



# Pharmacological Recommendation of Turmeric (*Curcuma longa* L.) as Medicinal Plant

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## Abstract:

Turmeric or *Curcuma longa* L. is a perennial herb, a member of the Zingiberaceae family, widely cultivated in Asian countries. The rhizome is the part of the plant that is used medicinally as a yellow powder, as a flavoring agent in many dishes, and as a medicine to treat many ailments, especially as an anti-inflammatory agent, as well as for flatulence, jaundice, it can be applied as an ointment to treat menstrual cramps, hematuria, bleeding, and colic or many skin conditions. *Curcuma longa* L. (root and rhizome), commonly known as turmeric, is a plant of high therapeutic and monetary value worldwide and is primarily used as a ferment and dietary supplement. The main dynamic elements of turmeric include three curcuminoids: curcumin, demethoxycurcumin, and bisdemethoxycurcumin. Similarly, unpredictable oils (Tumeron, Atlanton, Zingiberene) have additional pharmacological effects. Turmeric has incredible soothing properties and is a major cell-strengthening agent.

**Keywords:** Curcumin; Turmeric; Zingiberene; Anti-oxidant

## Introduction

Turmeric or *Curcuma longa* is primarily developed in Asian nations like China and India. The plant is one meter long in contrast, with short stems. Unquestionably, humans use turmeric, which has a significant fragrance throughout the world but is particularly popular in eastern cultures [1]. Curcumin is the most prevalent of the three curcuminoids—the others being demethoxycurcumin and bisdemethoxycurcumin—and is present in many of the bioactive components of turmeric. Turmeric is a typical peel found in all tropical and subtropical regions of the world. A majority of Asian countries, including China and India, have developed it [2]. In contrast, the plant has short stems and measures one meter in length. Without a doubt, humans use turmeric, a spice with a strong aroma that is particularly well-liked in eastern cultures. The three curcuminoids demethoxycurcumin, bisdemethoxycurcumin, and curcumin are most common and are found in many of the turmeric's bioactive ingredients. Curcumin and diferuloylmethane, two yellow coloring agents that make up 60% to 70% of the turmeric raw extract, are the two curcuminoid compounds that have been studied the most for their potential health benefits. Numerous clinical studies evaluating various potential health benefits of both turmeric and curcuminoids using these novel delivery methods have emerged over the past ten years as a result of significant research that improved the bioavailability of curcumin. These techniques include the addition of piperine, a

phytochemical that improves the absorption of curcumin in the intestines, and the use of cutting-edge transport systems that complex curcuminoids within various matrices [3].

## 2 .History of turmeric

Haridra, a Sanskrit term, means "strong remedy against jaundice." It is considered as the most well-known spice and has been eaten for countless centuries in western and southern India. It is also an essential part of Ayurvedic medicine. As a result, this skin is referred to as "Indian saffron" and is thought to be native to India [4]. Turmeric is believed to have originated in India and then travelled to China around the year 700 AD, East Africa around the year 800 AD, and West Africa around the year 1200 AD before beginning to acquire popularity throughout the world. Turmeric was introduced to Europe by Arab traders in the 13th century. Marco Polo was so taken with turmeric on his amazing Silk Road trip to India that he described it as a vegetable with saffron-like properties even though it is not saffron. His U.P. Rhizome was in Sihasnagart and Basti. The Jarda tribes in West Bengal's Parlia region use glue on the body to treat physical ills. To prevent sickness and improve their appearance, early Assamese women applied glue made from fresh rhizomes to their skin [5].

## 3. Scientific categorizing of Turmeric (*Curcuma longa* L.)

Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Order	Zingiberales
Family	Zingiberaceae
Genus	Curcuma
Species	C.longa
Bionomial name	Curcuma longa

## 4. Botanical elucidation:

- Physical description:

The root of *Curcuma longa* L. (Zingiberaceae family) is used to make turmeric. A perennial herbaceous shrub, turmeric grows as tall as 1 m (3 ft 3 in).

1. Turmeric leaves:

Two sets of substitute leaves have been arranged. Leaf sheath, stem, and leaf blade are distinguished from one another. A false stalk is formed from the sheaths of the leaves 50 to 115 centimetres (20-45 in) is the length of the petiole. The standard leaf cutting edges are 76 to 115 centimetres (30 to 45 in) long, rarely reaching 230 cm. (7 ft 7 in). They are elongated to curved with a diameter of 38 to 45 centimetres (15 to 17+12 in) and narrow at the tip [6].

