

A Review on Turmeric– Curcuma longa

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Abstract- Turmeric's principal component is curcuma, which includes the three curcumins that give it its many physiological and medicinal properties. Turmeric (*curcuma longa*) is widely used in traditional South Asian medicine, especially in China and India, due to its medicinal properties. This study examines curcumin's anti-inflammatory capabilities in cancer therapy. Curcumin interacts with several molecular targets, as proven by studies. Curcumin, the active component of turmeric, has been linked to the development of several cancers, according to a thorough literature assessment. Curcumin's capacity to inhibit and/or activate a range of intercellular transcription factors that control the generation and proliferation of proteins accounts for the majority of its anticancer potential. The current review provides an overview of the effects and mechanism of action.

Keywords- Arthritis, pharmacology, curcumin, anti-inflammatory properties.

INTRODUCTION

Turmeric (*curcuma longa*), a perennial rhizomatous plant, is native to South Asia. The rhizome of the plant gives spices used in kitchens as food coloring and preservatives their vivid yellow hue. Turmeric is mostly used in traditional Chinese and Indian medicine to treat inflammatory conditions. In addition to healing wounds, it is used to purify the blood and lessen inflammation. Antibacterial and antioxidant qualities are among the additional pharmacological activities. This essay's main focus is on the anti-inflammatory qualities of curcumin as a cancer treatment. One of the most studied ingredients in edemas is curcumin, which is thought to be the compound responsible for turmeric's therapeutic benefits in a variety of conditions like ulcerative colitis, inflammation, and other inflammatory diseases. 8 Among the conditions that could harm the joints are rheumatoid arthritis, osteoarthritis, stomach ulcers, IBS, and dyspepsia. Furthermore, a number of in vivo investigations [2] have demonstrated the therapeutic potential of turmeric for Alzheimer's disease.

TURMERIC: -



Synonyms of Curcuma Longa :-

English- Indiansaffron

Marathi- Halad

Sanskrit- Ameshta

Hindi- Haldi

Biological Sources-

Turmeric is made from the dried and fresh rhizomes of the plant known as *Curcuma longa* Linn (*C. domestica*), which belongs to the Zingiberaceae family [4]. It has a minimum of 1.5% curcumin.

Name in science: *Curcuma longa*

Kingdom: Plantae

Subkingdom: Tracheobionta-Vascular Plants

Division: Plants with flowers (Magnoliophyta)

Super Division: Phytoplankton

Class: Monocotyledons (Lilipids)

Category: Zingiberidae

Place an order for ginger ales.

Zingiberaceae, or the ginger family Genus: *L. curcuma* L.

Curcuma longa L. is a common species. [3]

Microscopic attributes: -

Color: brownish-yellow

Odor: distinctive

flavor: -quite-bitter[5].

Chemical Constituents-

About 5% of the substance is made up of volatile oil, resin, abundant zingiberene starch grains, and curcuminoids, which give turmeric its yellow hue. The main component of curcuminoids is curcumin. Zingiberene, borneol, caprylic acid, and turmeric one are among the other components in turmeric oil. Curcumin is said to possess antibacterial and anti-inflammatory properties (6).

Curcuma Longa's Taxonomical Classification

Storage:

Under trees or in well-ventilated shelters, rhizomes for seed are usually heaped and covered with leaves of the turmeric plant. [910]

Uses- Benefits to general health-

Benefits of medicine: -

- 1) Turmeric promotes emotional stability.
- 2) Curcumin facilitates healing of wounds.
- 3) Joint pain relief seemed to be improved in the turmeric group.
- 4) Stable blood sugar levels are supported by turmeric.
- 5) Another advantage of turmeric is that it optimizes cholesterol.
- 6) It can treat both acute and chronic allergies and provides health benefits for asthma sufferers.
- 7) It has been found to be effective in treating acne and psoriasis.
- 8) Its immunomodulatory effects are strong.

Historically, people have used turmeric as a natural wound healing remedy. Turmeric also helps treat osteoarthritis, cancer, atherosclerosis, liver disease, bacterial infections, eye conditions, and menstruation issues in women. Turmeric reduces inflammation in the mucous membranes that coat the lungs, stomach, intestines, and throat. [11,12]

Side Effects, Contraindications and Precautions:

Patients who experience bleeding problems should refrain from consuming turmeric, as should those who have gall bladder problems. High doses of turmeric cause uterine contractions in expectant mothers. Men who take turmeric may see a decrease in testosterone and a slowdown in sperm motility. Patients should cease taking turmeric at least two weeks before to surgery since it may cause blood coagulation problems and hinder the absorption of iron. Those who are iron deficient should therefore use it with caution. [12,13]

MECHANISMS OF ACTION

Antioxidant-

Curcumin's anti-inflammatory and antioxidant properties mostly account for its advantages on the numerous ailments covered in this review (16–17). Curcumin has been shown to enhance systemic signs of oxidative stress This has been demonstrated to increase the serum activity of antioxidants such as superoxide dismutase (SOD) [18,19,20].. A recent systematic review and meta-analysis of randomized control data on the effects of purified curcuminoids supplementation on oxidative stress parameters showed that curcuminoids had a significant effect on all parameters of

oxidative stress that were examined, including serum concentrations of glutathione peroxidase (GSH) and lipid peroxides, as well as plasma activities of SOD and catalase (21).

