

A Review on Turmeric: *Curcuma longa*.

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ABSTRACT: -

The primary component of turmeric is curcuma, which contains the three curcumins that give its varied physiological and therapeutic effects. The spice turmeric (*curcuma longa*), which has therapeutic characteristics, has been utilized extensively in South Asian traditional medical practices, particularly those in China and India. The current study reviews the research on curcumin's anti-inflammatory properties in the treatment of cancer. Studies have demonstrated that the highly pleiotropic substance curcumin interacts with a variety of molecular targets. A careful analysis of the literature review that curcumin, the main active component of turmeric, has a significant impact in the emergence of various malignancies. The majority of curcumin's anticancer potential comes from its ability to inhibit and/or a variety of intercellular transcription factors that regulate the production and growth of proteins are activated. An overview of the effects and mechanism of action is given in the current review.

Keywords: Curcumin, Anti-Inflammatory properties, Pharmacology, Arthritis.

I. INTRODUCTION: -

The perennial rhizomatous plant turmeric has its origins in South Asia (*curcuma longa*). The spices used in kitchens as food coloring and preservatives get their bright yellow color from the plant's rhizome. Traditional Chinese and Indian medicine, primarily, uses turmeric to treat inflammatory illnesses. It is used to reduce inflammation and clean the blood as well as to heal wounds. Additional pharmacological activities include antibacterial and antioxidant properties. The primary focus of this essay is on curcumin's

anti-inflammatory properties as a cancer treatment. Curcumin, which is regarded to be the substance responsible for turmeric's medical effectiveness in a range of disorders like ulcerative colitis, inflammation, and other inflammatory diseases, is one of the most investigated components edemas. 8 IBS, dyspepsia, gastric ulcer, osteoarthritis, and rheumatoid arthritis are some of the disorders that might affect the joints. Not only that, but several in vivo studies^[2] have shown that turmeric has therapeutic potential for Alzheimer's disease.

TURMERIC: -

Synonyms of *Curcuma Longa*: -

Sanskrit: ameshta

English: Indiansaffron

Hindi: haldi

Marathi: Halad^[3].

Biological sources: -

The plant known as *Curcuma longa* Linn (*C. domestica*), a member of the Zingiberaceae family, produces both dried and fresh rhizomes that are used to make turmeric^[4]. It contains at least 1.5% curcumin.

Microscopic characteristics: -

Color: yellowish-brown

Odour: characteristic

taste: -slightly bitter^[5].

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Chemical Constituents: -

The amount of volatile oil, resin, copious

zingiberene starch grains, and curcuminoids, which give turmeric its yellow color, is around 5%. Curcumin is the primary ingredient of curcuminoids. The additional ingredients in turmeric oil include turmeric one, zingiberene, borneol, and caprylic acid. According to reports, curcumin has antimicrobial and anti-inflammatory properties⁽⁶⁾.

Taxonomical Classification of Curcuma Longa

Scientific Name: Curcuma longa

Kingdom: Plantae

Subkingdom: Tracheobionta-Vascular plants

Super division: Spermatophyta

Division: Magnoliophyta – Flowering plants

Class: Liliopsid- monocotyledons

Subclass: Zingiberidae

Order: Zingiberales

Family: Zingiberaceae– Ginger

Family Genus : Curcuma L.-curcuma

Species: Curcuma longa L. –common^[3]

History: -

In India's Vedic civilization, where it was used as a culinary spice and had some religious significance, turmeric has been utilized for approximately 4000 years. By the year 700 A.D., it probably spread to China, East Africa, West Africa, and Jamaica. By the year 1200 A.D., it probably reached China. Marco Polo wrote about this spice in 1280, marveling at a vegetable with characteristics so close to saffron. Turmeric has a long history of medical use in South Asia, according to Sanskrit medical texts, Ayurvedic, and Unani traditions. A turmeric-containing ointment is suggested in Socrata's Ayurvedic Compendium, which dates back to 250 B.C., to treat the effects of tainted food.^[7,8]

Cultivation: -

➤ **Climate:** For optimum growth, the turmeric plant requires temperatures between 20°C and 30°C as well as a sizable amount of annual rainfall. Individual plants have long, oblong leaves and can reach a height of 1 m. Both the tropics and the subtropics are suitable for growing the tropical herb turmeric. If the shade is not too dense, it will grow lushly, but on open land that is exposed to the light, it generates bigger and better rhizomes. Turmeric needs a humid environment.

➤ **Soil:** It is best to grow turmeric in rich, friable soil. Suitable soils have a slightly higher sand content. It is grown in a variety of soil types,

from clay loams to light black, sandy loam, and red soils. It thrives in irrigated and rain-fed locations on light black, ashy loam, red soils, and stiff loams.