2. Turmeric flower:

There are stems and leaves at the top of the inflorescence, and there are no flowers; these are white to green, slightly pinkish purple in some places, and the upper end is cone-shaped. Hermaphrodite

flowers are bilateral symmetry and triplets [7]. Three sepals 0.8 to 1.2 cm (3/8 to 1/2 in) long, fused and white, with fluffy hairs; three calyx teeth inconsistent. Three bright yellow petals fuse into a corolla tube up to 3 cm long. The three coronal lobes are 1.0–1.5 cm (3/8–5/8 in) long and triangular with delicate barbs at the upper ends. Although normal corolla protrusions are larger than two levels, only the middle stamens of the inner ring are mature. The remaining stamens transform into staminodes.

### 3. Turmeric root:

The majority of curcuminoid compounds studied for their potential health benefits are curcumin and diferuloylmethane, two yellow coloring agents that make up 60% to 70% of the turmeric raw extract. There are incredibly long, tube-shaped, fragrant, golden to orange rhizomes.



**Fig1: Turmeric root powder**



**Fig 2: Turmeric root**

## 5. Phytopharmacology of turmeric

Turmeric has a variety of therapeutic and pharmacological effects. The main phytopharmacological and therapeutic properties of turmeric are listed below. Several clinical properties have been attributed to turmeric. As we all know, astragalus has the effect of strengthening the body, and it is listed as the enemy of diabetes, blood fat lowering, palliative, antidiarrheal, liver protection, antiasthma, and anticancer drug by clinical experts. Turmeric is widely used in cosmetics [8]. A companion section discusses its various restorative uses in medicine.

- **Antioxidant:**

A companion section discusses its various restorative uses in medicine. It is important to note that the majority of studies recalled for the meta-examination used some form of detail to overcome bioavailability issues, and four out of six used piperine. Curcumin's effect on libido is achieved through several different ingredients. It can seek different types of free revolutionaries such as: B. Reactive oxygen and nitrogen species (ROS and RNS, individually) [9].

- **Calming:**

Oxidative stress has been concerned in several ongoing illnesses, and its obsessive cycles are firmly recognized with these of irritation, in that one can be successfully incited by means of another. Truth be told, it is realized that incendiary cells free a range of receptive species at the web page of aggravation prompting oxidative pressure, which indicates the connection between oxidative strain and inflammation. Moreover, a range of responsive oxygen/nitrogen species can begin an intracellular flagging path that enhancements supportive of fiery pleasant articulation. Irritation has been identified in the development of several continual ailments and prerequisites. These conditions include AIDS, Parkinson's disease, Alzheimer's disease, exceptional sclerosis, epilepsy, cerebral injury, cardiovascular disease, metabolic disorder, malignancy, hypersensitivity, asthma, bronchitis, colitis, joint pain, renal ischemia, psoriasis, and Parkinson's disease. Beyond the scope of this study, curcumin has also been shown to inhibit aggravation through a number of structures; these findings support its use as a potential moderating expert [10].

- **Gastrointestinal effects:**

Turmeric has a variety of protective effects on the human intestine. Additionally, when rats are exposed to gastrointestinal insults like stress, alcohol, indomethacin, reserpine, and pyloric ligation, turmeric inhibits the development of ulcers by increasing gastric wall mucus. Additionally, it reduces intestinal spasm and raises the secretion of pancreatic enzymes, gastrin, bicarbonate, and secretin [11]. An open, section II scientific trial using 600 mg of powdered turmeric five times per day on 25 patients with endoscopically diagnosed peptic ulcers showed that 48 percent of patients had completely recovered. No adverse effects or abnormalities in the blood had been noted.

- **Diabetes mellitus:**

Turmeric exerts numerous defensive results on the human intestine. Turmeric additionally inhibits ulcer formation brought about by means of stress, alcohol, Indomethacin, reserpine, pyloric ligation, growing gastric wall mucus in rats subjected to these gastrointestinal insults. It additionally inhibits intestinal spasm and will increase bicarbonate, gastrin, secretin and pancreatic enzyme secretion [12]. An open, section II scientific trial carried out on 25 sufferers with endoscopically-diagnosed peptic ulcer, with 600 mg powdered turmeric 5 instances daily, end result proven that forty eight percentage of sufferers have been absolutely healed. No unfavorable reactions or blood abnormalities had been recorded. logical and foundational investigation uncovers the antidiabetic, hypolipidemic and hepatoprotective influences of *Curcuma longa* freeze dried rhizome powder broke down in milk which should be utilized as a possible and protected antidiabetic dietary enhancement of excessive doable. *Curcuma longa* is regarded to comprise curcuminoids, glycosides, terpenoids, and flavonoids. Maximal trouble of the protein Human Pancreatic Amylase (HPA) was once received with *Curcuma longa* isopropanol pay attention and CH<sub>3</sub>)<sub>2</sub>CO remove. This inhibitory recreation on HPA motives reduce in starch hydrolysis prompting added down glucose tiers. Turmeric rhizome grease paint is veritably salutary with Amla juice and Honey in Madhumeha (diabetes mellitus). The ingestion of 6 g turmeric multiplied postprandial serum insulin levels, however did not appear to have an effect on plasma glucose tiers or Gastrointestinal, in healthful subjects. The effects point out that *Curcuma longa* may also have an impact on insulin secretion [13]. The lively concepts inside the rhizome of Turmeric plant specifically curcuminoids decrease lipid peroxidation by way of keeping the things to do of antioxidant enzymes like superoxide dismutase, catalase and peroxidase at greater levels. Antioxidant residences of *curcuma longa* are due to curcumin and its three derivatives (demethoxycurcumin, bisdemethoxycurcumin and diacetyl curcumin)