Anti-Inflammatory-

Oxidative stress has been connected to a number of chronic diseases, and since one of these conditions can easily lead to the other, its pathogenic mechanisms are quite similar to those of inflammation. Actually, the fact that inflammatory cells release a range of reactive species at the site of inflammation, which results in oxidative stress, proves the link between oxidative stress and inflammation [22]. Furthermore, a range of reactive oxygen/nitrogen species possess the capability to initiate an intracellular signaling cascade that enhances the synthesis of genes that promote inflammation. The development of many chronic illnesses and disorders has been associated with inflammation. These illnesses include metabolic syndrome, cancer, bronchitis, asthma, arthritis, colitis, diabetes, obesity, depression, tiredness, and acquired immune deficiency syndrome. Alzheimer's disease (AD), Parkinson's disease, multiple sclerosis, epilepsy, cerebral injury, cardiovascular disease, and renal ischemia are also included. HIV/AIDS (23).

Arthritis-

One such condition linked to both chronic and acute inflammation is osteoarthritis (OA), a chronic ailment of the joints. It affects more than 250 million people globally, which drives up healthcare costs, hinders ADLs, and eventually degrades quality of life [24, 25]. Although OA was once mainly believed to be a degenerative, non-inflammatory condition, it is now known to have inflammatory elements, such as elevated cytokine levels, and may even be connected to systemic inflammation. There are a lot of pharmaceutical therapies available despite the lack of a cure, but many of them are pricey and have undesirable side effects. Consequently, there has been a sharp increase in interest in complementary therapies, including dietary supplements and herbal remedies. Curcumin has been shown in multiple trials to have anti-arthritic activities in patients with OA and RA [26,27,28, 29]

Healthy People-

Most human trials on curcumin that have been done so far have enrolled subjects who already had a medical problem. This could be the case because it can be difficult to conduct studies on healthy individuals since, in the event that baseline biomarkers are normal, the advantages would not be as clear-cut. Because of this, these studies may offer the most valuable information about any prospective health advantages in healthy individuals, despite the possible time and financial costs. Cross-comparisons across the few trials that have been conducted can be challenging due to the varied doses that have been employed, often up to 1 g [30, 31]. In one trial, healthy adults between the ages of 40 and 60 were given a lipidated form of curcumin at a dose of 80 mg per day. Participants were given either a placebo (delivered; N = 19) or curcumin (provided; N = 19) for a period of four weeks. The course of treatment included 400 mg of an 80 mg daily curcumin powder. Samples of saliva and blood were taken both before and after the four weeks. Curcumin significantly lowered triglyceride levels, but not total cholesterol, LDL, or HDL levels. Soluble intercellular adhesion molecule 1 (sICAM) and nitrous oxide (NO), two substances connected to atherosclerosis, both markedly increased. Myeloperoxidase levels showed an increase in neutrophil activity associated with inflammation, although c-reactive protein and ceruloplasmin did not. Salivary amylase activity dropped, which is a sign of stress, whereas salivary radical scavenger and plasma catalase activity increased. Glutathione peroxidase and super oxide dismutase activity remained unchanged. Both plasma alanine amino transferase activity, a marker of liver damage, and beta amyloid plaque, a marker of ageing in the brain, reduced. This suggests that a comparatively low dosage of curcumin may be beneficial for people who do not currently have any medical issues [32].

Metabolic Syndrome-

Curcumin's potential to reduce systemic inflammation has ramifications that go beyond arthritis, as systemic inflammation is linked to numerous illnesses that impact multiple systems. One such illness is metabolic syndrome (MetS), which is characterized by low high-density lipoprotein cholesterol (HDL-C), raised low-density lipoprotein cholesterol (LDL-C), elevated triglyceride levels, insulin resistance, hyperglycemia, hypertension, and obesity, particularly visceral obesity. Curcumin has demonstrated the ability to mitigate multiple elements of metabolic syndrome by enhancing insulin sensitivity [43, 44], inhibiting adipogenesis [45], and lowering hypertension [46], inflammation [47], and oxidative stress [48, 49]. Furthermore, there is proof that curcuminoids alter gene expression and the activity of lipoprotein metabolism-related enzymes, which lowers plasma triglyceride and cholesterol levels and raises HDL-C levels [50,51, 52]. Obesity and overweight are associated with chronic low-grade inflammation; pro-inflammatory cytokines are generated, however the precise processes are unknown it is believed that these cytokines mostly cause the difficulties linked to diabetes and cardiovascular disease. It is crucial to manage inflammation as a result. Over the course of eight weeks, 117 MetS individuals were randomly assigned to receive either 1 g curcumin plus 10 mg piperine to improve absorption, or a placebo plus 10 mg piperine in a double-blind, parallel-group trial. Following curcumin administration, there were substantial decreases ($p < 0.001$) in the serum concentrations of TNF- α , IL-6, transforming growth factor beta (TGF- β), and monocyte chemoattractant protein-1 (MCP-1). Serum levels of TGF- β were reduced ($p = 0.003$) in the placebo group, but not those of IL-6 ($p = 0.735$), TNF- α ($p = 0.138$), or MCP-1 ($p = 0.832$).

