In small-scale clinical trials, curcumin demonstrated a reduction in major depression and, in certain instances, provided relief from anxiety among participants in the studies.[9]

"Curcumin appears to positively impact mood by enhancing brain derived neurotrophic factor," mentions Dr. Jampolis. Brain-derived neurotrophic factor (BDNF) serves to maintain the health of neuronal cells, and its production appears to be stimulated by plant-based polyphenols like curcumin. "BDNF is linked to the regeneration of neurons," she adds.[9]

However, it's important to note that research in this area is limited. There are no long-term studies assessing the potential effects of curcumin over a duration of at least eight weeks.[9]

STUDIES OF TURMERIC OIL

Oral submucous fibrosis, a chronic ailment characterized by oral mucosal fibrosis, is a precancerous condition carrying a notable risk of malignant transformation. Laboratory studies examining the impact of turmeric oil and turmeric oleoresin on micronuclei incidence in lymphocytes from healthy individuals did not reveal an increase in micronuclei compared to untreated controls. Moreover, these compounds displayed protective effects against benzo[α]pyrene-induced micronuclei elevation in circulating lymphocytes.[10]

In subsequent research, patients diagnosed with oral submucous fibrosis received oral doses of turmeric oil (600 mg TO mixed with 3g TE/day), turmeric oleoresin (600 mg + 3g TE/day), and 3g turmeric extract/day as a control for three months. Results showed a reduction in micronucleated

cells both in exfoliated oral mucosal cells and circulating lymphocytes across all three treatment groups. Turmeric oleoresin exhibited heightened effectiveness in reducing oral mucosal cell micronuclei, while comparable decreases in micronuclei counts were noted in circulating lymphocytes among all three groups.[10]



FIGURE: 3

Another clinical investigation aimed to evaluate the effectiveness of curcumin capsule and turmeric oil in treating patients with oral submucous fibrosis, comparing their clinical and histopathological outcomes with conventional chemopreventive treatment. Following treatment and subsequent monitoring, statistically significant improvements were observed in the clinical signs and symptoms of patients treated with curcumin capsules and turmeric oil compared to those administered conventional therapy. Positive histopathological changes were also noted after the administration of curcumin capsules and turmeric oil.[10]

CONCLUSIONS

Turmeric's advantageous effects are historically derived from its consumption in the diet, even at modest levels and over extended durations. A comprehensive comprehension of the effective dosage, safety profile, and mechanism of action is indispensable for the judicious utilization of turmeric in treating human ailments. Further clinical investigations are essential to ascertain the suitability of turmeric in addressing human health concerns and advancing well-being. Turmeric showcases a spectrum of activities encompassing antibacterial, antiviral, anti-inflammatory, antitumor, antioxidant, antiseptic, cardioprotective, hepatoprotective, nephroprotective, radioprotective, and digestive properties. Analysis of turmeric's phytochemical composition has unveiled numerous compounds, such as curcumin, volatile oil, and curcuminoids, known for their robust pharmacological attributes. The intricacies stemming from these details strongly imply that bridging traditional wisdom regarding turmeric's medicinal applications, or that of

any medicinal plant, with modern medical sciences necessitates a comprehensive examination of the entire plant and a diverse array of its extracts in various therapy focused animal models. Therefore, our focus has been directed towards investigating the pharmacological activity profiles of turmeric oil.

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