- **Cardiovascular issues:**

The cell expansion in turmeric also anticipates cholesterol damage, assisting in the preventing of atherosclerosis. In fact, turmeric's cancer-fighting compounds have the same ability to suppress free radicals as vitamins C and E. Using the flavor in cooking has advantages because the cell-reinforcing properties of turmeric are not harmed by heat (unlike most nutrients). Curcumin lowers cholesterol and fatty substances, another type of fat that circulates in the body and increases the risk of cardiovascular disease, according to animal studies [14].

- **Osteoarthritis:**

According to studies, ingestible turmeric extracts, either alone or in combination with other herbaceous ingredients, may help with depressive management and may even improve functions in people with body part osteoarthritis [15]. In a few studies, turmeric was found to reduce osteoarthritis pain similarly to ibuprofen. However, it does not seem to work in addition to diclofenac to reduce pain and improve function in people with osteoarthritis [16].

- **Curcumin forestalls drug obstruction:**

Curcumin is a powerful medication obstruction preventer. It demonstrates unique inhibition of P-glycoprotein upregulation and allure mRNA promoted by Adriamycin. (ADM). The upper limit is also approximately equal to the cultivated intracellular drug accumulation and updated ADM cytotoxicity [17].

- **Alzheimer and turmeric:**

Epidemiological studies have suggested a decreased risk of Alzheimer's (AD) in patients who have used non steroidal anti-inflammatory drugs (NSAIDs) for a prolonged period of time, which concedes the possibility of demonstrating the role of brain inflammation in Alzheimer's disease. Once more, it was confirmed that raised cytokines and activated microglia were present. Curcumin has been shown to have NSAID-like properties and to lessen oxidative damage. The impact of 160 ppm and 5000 ppm doses of ingestible curcumin on redness, oxidative damage, and memorial study of plants was established to determine whether it could influence Alzheimer-like pathology [18]. Oxidized proteins and IL-1, a pro-inflammatory cytokine typically elevated in the brains of these rodents, were significantly decreased by both. This flavor shows promise for the treatment of Alzheimer's disease due to its allure productivity and obvious low toxicity.

- **Photo-protector activity:**

This response is brought on by its antioxidant activity. Unsaturated lipids accommodate a huge part of the skin's surface lipids. Then, bureaucracy is certain to be attacked by free radicals. Due to the sun's image of the body's internal organs, these radicals break down the skin more quickly. Long-term exposure to these radiations will cause the lipids to become humiliated, affecting the skin's character [19]. In laboratory tests, turmeric extract has been shown to be effective in reducing swelling and shielding epidermal containers from UVB-induced damage. Little dosages of turmeric's curcumin have happened shown to offer guardianship against the chromosomal harm incited by gamma aftermath.

- **Antimicrobial activity:**

A study of chicks infected with *Eimeria maxima* revealed that diets enriched with 1% turmeric successfully reduced digestive rage and further increased blood pressure. Seven days after luring application in another animal study, turmeric lubricate was used topically to repel pathogenic fungi and dermatophytes in guinea piglets. Turmeric has hepatoprotective and Reno protective properties. Turmeric has been shown to have silymarin-like Reno protective and hepatoprotective properties. Another moderate effort is made by curcumin against larger *Leishmania* and *Plasmodium falciparum* structures [20]. Animal studies have shown that turmeric protects the liver and kidneys from a variety of hepatotoxic insults. Turmeric's antioxidant properties and ability to reduce the production of pro-inflammatory cytokines are primarily responsible for its hepatoprotective and Reno protective effects. Aflatoxin-induced necrosis, biliary hyperplasia, and fatty changes were all reversed by turmeric and curcumin. By increasing biliary excretion of bile salts, cholesterol and bilirubin and increasing bile solubility, the salt of curcumin, sodium curcumate, also has a choleric effect and can prevent and treat cholelithiasis.

