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Versatility of turmeric: A review the golden spice of life

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Abstract
Turmeric, botanically known as *Curcuma longa,* Linn, grows in tropical and subtropical regions throughout the world. The turmeric possesses high nutritional value. Extensive research within the last half a century has proven that most of these activities, associated with turmeric are due to curcumin. The medicinal properties of Turmeric include anti-inflammatory, anti-oxidant, anti-coagulant, anti-diabetic, anti-microbial, anti-ulcer, wound healing and anti-fertility activities. It is effectively used in diabetes, various malignant disease, Alzheimer's disease and other chronic disease.
The present paper reviews the Introduction, Geographical distribution, History, Cultivation, Uses, Strange facts, Side effects, Synonyms, Botanical description, Taxonomical classification, Nutritional value, Phytochemical constituents, and Pharmacological activities along with the current trends in research on Turmeric.

Keywords: *Curcuma longa,* curcumin, ayurvedic medicine, pharmacology

Introduction [17, 27]

An '*Zingiberaceae* family' member- *Curcuma Longa, Linn*, well known as Turmeric, is a perennial, erect and leafy plant with very large, lily like leave up to 1.2 m long. It has oblong, pointed leaves and funnel-shaped yellow flowers. The rhizome, the portion of the plant used medicinally, is usually boiled, cleaned, and dried, yielding a yellow powder. Dried *Curcuma longa* is the source of the spice turmeric, the ingredient that gives curry powder its characteristic yellow colour. Turmeric is used extensively in foods for its flavour and colour, as well as having a long tradition of use in the Chinese and Ayurveda systems of medicine; India has a rich history of using plants for medicinal purposes.
Turmeric (*Curcuma longa*) is extensively used as a spice, food preservative and colouring material in India. Turmeric is widely consumed in the countries of its origin for a variety of uses, including as a dietary spice, a dietary pigment, and an Indian folk medicine for the treatment of various illnesses. It is used in the textile and pharmaceutical industries and in Hindu religious ceremonies in one form or another. Current traditional Indian medicine uses it for biliary disorders, anorexia, cough, diabetic wounds, hepatic disorders, rheumatism, and sinusitis. The old Hindu texts have described it as an aromatic stimulant and carminative. Powder of turmeric mixed with slaked lime is a household remedy for the treatment of sprains and swelling caused by injury, applied locally over the affected area. Safety evaluation studies indicate that both turmeric and curcumin are well tolerated at a very high dose without any toxic effects. Thus, both turmeric and curcumin have the potential for the development of modern medicine for the treatment of various diseases.

Fig 1: Turmeric

Fig 2: Turmeric leaves

Fig 3: Turmeric seeds

Fig 4: Turmeric fruit

Fig 5: Turmeric flowers

Geographical Distribution [29]

World scenario: It is commonly found in Cambodia, China, India, Nepal, Indonesia, Madagascar, Malaysia, Philippines and Viet Nam.

India scenario: It is commonly found in West Bengal, Tamil Nadu, and Maharashtra and also in Madras.

History [48-52]

The use of turmeric dates back nearly 4000 years to the Vedic culture in India, where it was used as a culinary spice and had some religious significance. It probably reached China by 700 A.D, East Africa by 800 A.D, West Africa by 1200 A.D, and Jamaica in the eighteenth century. In 1280, Marco Polo described this spice, marvelling at a vegetable that exhibited qualities so similar to that of saffron. According to Sanskrit medical treatises and Ayurvedic and Unani systems, turmeric has a long history of medicinal use in South Asia. Sushruta's Ayurvedic *Compendium*, dating back to 250 B.C, recommends an ointment containing turmeric to relieve the effects of poisoned food.

Cultivation [32, 39]

Climate: The turmeric plant needs temperatures between 20°C and 30°C and a considerable amount of annual rainfall to thrive. Individual plants grow to a height of 1 m, and have long, oblong leaves. Turmeric is a tropical herb and is grown in both tropics and subtropics. It will grow luxuriantly in shade if not too dense, but it produces larger and better rhizomes in the open ground to the sun. Turmeric requires humid climate.

Soil: soil for turmeric cultivation should be rich and friable. Soils with a little higher sand content are well suited. It is grown in different type of soils from light black, sandy loam and red soils to clay loams. It grows on light black, ashy loam and red soils to stiff loams in irrigated and rain fed areas.