A comparison between the two groups revealed that the curcumin group experienced considerably larger decreases in serum concentrations of TNF- α , IL-6, TGF- β , and MCP-1 ($p < 0.001$). After adjusting for potential confounders, such as changes in blood lipids and glucose levels, as well as the baseline serum concentration of the cytokines, changes in other indicators, aside from IL-6, continued to be statistically significant.

Within a two-week washout period, 36 obese people were randomly assigned to receive either 1 g curcumin plus 10 mg piperine or a placebo for 30 days in a randomized double-blind placebo-controlled crossover experiment. Following this, they were given the other medication. Serum triglyceride concentrations were significantly reduced, but body mass index (BMI), body fat, and serum concentrations of high-sensitivity C-reactive protein (hs-CRP), LDL-C, HDL-C, and total cholesterol were not significantly affected by the treatment. The authors speculate that the reason these results contradict other publications could be due to the short supplemental time, poor diet control, and low supplemental dose. [50]

Anticarcinogenic Effects-

Curcumin has been shown in animal tests with rats and mice and in vitro research with human cell lines to prevent carcinogenesis at three stages: tumor promotion, angiogenesis, and tumor growth.

Curcumin decreased tumor growth and cell proliferation in two investigations of prostate and colon cancer. Both in vitro and in vivo investigations have shown that curcumin and turmeric can inhibit the activity of a number of prevalent mutagens and carcinogens in a range of cell types. Turmeric and curcumin have anticarcinogenic properties because they directly scavenge free radicals and act as direct antioxidants. They also indirectly raise glutathione levels, which helps the liver detoxify pollutants and carcinogens while also preventing the development of nitrosamines.

Antimicrobial Effects-

Numerous bacteria, parasites, and harmful fungi are inhibited in their growth by curcuma longa essential oil and turmeric extract. Diets supplemented with 1 percent turmeric were shown to reduce small intestine lesion scores and improve weight gain in chicks infected with the caecal parasite *Eimeria maxima*. Turmeric oil used topically inhibited dermatophytes and pathogenic fungus, however neither curcumin nor turmeric oil affected the yeast isolates in another animal investigation in which guinea pigs were infected with either pathogenic molds, dermatophytes, or yeast. The guinea pigs with dermatophyte and fungal infections showed improvements in their lesions, which vanished seven days after the use of turmeric. Curcumin has demonstrated a moderate level of effectiveness against important pathogens such as *Plasmodium falciparum* and *Leishmania*.

Curcumin enhances immunity-

In the unlikely event that some cells avoid apoptosis, curcumin can potentially aid the body in battling cancer. Following consumption of curcumin, researchers observed increased numbers of B type and CD4+ T-helper immune cells in the intestinal mucosa. Apart from stimulating the immune system locally, curcumin also improves immunity overall. When mice were fed curcumin, researchers in India found that the mice had more antibodies and a stronger immune system.

Side Effects-

Curcumin has a lengthy history of safety. For instance, the Allowable Daily Intake (ADI) value of curcumin is 0–3 mg/kg body weight, citing reports from the European Food Safety Authority (EFSA) and the Joint United Nations and World Health Organization Expert Committee on Food Additives [65]. Many studies conducted on healthy participants have substantiated curcumin's safety and effectiveness. Notwithstanding its well-established safety, there have been a few documented adverse effects. The efficiency and safety of curcumin have been verified by multiple studies conducted on healthy individuals. Notwithstanding its well-established safety, there have been a few documented adverse effects. In a dose response trial, seven participants who received 500–12,000 mg and were monitored for 72 hours had yellow stool, dermatitis, diarrhea, and headaches [19] Another study found that some participants who received 0.45 to 3.6 g/day of curcumin for one to four months experienced nausea, diarrhea, and elevated levels of lactic dehydrogenase and alkaline phosphatase in their serum [66].

CONCLUSIONS

Because curcumin offers so many health benefits, people from all over the world are interested in it. Its anti-inflammatory and antioxidant mechanisms seem to be key in mediating these advantages. The ideal method to benefit from these effects is to take curcumin in combination with drugs like piperine, as this greatly increases its bioavailability. Curcumin has been shown in a study to be beneficial in treating anxiety, arthritis, metabolic syndrome, oxidative and inflammatory diseases, and hyperlipidemia. Furthermore, it may aid in the treatment of inflammation and muscle soreness brought on by exercise, improving recuperation and function in physically active individuals. In addition, even those without known medical issues may benefit from a comparatively low dosage.

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