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Review Article

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A REVIEW ON CURCUMA LONGA L.

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ABSTRACT

Turmeric (Curcuma longa L.) is a popular natural drug, traditionally used for the treatment of a wide range of diseases. Its root, as its most popular part used for medicinal purposes, contains different types of phytochemicals and minerals. This review summarizes what is currently known on biochemistry, safety, pharmacological activities (mechanistically), and clinical applications of turmeric. In short, curcumin is considered as the fundamental constituent in ground turmeric rhizome. Turmeric possesses several biological activities including anti-inflammatory, antioxidant, anticancer, antimutagenic, antimicrobial, antiobesity, hypolipidemic, cardioprotective, and neuroprotective effects. These reported pharmacologic activities make turmeric an important option for further clinical research. Also, there is a discussion on its safety and toxicity.

KEWWORD: Pharmacognostic Study, Pharmacological Activity.

1. INTRODUCTION

Introduction Medicinal plants are the fundamental components of any indigenous medicine system. The use of different plant species for the treatment of different kinds of health hazards is the oldest form of health care system acknowledged in human civilization all over the globe (Fransworth, 1994), and presently more than 80% of the world populations, mostly of the third world countries depend on herbal medication for their primary health care (WHO, 1993). The genus Curcuma L. belonging to the family Zingiberaceae, originated in the Indo – Malayan region (Purseglove, 1974)[1] has a wide spread occurrence in the tropics of Asia to Africa and Australia. The genus globally consists of about 80 species of which 40 are reported from India (Sashikumar, 2005). The word Curcuma derived from the Arabic word "Kurkum" which means yellow colour, it is mainly due to the yellow colour of the underground rhizome. Curcuma is known as the golden spies of India. The rhizome is vegetative in nature as well as the propagating part which is traditionally used in medicine and food since ancient times (Srimal, 1997).[2] The use of different Curcuma species has been given in the vedic culture of India, nearly 4000 years back. It reached China before the 7th century, East Africa in the 8th century and West Africa in the 13th century. This multipurpose ancient and sacred spice of India, also known asIndian Saffron", finds a place in offerings on religious and ceremonial occasions (Khan et al., 2014). India is the largest producer and exporter of turmeric in the world accounting for more than 50% of the world"s trade; fulfilling 90% of world's demand (APEDA, 2018; Olojede et al., 2009).[3]

2. TURMERIC

2.1. Synonyms

Saffron Indian; haldi (Hindi); Curcuma; Rhizoma curcumae.

2.2. Biological Source

Turmeric is the dried rhizome of *Curcuma longa* Linn. (syn. *C.domestica* Valeton)., belonging to family Zingiberaceae.

2.3. Taxanomical Classification

Kingdom: Plantae
Phylum: Tracheophyta
Class: Liliopsida
Order: Zingiberales
Family: Zingiberaceae
Scientific name: Curcuma pseudomontana J. Graham
Common name(s) English: Hill turmeric

2.4. Geographical Source

The plant is a native to southern Asia and is cultivated extensively in temperate regions. It is grown on a larger scale in India, China, East Indies, Pakistan, and Malaya.

2.5. 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.

2.6. Cultivation

2.6.1. 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.

2.6.2. Soil. Suitable soils have a slightly higher sand content. It is grown in a variety of soil types 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.

Fig No. 01: Cultivation of turmeric.

2.6.3. 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.

2.6.4. 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.

2.6.5. Storage: Rhizomes for seed are typically piled up and covered with turmeric leaves under trees or in wellventilated shelters.

2.7. Characteristics

The primary rhizomes are ovate or pear-shaped, oblong or perform or cylindrical and often short branched. The rhizomes are known as 'bulb' or 'round' turmeric. The secondary, more cylindrical, lateral branched, tapering on both ends, rhizomes are 4–7 cm long and 1–1.5 cm wide and called as 'fingers'. The bulbous and finger-shaped parts are separated and the long fingers are broken into convenient bits. They are freed from adhering dirt and fibrous roots and subjected to curing and polishing process. The curing consists of cooking the rhizomes along with few leaves in water until they become soft. The cooked rhizomes are cooled, dried in open air with intermittent turning over, and rubbed on a rough surface. Color is deep yellow to orange, with root scar and encircling ridge-like rings or annulations, the latter from the scar of leaf base. Fracture is horny and the cut surface is waxy and resinous in appearance. Outer surface is deep yellow to brown and longitudinally wrinkled. Taste is aromatic, pungent and bitter; odour is distinct.[5]

Fig. No.02: Rhizomes and whole plant of turmeric.