Harvesting: usually harvested extends from January to March-April. Early varieties mature in 7-8 months and medium varieties in 8-9 months. The crop is ready for harvesting when the leaves turn yellow and start drying up. At the time of maturity, leaves are cut close to the ground, the land is ploughed and rhizomes are gathered by hand picking or the clumps are carefully lifted with a spade.

Irrigation: For turmeric number of irrigations will depends upon the soil and climatic conditions. Depending upon the soils are rainfall 15 to 25 irrigations are given in medium heavy soils an in case of light texture red soils 35-40 irrigations are needed.

Storage: Rhizomes for seed are generally heaped under the shade of trees or in well ventilated sheds and covered with turmeric leaves. The seed rhizomes can also be stored in pits with sawdust.

Uses [3-6]

General health benefits

- Turmeric promotes balanced mood.
- Turmeric helps wounds healing.
- Turmeric group seemed to enjoy more relief from joint pain.
- Turmeric helps in balanced blood sugar.

- Turmeric soothes irritated tissue.
- Turmeric also helps in cholesterol optimization.
- It can treat tonic and acute allergies and offers health benefits for asthma and eczema.
- It has been found to be effective in treating acne and psoriasis.
- It acts as powerful immunomodulator.

Medicinal uses

Traditionally Turmeric is used as home remedy for wound healing. Turmeric also helps to cure digestive disorder, Liver disease, cancer, and atherosclerosis, and osteoarthritis, menstrual problem of women, bacterial infection, and eye disorder. Turmeric is anti-inflammatory to the mucous membrane which coat the throat, lungs, stomach and intestine. Pharmacological activities of *Curcuma Longa* are summarized in Table No.3

Strange facts [34]

- Turmeric is known as The Golden Spice of India.
- India is the world largest producer and consumer of turmeric powder.
- Erode the city of Indian state Tamil Nadu is the largest producer of turmeric and is known as Yellow city of India.
- Turmeric may be applied to the bride's skin as part of purification ritual before the wedding ceremony.
- It is used in holy ritual and used to make kumkuma, a red cosmetic powder.
- The curcumin powder dissolved in alcohol is used for water containing products.
- It is served as a tea in Okinawa, Japan.

Side Effects, Contraindications and Precautions [18, 19]

- The patient facing gall bladder is recommended not to eat turmeric.
- If any patient had bleeding problems, it is recommended to steer clear of turmeric.
- High doses of turmeric cause uterine contraction in pregnant women.
- Turmeric might lower testosterone levels and decrease sperm movement when taken by mouth by men.
- Turmeric might slow blood clotting so stop using it at least two weeks before a scheduled surgery.
- Taking high amounts of turmeric might prevent the absorption of iron. So it should be used with caution in people with iron deficiency.

Synonyms of Curcuma Longa [42]

- Sanskrit : Ameshta
- English : Indian saffron
- Hindi : Haldi
- Bengali : Halud
- Assamese : Kordoi/ rohdoi
- Gujarati : Halad, Haldar
- Marathi : Halad
- Telugu : Haridra
- Tamil : Ameshta
- Malayalam : Manjal
- Sinhala : Kaha
- French : Curcuma
- Indonesian : Kunyit
- Malay : Kunyit basah

Botanical Description of Curcuma Longa

- Fruit type Tropical
- Edible part Fruit
- Shape of fruit Oval with 5 groves
- Fruits per tree(annual) 200 pound
- Texture Crisp
- Taste Sweet

Taxonomical Classification of Curcuma Longa

- Scientific Name: Curcuma longa
- Kingdom: Plantae
- Subkingdom: Tracheobionta -Vascular plants
- Superdivision: Spermatophyta
- Division: Magnoliophyta – Flowering plants
- Class: Lilliopsida- monocotyledons
- Subclass: Zingiberidae
- Order: Zingiberales
- Family: Zingiberaceae– Ginger family
- Genus: Curcuma L.- curcuma
- Species: Curcuma longa L. –common turmeric

Table 1: Nutritional Value of Curcuma Longa [9, 20, 30, 31]

Nutrients	Value per table spoon (7g)
Calories	23.9
Water	0.8g
Cholesterol	0 mg
Protein	1.5(6.3kJ)
Fat	5.6(23.4kJ)
Carbohydrate	16.8(70.3Kj)
Fiber	1.4g
Minerals	
Calcium	12.4mg
Phosphorous	18.1mg
Iron	2.8mg
Zinc	0.3mg
Magnesium	13.0mg
Potassium	170mg
Sodium	2.6 mg
Vitamins	
Thiamine	0.0mg
Riboflavin	0.0 mg
Betaine	0.7 mg
Vitamin C	1.7mg
Vitamin A	0.0 IU
Folate	2.6mcg
Choline	3.3mg

