

## Turmeric Plant with Many Roles

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### ABSTRACT:

Herbal medicine has played an importance in both medicine and economics. Ethnobotany is a recent branch of natural science dealing with various aspects such as anthropology, archeology, botany, ecology, economics and medicine, religion, culture, and several other disciplines. Recently, great interest is given to studies of herbal drugs and traditional remedies are indicated worldwide and there has been an upsurge in the scientific investigations in the area. Although turmeric (*Curcuma longa* and *Curcuma aromatica* Salisb.) has been described in Ayurveda, as a treatment for inflammatory diseases and is referred to by different names in different cultures, an active principle called Curcumin or diferuloylmethane, a yellow pigment present in turmeric (curry powder) has been shown to exhibit numerous activities. Extensive research over the last fifty years has revealed several important functions of curcumin. The present study aimed to review the ethnobotanical properties, pharmacognostic, phytochemical, and pharmacological properties of turmeric plants. The root part of the plant is widely used by different tribal communities as turmeric has been shown to have a wide spectrum of biological actions, which include anti-inflammatory, anti-diabetic, analgesic, antibacterial, anti-fungal, anti-protozoal, anti-ulcer, hypocholesterolemic activities. Its anti-cancer effect induced mainly mediated through the induction of apoptosis and many more medicinal values.

### KEYWORDS-

(Herbal medicine, turmeric, pharmacokinetics, Curcumin )

### I. INTRODUCTION:-

Natural plant products have been used throughout human history for various purposes.

Having co-evolved with animal life, many of the plants from which these natural products are derived are billions of years old. Tens of thousands of these products are produced as secondary metabolites by higher plants as a natural defense mechanism against disease and infection. Many of these natural products have pharmacological or biological activity that can be exploited in pharmaceutical drug discovery and drug design. Medicines derived from plants have played a pivotal role in the health care of many cultures, both ancient and modern (Newman, Cragg, and Sander 2003; Butler 2004; Balunas and Kinghorn 2005; Gurib-Fakim 2006; Newman and Cragg 2007). The Indian system of holistic medicine known as "Ayurveda" uses mainly plant-based drugs or formulations to treat various ailments, including cancer. Of the at least 877 small-molecule drugs introduced worldwide between 1981 and 2002, the origins of most (61%) can be traced to natural products (Newman and Cragg 2007). Although many synthetic drugs are produced through combinatorial chemistry, plant-based drugs are more suitable, at least in biochemical terms, for human use. Nonetheless, modern medicine has neither held in very high esteem nor encouraged the medicinal use of natural products. Traditional medicine plays an important role in health care services. A large number of medicinal plants are used in Various pharmacological activities.

### TAXONOMY

- Kingdom- Plantae
- Class- Liliopsida
- Sub class- Commelinids
- Order- Zingiberales
- Family- Zingiberaceae
- Genus- Curcuma
- Species- Curcuma longa

Turmeric is a plant that has a very long history of medicinal use, dating back nearly 4000 years. In Southeast Asia, turmeric is used not only as a principal spice but also as a component in religious ceremonies. Because of its brilliant yellow color, turmeric is also known as “Indian saffron.” Modern

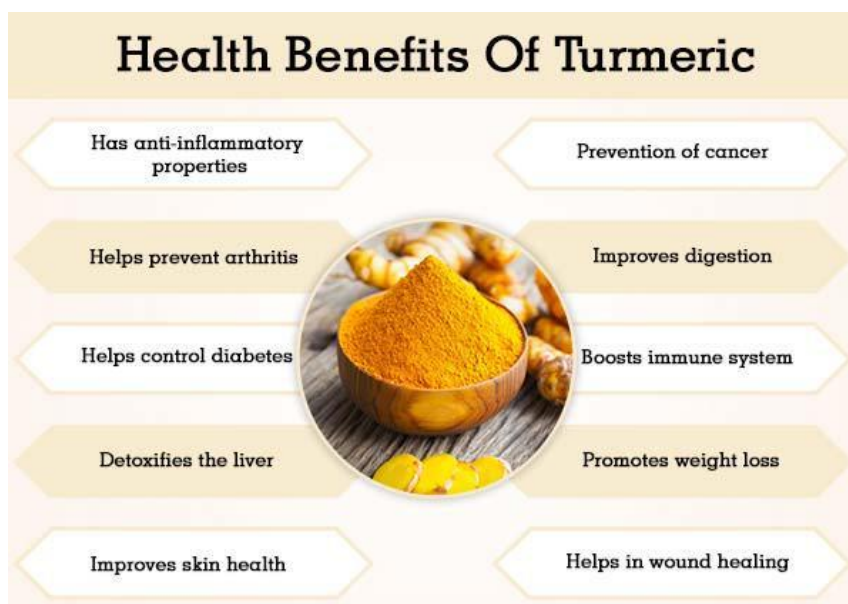
medicine has begun to recognize its importance, as indicated by the over publications dealing with turmeric that came out within the last 25 years. This review first discusses in vitro studies with turmeric, followed by animal studies, and finally, studies carried out on humans; the safety and efficacy of turmeric are further addressed.