- **Inflammatory and edematous disorders:**

Curcumin is a potent anti-inflammatory agent with specific lipoxygenase and COX-2-restricting properties. *In vitro*, and *in vivo* examinations have exhibited appeal things at abridging two together intense and unending redness. In mice, curcumin causes shy edema at doses between 50 and 200 mg/kg. A 48 mg/kg body pressure application resulted in a 50% reduction in edema, making curcumin nearly as effective as cortisone and phenylbutazone at similar doses. In rodents, a lower dose Turmeric: Swelling and edema in the fondle were reduced by 20-80 mg/kg of curative spices. Curcumin was also a shy chemical compound that caused arthritis in rats at 40 mg/kg and did not cause severe toxicity up to 2 g/kg/epoch. An animal study found that an intraperitoneal dose of turmeric extract containing 4 mg total curcuminoids/kg/era for four days prior to the onset of rheumatoid arthritis caused shy joint redness in both acute (75 percent) and persistent (68 percent) stages of the disease. When administered to rats four days before the onset of arthritis, a 30-fold greater quantity of the curcuminoid preparation reduced joint redness by 48%, demonstrating the efficacy of a spoken preparation [21].

- **Antifertility:**

Turmeric is justified to have antagonistic to copiousness activity, as visualized in preliminary beings. When executed verbally to rats from the first to seventh era of gestation, a lot of 200 mg/kg corpse burden of oil heavenly and liquid extracts had a 100% antagonistic-opinion effect [22]. Studies granted the impact of curcumin as a potential vaginal protective and pursued that it suppressed human semen action and had the potential for the bettering of novel intravaginal safeguard. Curcumin was raised to have an antihuman immunodeficiency bacterium (HIV) possession apart from a discriminating semen-immobilizing effect, in accordance with the test results. The study raises that turmeric had a pill effect on male light rats what they acted group had lower semen action and bulk. It is concepting that turmeric had an effect on androgen combining either by preventing the function of Ley dig containers or the hypothalamus-pituitary pivot, that improper sequence shy spermatogenesis.

- **Turmeric in Liver Diseases:**

Curcumin paste was applied to the majority of the patient to treat jaundice, and the sorcerer successfully performed a beguiling cure. After that, the turmeric was washed away, and the political community as a whole believed that the disease was also washed away [23]. Turmeric is a deliberate liver-adapted disease

[24]. Patients suffering from jaundice or even infectious hepatitis should include turmeric in their diet because it is effective in discussing the condition. Turmeric and *Phyllanthus fraternus* have been shown to be very active in a clinical trial to treat poisonous hepatitis, with the exception of some side effects. In Japan, exploratory mammals were shown to be protected from CC14-inferred hepatotoxicity by vulgar turmeric rhizomes. The curcuminoids had a significant antagonistic and hepatotoxic effect. Ethanolic concentrate of turmeric went with significant hepatoprotective impact. Curcumin, along with *Eclipta alba* and *P. fraternus*, was a promising combination against liver damage. It reduced antitoxin bilirubin and normalized the amount of lipid in the liver in exploratory rats with CC14-inferred hepatotoxicity. Antitoxin triglycerides, cholesterol, and pre-lipoproteins all increased, and glycogen levels returned to normal after the situation.

## 6. Side Effects:

Curcumin has a traditional energy record for completely few occasions. For instance, the Allowable Daily Intake (ADI) of curcumin is middle from two points 0 and 3 mg/kg frame burden, in accordance with reports from JECFA (The Joint United Nations and World Health Organization Expert Committee on Food Additives) and EFSA (European Food Safety Authority) [25]. Curcumin's strength and animation have happened situated any preliminary studies on sound cases. Despite this based freedom, any hostile consequences have happened depicted. In any response study, seven cases the one taken 500–12,000 mg and were trailed for 72 hours knowing vague insides, using one's brain pain, a rash, and yellow seat [26]. In a various study, few family the one accepted 0.45 to 3.6 g of curcumin day-to-day for individual to four months fretted of revulsion, muscle spasm, and an increase in the amount of fundamental phosphatase and usually from breast dehydrogenase in their ancestry.

## 7. Conclusions:

Curcumin has gotten overall consideration for its various medical advantages, which seem to act essentially through its enemy of oxidant and calming instruments. These advantages are best accomplished when curcumin is joined with specialists like piperine, which increment its bioavailability fundamentally. Examination proposes that curcumin can help in the administration of oxidative and incendiary conditions, metabolic disorder, joint pain, tension, and hyperlipidemia. It might likewise help in the administration of activity instigated aggravation and muscle touchiness, accordingly improving recuperation and resulting execution in dynamic individuals. Likewise, a moderately low portion can give medical advantages to individuals that don't have analyzed ailments.

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