Table 2: Phytoconstituents of Curcuma Longa [9, 20, 31]

Sr.	Phytoconstituents in Curcuma Longa Linn
1	1,8-cineole, 2-bornanol, 2-hydroxy-methyl-anthraquinone,4-hydroxybisabola-2
2	10-diene-9-one;4-methoxy-5-hydroxybiosabola;4-hydroxy-cinnamoyl-(Feruloyl)-methane, Alpha-atlantone, Alpha-pinene, Alpha-terpineol, Ar-turmerone, Arabinose
3	Ascorbic-acid, Ash, Azulene, Beta-carotene, Beta-pinene, Beta-sesquiphellandrene, Bis-(Para-hydroxy-cinnamoyl)-methane,
4	Bis-desmethoxycurcumin, Bisabolene, Bixin, Borneol, Boron, Caffeic-acid, Calcium, Caprylic-acid, Caryophyllene, Chromium, Cineole, Cinnamic-acid, Cobalt, Copper, Cuminyl-alcohol, Curcumene, Curcumenol, Curcumin, Curdione,
5	Eugenol,Epiprocurcumenol;Eucalyptol;Eugenol;Feruloyl-p-coumaroyl-methane, Gamma-atlantone,Germacrone,Germacrone-13-al;Guaiacol, Isoborneol, L-alpha-curcumene
6	L-beta-curcumene, Limonene, Manganese, Monodesmethoxycurcumin, Niacin, Nickel, norbixin; O-coumaric-acid, P-coumaric-acid, P-cymene, P-methoxycinnamic-acid, P-tolymethylcarbinol,Phosphorus, Protocatechuic-acid, Procurcumadiol
7	Acidic polysaccharides: utonan A、B、C、D.
8	Volatile Oil(4.2%),its main content is turmerone, arturmerone, curcumene, germacrone, ar-curcumene,
9	The herbal classics CHMM(Chinese Herbal Materia Medica)
10	Other chemicals: campesterol, stigmasterol, beta-sitosterol, cholesterol, fatty acids and metallic elements potassium,sodium,magnesium,calcium,manganese,iron,copper,zinc,the rate of copper/zinc .

Table 3: Pharmacological Activities of Curcuma Longa [1, 2, 12-14, 32, 33]

Sr. No	Pharmacological activity	Mechanism of action
1.	Anti-inflammatory	Inhibit lipoxygenase and COX-2 inhibitor
2.	Anti-oxidant	It inhibits the generation of reactive oxygen species (ROS) like superoxide anion, H_2O_2 and nitrite radicle generation.
3.	Anti-coagulant	It inhibits collagen and adrenaline induced platelet aggregation.
4.	Anti-diabetic	It prevents galactose induced cataract formation at very low doses.
5.	Anti-microbial	It inhibits the growth of variety of bacteria, parasite and pathogenic fungi.
6.	Anti-ulcer	An open, phase II trial was performed on 25 patients with endoscopically-diagnosed gastric ulcer.
7.	Wound healing	Its mechanism involved an increase in the levels of beta transforming growth factor plus an increase in the activity of the enzyme nitric oxide synthase.
8.	Anti-fertility	It inhibits 5*a*-reductase, which converts testosterone to 5*a*-dihydrotestosterone, thereby inhibiting the growth of flank organs in hamster.

Conclusion

So far, the view of above fact is concerned, it can be concluded that Curcuma longa (Turmeric) has been in use since times immoral to treat wide range of ailments. It has been subjected to quite extensive phytochemical, experimental and clinical investigations. Turmeric has broad spectrum beneficial usage which shows Anti-inflammatory, Anti-allergic, Anti- hypertensives, Anti-septic, Anti-oxidant, Anti-coagulant, Anti-diabetic, Anti-microbial, Anti-ulcer, Anti-fertility and Wound healing activities. 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. Phytochemical analysis of turmeric has revealed a large number of compounds, including starch, protein, vitamins volatile oils, essential elements curcumin and curcuminoids which have been found to have numerous potent pharmacological properties. This review will provide new drive to deploy Turmeric as curative and preventive measure.

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