➤ **Harvesting:** Typically, the harvest season runs from January until March or April. Early and medium varieties reach maturity in 7-8 and 8-9 months, respectively. The crop is ready to be picked when the leaves begin to dry out and turn yellow. When the plant reaches maturity, the leaves are removed just above the soil, the earth is tilled, and rhizomes are collected by hand plucking or by carefully lifting the clumps with a spade.

➤ **Irrigation:** The number of irrigations for turmeric will depend on the soil and weather. In medium-heavy soils, 15 to 25 irrigations are supplied, while in red soils with a light texture, 35 to 40 irrigations are required.

Storage:

Rhizomes for seed are typically piled up and covered with turmeric leaves under trees or in well-ventilated shelters. [910]

Uses: -General health benefits: -

Medicinal uses: -

- 1) Turmeric encourages a stable mood.
- 2) Curcumin promotes wound healing.
- 3) The turmeric group appeared to get better joint pain alleviation.
- 4) Turmeric supports stable blood sugar levels.
- 5) Optimizing cholesterol is another benefit of turmeric.
- 6) It has health advantages for asthma and eczema and can cure both chronic and acute allergies.
- 7) It has been discovered to be successful in treating psoriasis and acne.
- 8) It has potent immunomodulatory effects.

Turmeric has historically been used as a natural treatment for wound healing. Additionally, turmeric aids in the treatment of bacterial infections, eye disorders, cancer, atherosclerosis, liver disease, osteoarthritis, and women's menstrual problems. The mucous membranes that cover the throat, lungs, stomach, and intestine are anti-inflammatory when treated with turmeric.^[11,12]

Side Effects, Contraindications and Precautions: -

• Patients with gall bladder issues are advised not to consume turmeric; patients with bleeding issues are advised to avoid turmeric. In pregnant women, high dosages of turmeric produce uterine contractions.

Men who use turmeric may experience reduced testosterone levels and slower sperm motility. Patients should stop using turmeric at least two weeks before to surgery since it may impair blood coagulation and prevent iron absorption. As a result, those who are iron deficient should utilize it with caution.^[12,13]

Parts of plant: -^[15]

❖ **Turmericseeds**



Fig.1.Turmericseeds

❖ **Turmericleaves**



Fig. 2 Turmericleaves

❖ **Turmericflowers**



Fig 3.Turmericflowers

❖ **Turmericfruit**



Fig . 4) Turmeric fruit

❖ **Turmericpowder**



Fig. 5 Turmeric powder

Mechanisms of Action: -**Antioxidant: -**

Curcumin's benefits on the many illnesses included in this review are mostly explained by its antioxidant and anti-inflammatory characteristics^{(16) (17)} It has been demonstrated that curcumin improves oxidative stress systemic indicators. Superoxide dismutase (SOD) and other antioxidants' serum activity have been shown to rise as a result^[18,19,20]. A recent systematic review and meta-analysis of randomized control data on the effectiveness of supplementing with purified curcuminoids on oxidative stress parameters revealed a significant impact of curcuminoids supplementation on all examined parameters of oxidative stress, including plasma activities of SOD and catalase, as well as serum concentrations of glutathione peroxidase (GSH) and lipid peroxides⁽²¹⁾

Anti-Inflammatory: -

Numerous chronic diseases have been linked to oxidative stress, and since one of these diseases can easily cause the other, its pathological processes are quite similar to those of inflammation. In reality, the association between oxidative stress and inflammation is demonstrated by the fact that inflammatory cells release a variety of reactive species at the site of inflammation, which causes oxidative stress^[22]. Additionally, a variety of reactive oxygen/nitrogen species have the ability to start an intracellular signaling cascade that boosts the production of pro-inflammatory genes. Numerous chronic illnesses and diseases have been linked to inflammation in their

development. These conditions include Alzheimer's disease (AD), Parkinson's disease, multiple sclerosis, epilepsy, cerebral injury, cardiovascular disease, metabolic syndrome, cancer, allergy, asthma, bronchitis, colitis, arthritis, renal ischemia, psoriasis, diabetes, obesity, depression, exhaustion, and acquired immune deficiency syndrome. AIDS^{(23) (23)}

Arthritis: -

Osteoarthritis (OA), a chronic disorder of the joints, is one such illness connected to inflammation, both chronic and acute. Over 250 million individuals are affected by it worldwide, which raises healthcare expenses, impairs everyday activities (ADL), and ultimately lowers quality of life^[24,25]. While OA used to be primarily thought of as a degenerative and non-inflammatory disorder, it is now understood to have inflammatory components, including higher cytokine levels, as well as possibly being related to systemic inflammation. Despite the lack of a treatment, there are a number of pharmaceutical treatments available; however, many are expensive and have unfavorable side effects. As a result, interest in complementary therapies, such as dietary supplements and herbal cures, has surged. In patients with OA and rheumatoid arthritis (RA), curcumin has been demonstrated to have anti-arthritis properties in several studies^[26,27,28,29].

