



# Comprehensive Review on Turmeric (*Curcuma Longa* L.) as Medicinal Plant and its Nutraceutical Quality to Human



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## Abstract

The objective of this comprehensive review assesses research analysing the nutraceutical qualities and bioactive compounds within turmeric that contribute to human nutrition, health promotion and chronic disease prevention. *Curcuma longa* L. (root and rhizome), commonly known as turmeric, is a plant of high medicinal and economic value globally, where it is mainly used as a spice and food supplement. The major active ingredients of turmeric include three curcuminoids; curcumin (diferuloylmethane, the primary constituent responsible for yellow color of turmeric), demethoxycurcumin, and bisdemethoxycurcumin. In addition, volatile oils (tumerone, atlantone, and zingiberene) also have pharmacological activity. In addition, carbohydrates, proteins, and resins are also present in turmeric. Turmeric has excellent anti-inflammatory properties and is a superior antioxidant. The anticancer property of turmeric may be closely related to its anti-inflammatory property.

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

## Introduction

Turmeric is a spice that is spread throughout the world's tropical and subtropical regions. In Asian countries, it is widely cultivated, primarily in China and India. With a short stem, the plant measures up to 1 m long. Turmeric is an important spice throughout the world, particularly among the Eastern people, with a distinct human use [1]. In many Asian dishes, turmeric is one of the main ingredients, imparting a mustard-like, earthy aroma and pungent, slightly bitter taste to foods. Most of it is used in savory dishes, but some sweet dishes, such as the cake sfouf, are also used. In India, turmeric leaf is used by layering rice flour and coconut-jaggery mixture on the leaf to prepare special sweet dishes, patoleo, and then closing and steaming it in a special utensil [2]. Most of the turmeric is used to impart a golden yellow color in the form of rhizome powder. It is used in a wide variety of products, including canned drinks, baked goods, dairy products, ice cream, milk, yellow cakes, orange juice, cookies, popcorn, sauces, cereals, and gelatin. It is a primary ingredient in curry powders, while turmeric is often used fresh, such as ginger, usually used in its dried, powdered form [3].

*Curcuma longa* Linn. (Turmeric) is a member of the Zingiberaceae family. In terms of medicinal properties, the

plant has a lot of promise. Its anti-inflammatory, cholagogue, hepatoprotective, blood-purifying, antioxidant, liver tissue detoxifier and regenerator, antiasthmatic, anti-tumor, antiprotozoal, stomachic, carminative properties are revealed in literature. It decreases elevated plasma cholesterol levels. Its antiplatelet activity provides the heart and arteries with protection. In lymphocytes, it also prevents DNA damage. Curcumin (a flavonoid) [4] is found in many constituents present in this plant. The turmeric powder is about 60-70% carbohydrates, 6-13% water, 6-8% protein, 5-10% fat, 3-7% dietary minerals, 3-7% essential oils, 2-7% dietary fiber, and 1-6% curcuminoids [5]. The Diarylheptanoids, a class of various curcuminoids, such as curcumin, demethoxycurcumin, and bisdemethoxycurcumin, contain phytochemical components of turmeric [5].

Curcumin accounts for up to 3.14% of assayed commercial turmeric powder samples (the average was 1.51%); curry powder contains much less turmeric powder (an average of 0.29 percent) [6]. There are some 34 essential oils in turmeric, the main constituents of which are tumerone, germacrone, atlantone, and zingiberene [7-9]. Furthermore, nutrients present in turmeric do more than just resist diseases of deficiency. It has an elevated dietary status that can be abused. Curcumin contains vitamins or

vitamin precursors which, together with fatty acids and essential oils, produce vitamin C, beta-carotene and polyphenol. Compared with other spices, turmeric is a good source of spice. It was regarded as an under-exploited spice, although it was consumed in Africa and some sub-Saharan countries. It was probably one of the tropical crops that was most underutilized. Leaves are a great source of minerals and vitamins [10].

## Antioxidant activity of Turmeric

It has been shown that curcumin is an effective scavenger of oxygen free radicals. Its antioxidant function is like that of vitamins C and E. It can protect against oxidation by lipids or hemoglobin. The generation of reactive oxygen species (ROS) such as H<sub>2</sub>O<sub>2</sub>, superoxide anions and nitrite radical generation by activated macrophages can be significantly inhibited. There are also antioxidant activities of the curcumin derivatives, bisdemethoxycurcumin and demethoxycurcumin [11]. Curcumin pre-treatment has been shown to minimize the oxidative stress and changes in the heart caused by ischemia [12].

## Anti-cancer effect of Turmeric

The activity of many common mutagens and carcinogens can be suppressed by turmeric and curcumin. Direct antioxidant and free-radical scavenging effects and their ability to indirectly increase glutathione levels have been correlated with the anticarcinogenic effects of turmeric and curcumin, thereby aiding in hepatic detoxification of mutagens and carcinogens and inhibiting nitrosamine production. It has also been shown that curcumin inhibits UV rays' mutagenic induction effect [13-16].

## Inflammatory and Edematous Conditions

Curcumin is a potent anti-inflammatory with specific inhibitory properties of lipoxygenase- and COX-2-. In vitro and in vivo trials have shown their effect on the reduction of both acute and chronic inflammation [13].

## Photo-protection activity of Turmeric

This behavior is due to its role as an antioxidant. The lipids on the surface of the skin are mostly unsaturated. Therefore, free radicals strike them quickly. The sun's ultraviolet rays penetrate the skin and increase the harm these radicals do. Prolonged exposure to such radiation will weaken lipids, resulting in a degradation of the skin's texture. In laboratory studies, turmeric extract has been shown to be effective in suppressing inflammation and protecting epidermal cells from ultraviolet B-radiation damage [17]. Moreover, curcumin has been shown to protect against chromosomal damage caused by gamma-radiation in small doses of turmeric.

## Conclusion

Curcumin, which has a yellow color and is the basic component of this plant, is considered the coloring concept of turmeric. The yellow pigment associated with curry powder, turmeric, and, to a lesser degree, ginger, is curcumin. Turmeric's anti-cancer, anti-inflammatory and photo-protection role may be closely linked to its antioxidant properties [17].

## Conflict of Interest

The author declared that no competing interests.

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