#### PROPERTIES OF CURCUMIN(TURMERIC).

Curcumin has antioxidant, anti-inflammatory, Antiviral, and antifungal actions. Studies have shown that curcumin is not toxic to Humans. Curcumin exerts anti-inflammatory activity by inhibiting of a number of different molecules that play an important role in inflammation. Turmeric is Effective in reducing post-surgical inflammation. Turmeric helps to prevent Atherosclerosis by reducing the formation of blood clumps. Curcumin inhibits the Growth of *Helicobacter pylori*, which causes gastric ulcers and has been linked with Gastric cancers. Curcumin can bind with heavy metals such as cadmium and lead, Thereby reducing the toxicity of these heavy metals. This property of curcumin Explains its protective action on the brain. Curcumin acts as an inhibitor for Cyclooxygenase, 5-lipoxygenase, and glutathione S-transferase. It is a common Spice, known mostly for its use in Indian dishes as a common ingredient in curries And other ethnic meals. Turmeric has also been used for centuries in Ayurvedic Medicine, which integrates the medicinal properties of herbs with food. This Extraordinary herb has found its way into the

spotlight in the West because of its Wide range of medicinal benefits. Turmeric is a potent antioxidant. Curcumin, its main active constituent, is as powerful and antioxidant as Vitamins C, E, and Beta-Carotene, making turmeric usage a consumer choice for Cancer prevention, liver protection, and premature aging. Several published studies Also show that turmeric inhibits the growth of several different types of cancer Cells. In addition, turmeric is a powerful anti-inflammatory, easing conditions such As bursitis, arthritis, and back pain. Turmeric’s anti-inflammatory action is likely Due to a combination of three different properties. First, turmeric lowers the production of inflammation-inducing histamine. Secondly, it increases and prolongs the action of the body’s natural anti-inflammatory adrenal hormone, cortisol, and finally, turmeric improves circulation, Thereby flushing toxins out of small joints where cellular wastes and inflammatory Compounds are frequently trapped. Research has also confirmed the digestive Benefits of turmeric. Turmeric acts as a cholagogue, stimulating bile production, Thus, increasing the body’s ability to digest fats, improving digestion, and Eliminating toxins from the liver.



**ACTIVE CONSTITUENTS.** The active constituents of turmeric are the flavonoid Curcumin (diferuloylmethane) and various volatile oils, including tumerone, Atlantone, and zingiberone. Other constituents include sugars, proteins, and resins. The best-researched active constituent is curcumin, which comprises 0.3–5.4 Percent of raw turmeric.

**PHARMACOKINETICS.** Pharmacokinetic studies in animals have demonstrated That 40-85 percent of an oral dose of curcumin passes through the gastrointestinal tract unchanged, with most of the absorbed flavonoid being metabolized in the intestinal mucosa and liver. Due to its low rate of absorption, curcumin is often formulated with bromelain for increased absorption and enhanced anti-inflammatory effects.

**TURMERIC MIGHT POSSESS PROPERTY LIKE:-**

- ❖ It might be an antioxidant
- ❖ It might help lower blood sugar levels (antidiabetic)
- ❖ It might be a hypolipidemic (cholesterol-lowering)

- ❖ It might help alleviate inflammation (anti-inflammatory)
- ❖ It might be effective against microorganisms (antimicrobial)
- ❖ It might have hepatoprotective (liver-protecting) properties
- ❖ It might have nephroprotective (kidney-protecting) properties
- ❖ It might act as an anticoagulant (inhibits blood clotting)<sup>1</sup>

#### **MECHANISMS OF ACTION**

##### **Antioxidant Effects.:-**

Water- and fat-soluble extracts of turmeric and its curcumin component exhibit strong antioxidant activity, comparable to vitamins C and E. A study of ischemia in the feline heart demonstrated that curcumin and E. A study of ischemia in the feline heart demonstrated that curcumin Pretreatment decreased ischemia-induced changes in the heart. An in vitro study Measuring the effect of curcumin on endothelial heme oxygenase-1, an inducible Stress protein, was conducted utilizing bovine aortic endothelial cells. Incubation (18 hours) with curcumin resulted in enhanced cellular resistance to oxidative Damage.



### Hepatoprotective Effects:-

Turmeric has been found to have a Hepatoprotective characteristic similar to silymarin. Animal studies have Demonstrated turmeric’s hepatoprotective effects from a variety of hepatotoxic Insults, including carbon tetrachloride (CCl<sub>4</sub>), galactosamine, acetaminophen (paracetamol), and Aspergillus aflatoxin. Turmeric’s hepatoprotective effect is Mainly a result of its antioxidant properties, as well as its ability to decrease the Formation of pro-inflammatory cytokines. In rats with CCl<sub>4</sub>-induced acute and Subacute liver injury, curcumin administration significantly decreased liver injury In test animals compared to controls. Turmeric extract inhibited fungal aflatoxin Production by 90 percent when given to ducklings infected with Aspergillus parasiticus. Turmeric and curcumin also reversed biliary hyperplasia, fatty changes, And necrosis induced by aflatoxin production. Sodium curcumin, a salt of Curcumin, also exerts choleric effects by increasing biliary excretion of bile salts, Cholesterol, and bilirubin, as well as increasing bile solubility, therefore possibly Preventing and treating cholelithiasis.