Healthy People: -

The majority of curcumin human studies conducted to far have recruited participants with pre-existing medical conditions. Perhaps this is the case because it can be challenging to do studies on healthy participants because the benefits might not be as obvious and visible if baseline biomarkers are normal. As a result, despite the potential time and financial costs, such studies may provide the most useful information regarding any potential health benefits in healthy individuals. Because diverse dosages, frequently as high as 1 g, have been used, cross-comparisons across the few studies that have been undertaken can be difficult^[30,31]. In one study, healthy adults between the ages of 40 and 60 received an 80 mg/day dose of a lipidated form of curcumin. For four weeks, individuals received either curcumin (supplied; N = 19) or a placebo (administered; N = 19). Treatment consisted of 400 mg of an 80 mg per day curcumin powder. Before and after the four weeks, samples of blood and saliva were obtained. Triglyceride levels were markedly reduced by curcumin, but not total

cholesterol, LDL, or HDL levels. Two chemicals linked to atherosclerosis, soluble intercellular adhesion molecule 1 (sICAM) and nitrous oxide (NO), both increased significantly. Although neither c-reactive protein nor ceruloplasmin indicated an increase in neutrophil activity linked to inflammation, myeloperoxidase levels did. Glutathione peroxidase and super oxide dismutase activity were unchanged, but salivary amylase activity decreased—a symptom of stress—while plasma catalase and salivary radical scavenger activity increased. Both plasma alanine amino transferase activity, a marker of liver damage, and beta amyloid plaque, a marker of ageing in the brain, reduced. This implies that those with no existing medical conditions might benefit from a relatively low dose of curcumin^[32].

II. CONCLUSIONS: -

Curcumin has attracted interest from all over the world due to its many health benefits. Its anti-oxidant and anti-inflammatory processes appear to play a major role in mediating these benefits. Combining curcumin with drugs like papering, which dramatically increases its bioavailability, is the greatest approach to reap these benefits. According to study, curcumin may help treat oxidative and inflammatory disorders, metabolic syndrome, arthritis, anxiety, and hyperlipidemia. Additionally, it might help in the management of muscle pain and inflammation brought on by physical activity, enhancing recovery and performance in physically active people. Additionally, a relatively small dose may be beneficial even for people who have no recognized medical conditions.

REFERENCES: -

- [1]. International Journal of Creative Research Thoughts (IJCRT)www.ijcrt.orgAnti-inflammatoryproperties ofTurmeric(Curcuma longa)inAnticanceractivity.
- [2]. AmmonHP,Wahl MA.PharmacologyofCurcuma longa.Planta Med1991;57: 1-7.
- [3]. AmaraAA,El-MassryMH,BogdadyHH.Plantcrudeextracts could be the solution:ExtractsshowingIvivoantitumorigenicactivity. PakJPharmSci. 2008; 21:159-71.[PubMed]
- [4]. TextbookofniralpublicationC.K.Kokate,A .P.Purohit,S.B.Gokhalepageno14.136
- [5]. TextbookofniralpublicationC.K.Kokate,A .P.Purohit,S.B.Gokhalepageno14.137
- [6]. TextbookofniralpublicationC.K.Kokate,A .P.Purohit,S.B.Gokhalepageno9.109
- [7]. <http://www.agrifarming.in/turmeric-farming/>
- [8]. Blumenthal M, Goldberg A, Brinckmann J. Herba Medicine: Expanded Commission E Monographs. Newton,MA: Integr MedComm,2000,379-84.
- [9]. Soudamini NK, Kuttan R. Inhibition of chemicalcarcinogenesis by curcumin. JEthnopharmacol.1989;27:227- 233
- [10]. Aggarwal BB, Takada Y, Oommen OV. From chemoprevention to chemotherapy:Common targets and common goals. Expert Opin Investig Drugs. 2004; 3:1327-38.[PubMed]
- [11]. Ramirez-Tortosa MC, Mesa MD, Aguilera MC et al. Oral administration of a turmericextractinhibitsLDLoxidationandhypocholesterolemiceffectsinrabbits
- [12]. SoudaminiNK,KuttanR.Inhibitionofchemicalcarcinogenesisbycurcumin.JEthnopharmacol.1989;27:227-233.
- [13]. Park EJ, Jeon CH, Ko G et al. Protective effect of curcumin in rat liver injury inducedbycarbontetrachloride.J PharmPharmacol.2000; 52:437-440.
- [14]. Deshpande UR, Gadre SG, Raste AS et al. Protective effect of turmeric (Curcuma longa L.) extract on carbon tetrachloride-induced liver damage in rats. Indian J Exp Biol.1998;36:573-577
- [15]. JournalofPharmacognosyandPhytochemistry
- [16]. Lin Y.G., Kunnumakkara A.B., Nair A., Merritt W.M., Han L.Y., Armaiz-Pena G.N., Kamat A.A., Spannuth W.A., Gershenson D.M., Lutgendorf S.K., et al. Curcumin inhibits tumor growth and angiogenesis in ovarian carcinoma by targeting the nuclear factor-κB pathway. Clin. Cancer Res. 2007.
- [17]. Marchiani A., Rozzo C., Fadda A., Delogu G., Ruzza P. Curcumin and curcumin-like molecules: From spice to drugs. Curr. Med. Chem. 2014.
- [18]. Banach M., Serban C., Aronow W.S., Rysz J., Dragan S., Lerma E.V., Apetrii M., Covic A. Lipid, blood pressure and kidney update 2013. Int. Urol. Nephrol. 2014.
- [19]. Menon V.P., Sudheer A.R. Antioxidant