2.8. Microscopy

The transverse section of the rhizome is characterized by the presence of mostly thin-walled rounded parenchyma cells, scattered vascular bundles, definite endodermis, few layers of cork developed under the epidermis, and scattered oleoresin cells with brownish contents. The epidermis is consisted of thick-walled cells, cubical in shape, of various dimensions. The cork cambium is developed from the sub-epidermal layers and even after the development of the cork, the epidermis is retained. Cork is generally composed of four to six layers of thin-walled brick-shaped parenchymatous cells. The parenchyma of the pith and cortex contains grains altered to a paste, in which sometimes long lens shaped unaltered starch grains of 4–15 µm diameter are found. Oil cells have suberised walls and contain either orange-

yellow globules of a volatile oil or amorphous resinous masses. Cortical vascular bundles are scattered and are of a collateral type. The vascular bundles in the pith region are mostly scattered and they form discontinuous ring just under the endodermis. The vessels have mainly spiral thickenings and only a few have reticulate and annular structure.[60]

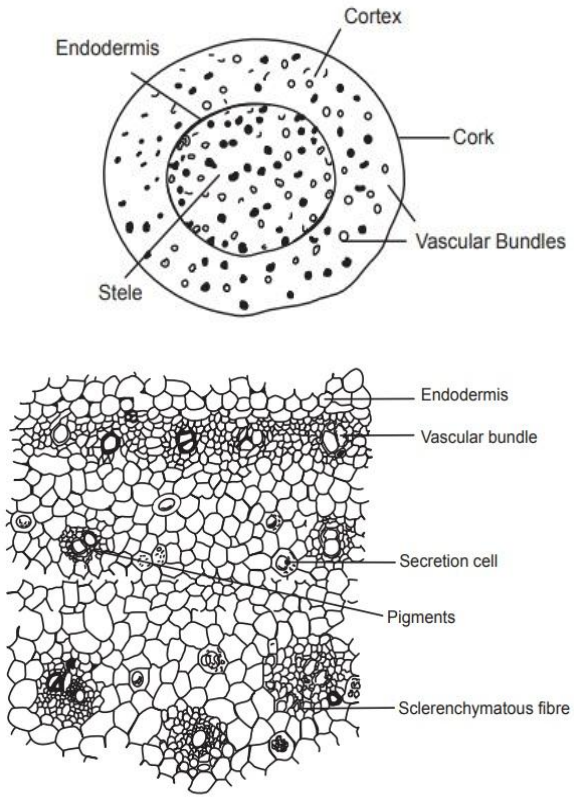

Fig No. 04: Transverse section of turmeric rhizome.

2.9. Morphological Character

Perennial herb up to 1.0 m in height; stout, fleshy, main rhizome nearly ovoid (about 3 cm in diameter and 4 cm long). Lateral rhizome, slightly bent (1cm _2–6cm), flesh orange in colour; large leaves lanceolate, uniformly green, up to 50cm long and 7–25cm wide; apex acute and caudate with tapering base, petiole and sheath sparsely to densely pubescent. Spike, apical, cylindrical, 10–15cm long and 5–7 cm in diameter. Bract white or white with light green upper half, 5–6 cm long, each subtending flowers, bracteoles up to 3.5 cm long. Pale yellow flowers about 5cm long; calyx tubular, unilaterally split, unequally toothed; corolla white, tube funnel shaped, limb 3-lobed. Stamens lateral, petaloid, widely elliptical, longer than the anther; filament united to anther about the middle of the pollen sac, spurred at base. Ovary trilocular; style glabrous. Capsule ellipsoid. Rhizomes orange within.[7,21]

Fig No. 05: Turmeric.