**Anti-inflammatory Effects:-** The volatile oils and curcumin of Curcuma Longa exhibit potent anti-inflammatory effects oral administration of curcumin in Instances of acute inflammation was found to be as effective as cortisone or Phenylbutazone, and one-half as effective in cases of chronic inflammation. In rats With Freund’s adjuvant-induced arthritis, oral administration of Curcuma longa Significantly reduced inflammatory swelling compared to controls. In monkeys, Curcumin inhibited neutrophil aggregation associated with inflammation. C. longa’s anti-inflammatory properties may be attributed to its ability to inhibit Both biosynthesis of inflammatory

prostaglandins from arachidonic acid, and Neutrophil function during inflammatory states. Curcumin may also be applied Topical to counteract inflammation and irritation associated with inflammatory Skin conditions and allergies, although care must be used to prevent staining of Clothing from the yellow pigment.

**Anticarcinogenic Effects:-** Animal studies involving rats and mice, as well as In vitro studies utilizing human cell lines, have demonstrated curcumin’s ability to inhibit carcinogenesis at three stages: tumor promotion, angiogenesis, and tumor Growth. In two studies of colon and prostate cancer, curcumin inhibited cell proliferation and tumor growth. Turmeric and curcumin are also capable of Suppressing the activity of several common mutagens and carcinogens in a variety Of cell types in both in vitro and in vivo studies. The anticarcinogenic effects of Turmeric and curcumin are due to direct antioxidant and free-radical scavenging effects, as well as their ability to indirectly increase glutathione levels, thereby Aiding in hepatic detoxification of mutagens and carcinogens, and inhibiting Nitrosamine formation.

**ANTIMICROBIAL EFFECTS:-** Turmeric extract and the essential oil of Curcuma Longa inhibit the growth of a variety of bacteria, parasites, and pathogenic fungi. A Study of chicks infected with the caecal parasite Eimera maxima demonstrated that Diets supplemented with 1 percent turmeric resulted in a reduction in small Intestinal lesion scores and improved weight gain. Another animal study, in which Guinea pigs were infected with either dermatophytes, pathogenic molds, or yeast, Found that topically applied turmeric oil inhibited dermatophytes and pathogenic Fungi, but neither curcumin nor turmeric oil affected the yeast isolates. Improvements in lesions were observed in the dermatophyte- and fungi-infected Guinea pigs, and at seven days post-turmeric application the lesions

disappeared. Curcumin has also been found to have moderate activity against Plasmodium Falciparum and Leishmania major organisms.

**Cardiovascular Effects** Turmeric's protective effects on the cardiovascular system include lowering cholesterol and triglyceride levels, decreasing the Susceptibility of low-density lipoprotein (LDL) to lipid peroxidation, and inhibiting Platelet aggregation. These effects have been noted even with low doses of Turmeric. A study of 18 atherosclerotic rabbits given low-dose (1.6–3.2 mg/kg body weight daily) turmeric extract demonstrated decreased susceptibility of LDL to Lipid peroxidation, in addition to lower plasma cholesterol and triglyceride levels. The higher dose did not decrease lipid peroxidation of LDL, but cholesterol and Triglyceride level decreases were noted, although to a lesser degree than with the Lower dose. Turmeric extract's effect on cholesterol levels may be due to decreased Cholesterol uptake in the intestines and increased conversion of cholesterol to bile Acids in the liver. Inhibition of platelet aggregation by C. longa constituents is Thought to be via potentiation of prostacyclin synthesis and inhibition of Thromboxane synthesis.

#### **GASTROINTESTINAL**

#### **EFFECTS:-**

Constituents of Curcuma longa exert several Protective effects on the gastrointestinal tract. Sodium curcumin inhibited Intestinal spasm and p-tolymethylcarbinol, a turmeric component, increased Gastrin, secretin, bicarbonate, and pancreatic enzyme secretion. Turmeric has also Been shown to inhibit ulcer formation caused by stress, alcohol, indomethacin, Pyloric ligation, and reserpine, significantly increasing gastric wall mucus in rats Subjected to these gastrointestinal insults. Curcumin enhances immunity. Curcumin can also help the body fight off Cancer should some cells escape apoptosis. When researchers looked at the lining Of the intestine after ingestion of curcumin, they found that CD4+ T-helper and B Type immune cells were greater in number. In addition to this localized immune Stimulation, curcumin also enhances immunity in general. Researchers in India have documented increased antibodies and more immune action in mice given curcumin.

## **II. CONCLUSIONS:-**

The beneficial effects of turmeric are traditionally achieved through dietary consumption, even at low levels, over long periods of time. A precise understanding of effective dose, safety, and mechanism of action is required for the rational use

of turmeric in the treatment of human diseases. Further clinical studies are warranted if turmeric is to be employed in meeting human needs and improving human welfare. The activities of turmeric include antibacterial, antiviral, anti-inflammatory, antitumor, antioxidant, antiseptic, cardioprotective, hepatoprotective, nephroprotective, radioprotective, and digestive activities

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