- and anti-inflammatory properties of curcumin. *Adv. Exp. Med. Biol.* 2007.
- [20]. Panahi Y., Alishiri G.H., Parvin S., Sahebkar A. Mitigation of systemic oxidative stress by curcuminoids in osteoarthritis: Results of a randomized controlled trial. *J. Diet. Suppl.* 2016.
- [21]. Sahebkar A., Serbanc M.C., Ursoniuc S., Banach M. Effect of curcuminoids on oxidative stress: A systematic review and meta-analysis of randomized controlled trials. *J. Funct. Foods.* 2015.
- [22]. Biswas S.K. Does the Interdependence between Oxidative Stress and Inflammation Explain the Antioxidant Paradox? *Oxid. Med. Cell. Longev.* 2016.
- [23]. Panahi Y., Hosseini M.S., Khalili N., Naimi E., Simental-Mendia L.E., Majeed M., Sahebkar A. Effects of curcumin on serum cytokine concentrations in subjects with metabolic syndrome: A post-hoc analysis of a randomized controlled trial. *Biomed. Pharmacother.* 2016.
- [24]. Hunter D.J., Schofield D., Callander E. The individual and socioeconomic impact of osteoarthritis. *Lancet Nat. Rev. Rheumatol.* 2014.
- [25]. 32. Vos T., Barber R.M., Bell B., Bertozzi-Villa A., Biryukov S., Bolliger I., Charlson F., Davis A., Degenhardt L., Dicker D., et al. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: A systematic analysis for the Global Burden of Disease Study. *Lancet.* 2013.
- [26]. Henrotin Y., Priem F., Mobasher A. Curcumin: A new paradigm and therapeutic opportunity for the treatment of osteoarthritis: Curcumin for osteoarthritis management. SpringerPlus. 2013.
- [27]. Belcaro G., Cesarone M.R., Dugall M., Pellegrini L., Ledda A., Grossi M.G., Togni S., Appendino G. Product-evaluation registry of Meriva®, a curcumin-phosphatidylcholine complex, for the complementary management of osteoarthritis. *Panminerva Med.*
- [28]. Belcaro G., Hosoi M., Pellegrini L., Appendino G., Ippolito E., Ricci A., Ledda A., Dugall M., Cesarone M.R., Maione C., et al. A controlled study of a lecithinized delivery system of curcumin (meriva®) to alleviate the adverse effects of cancer treatment. *Phytother. Res.* 2014.
- [29]. Chandran B., Goel A. A randomized, pilot study to assess the efficacy and safety of curcumin in patients with active rheumatoid arthritis. *Phytother. Res.* 2012.
- [30]. Strimpakos A., Sharm R. Curcumin: Preventive and therapeutic properties in laboratory studies and clinical trials. *Food Chem. Toxicol.* 2008.
- [31]. Epstein J., Sanderson I., Macdonald T. Curcumin as a therapeutic agent: The evidence from in vitro, animal and human studies. *Br. J. Nutr.* 2010.
- [32]. DiSilvestro R.A., Joseph E., Zhao S., Bomser J. Diverse effects of a low dose supplement of lipidated curcumin in healthy middle-aged people. *Nutr. J.* 2012.