2.10. Chemical Constituents

Turmeric contains yellow colouring matter called as curcuminoids (5%) and essential oil (6%). The chief constituent of the colouring matter is curcumin I (60%) in addition with small quantities of curcumin III, curcumin II and dihydrocurcumin. The volatile oil contains mono- and sesquiterpenes like zingiberene (25%), α-phellandrene, sabinene, turmerone, arturmerone, borneol, and cineole. Choleretic action of the essential oil is attributed to β-tolylmethyl carbinol.

The volatile oil also contains α- and β-pinene, camphene, limonene, terpinene, terpinolene, caryophyllene, linalool, isoborneol, camphor, eugenol, curdione, curzerenone, curlone, AR-curcumenes, β-curcumene, γ-curcumene. α- and β-turmerones, and curzerenone.[8,20]

2.11. Chemical Tests

1. Turmeric powder on treatment with concentrated sulphuric acid forms red colour.
2. On addition of alkali solution to Turmeric powder red to violet colour is produced.
3. With acetic anhydride and concentrated sulphuric acid Turmeric gives violet colour. Under UV light this colour is seen as an intense red fluorescence.
4. A paper containing Turmeric extract produces a green colour with borax solution.
5. on addition of boric acid a reddish-brown colour is formed which, on addition of alkalies, changes to greenish-blue.
6. A piece of filter paper is impregnated with an alcohol extract, dried, and then moistened with boric acid solution slightly acidified with hydrochloric acid, and redried. Pink or brownish-red colour is developed on the filter paper which becomes deep blue on addition of alkali.[9]

2.12. Uses

- Turmeric is used as aromatic, anti-inflammatory, stomachic, ureic, anodyne for billiary calculus, stimulant, tonic, car minative, blood purifier, antiperiodic, alterative, spice, colouring agent for ointments and a common household remedy for cold and cough. Externally.[10]

- It is used in the form of a cream to improve complexion.
- Dye-stuff acts as a cholagogue causing the contraction of the gall bladder.
- It is also used in menstrual pains. Curcumin has choleretic and cholagogue action and is used in liver diseases.
- Curcumin is a nontoxic authorized colour, heat resistant and sensitive to changes in pH. Curcuminoids have antiphlogistic activity which is due to inhibition of leukotriene biosynthesis. ar-Turmerone has antisnake venom activity and blocks the haemorrhagic effect of venom.[15,16]
- Bone cancer Dennis and coworkers demonstrated a novel skylight in amalgamation treatment by exploiting a synthetic analogue of natural compound pancratistatin with the curcumin, for the management of osteosarcoma Although curcumin has strong antiproliferative and anti-inflammatory properties, its low water solubility limits its uses. One controlled study described the preparation and characterization of nanocurcumin using poly-lactic-co-glycolic acid. It seems that water solubility and antitumor activity of the mentioned nanoparticulate formulation significantly improved.[11,12]
- Lung Cancer *C. longa* is presently labeled to own tumor inhibiting gears not only in vitro but also in vivo. It has been testified that curcumin can progress the tumor hindering efficiency of docetaxel in lung cancer. Likewise, synchronized administration of curcumin and docetaxel results in slight toxicity to normal tissues as well as the bone marrow and liver
- Blood and Other Cancers-Additionally, curcumin is able to repress the growth of a variety of malignant cell types together with the lymphoma cells. The treatment of Burkitt's lymphoma cell lines with curcumin in combination with ionizing radiation (IR) indicates that curcumin application increases the sensitivity of lymphoma cells to IR-initiated apoptosis and improves G2/M phase arrest in the cell cycle.[14]
- Antioxidant and Anti-Inflammatory Activity Recently, especial attention has been paid to turmeric due to its antioxidant activities which are carried through direct scavenging of oxygen radicals and stimulating antioxidant responses by nuclear factor erythroid 2-related factor 2 (Nrf2) activation. That feature, besides the favorable outcomes on the endothelial function and the inflammatory state of the tissue and plasma, indicated that it was helpful for the treatment of diabetic microangiopathy potentially.[13]

2.13. Adulteration

The genuine drug is adulterated with the rhizomes of *Acorus calamus.*

2.14. Marketed Products

It is one of the ingredients of the preparations known as J.P. Nikhar oil, J.P. Kasantak (Jamuna Pharma), Diabecon, Purian (Himalaya Drug Company), and Respinova (Lupin Herbal Laboratory).

3. 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.

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