

Medicinal and Chemical study of Turmeric (*Curcuma longa*)

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Abstract : Turmeric is a flowering plant, *Curcuma longa* of the ginger family, Zingiberaceae, the roots of which are used in cooking. The plant is a perennial, rhizomatous, herbaceous plant native to the Indian subcontinent and Southeast Asia, that requires temperatures between 20°C and 30°C and a considerable amount of annual rainfall to thrive. For centuries, *Curcuma longa* (turmeric) was used as a spice in Asian cuisine and as a medicinal herb for treatment of inflammation, pain, wound healing, and digestive disorders. Turmeric was also used in Ayurveda and other traditional Indian medical systems, as well as Eastern Asian medical systems such as traditional Chinese medicine. In India, it was traditionally used for disorders of the skin, upper respiratory tract, joints, and digestive system. The present study is intended towards its medicinal and chemical properties .

Keywords : Turmeric , Curcumin , Chemical composition , Health benefits

I. INTRODUCTION

Turmeric, a plant in the ginger family, is native to Southeast Asia and is grown commercially in that region, primarily in India. Its rhizome (underground stem) is used as a culinary spice and traditional medicine. Historically, turmeric was used in Ayurveda and other traditional Indian medical systems, as well as Eastern Asian medical systems such as traditional Chinese medicine. In India, it was traditionally used for disorders of the skin, upper respiratory tract, joints, and digestive system. Today, turmeric is promoted as a dietary supplement for a variety of conditions, including arthritis, digestive disorders, respiratory infections, allergies, liver disease, depression, and many others. Turmeric is a common spice and a major ingredient in curry powder. Curcumin is a major component of turmeric, and the activities of turmeric are commonly attributed to curcuminoids (curcumin and closely related substances). Curcumin gives turmeric its yellow color. Turmeric dietary supplements are made from the dried rhizome and typically contain a mixture of curcuminoids. Turmeric is also made into a paste for skin condition

II. BOTANICAL DESCRIPTION

Turmeric, (*Curcuma longa*), perennial herbaceous plant of the ginger family (Zingiberaceae), the tuberous rhizomes, or underground stems, of which have been used from antiquity as a condiment, a textile dye, and medically as an aromatic stimulant. Turmeric is a perennial herbaceous plant that reaches up to 1 m (3 ft 3 in) tall. Highly branched, yellow to orange, cylindrical, aromatic rhizomes are found.

The leaves are alternate and arranged in two rows. They are divided into leaf sheath, petiole, and leaf blade. From the leaf sheaths, a false stem is formed. The petiole is 50 to 115 cm (20–45 in) long. The simple leaf blades are usually 76 to 115 cm (30–45 in) long and rarely up to 230 cm (91 in). They have a width of 38 to 45 cm (15 to 18 in) and are oblong to elliptical, narrowing at the tip.

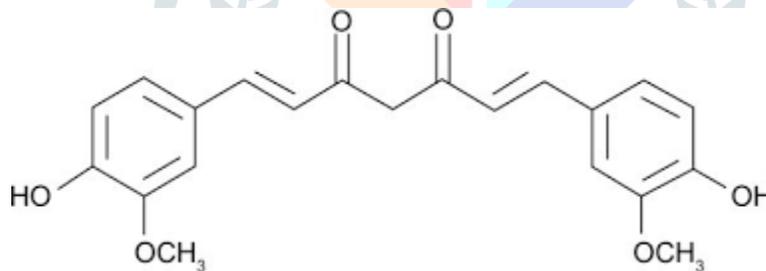
Botanical view of *Curcuma longa*

Turmeric rhizome and powder

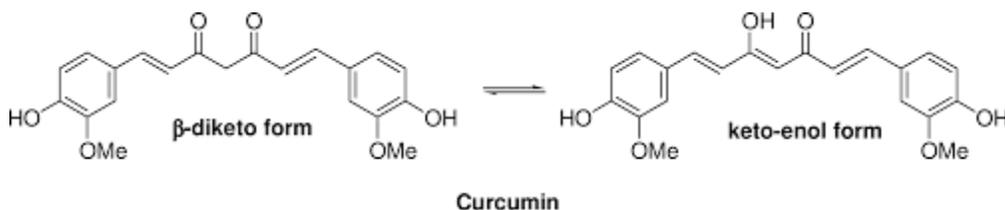
III. CHEMICAL COMPOSITION

Curcumin is a bright yellow chemical produced by *Curcuma longa* plants. It is the principal curcuminoid of turmeric, a member of the ginger family, Zingiberaceae. It is sold as an herbal supplement, cosmetics ingredient, food flavoring, and food coloring.

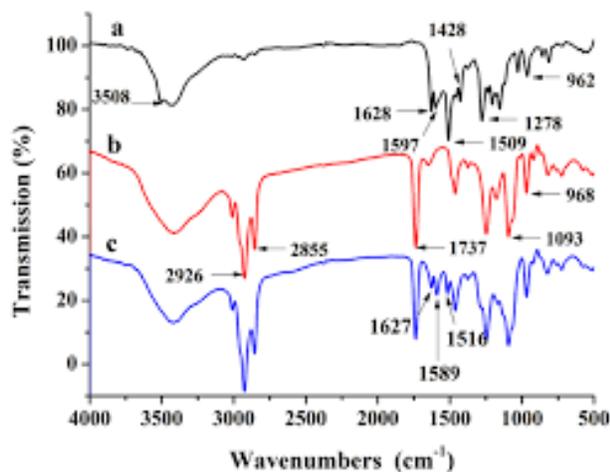
Formula: $C_{21}H_{20}O_6$, Molar mass: 368.38 g/mol, IUPAC ID: 1,7-bis (4-hydroxy- 3-methoxyphenyl) -1,6-heptadiene-3,5-dione, Melting point: 183 °C, Boiling point: 591.4 °C



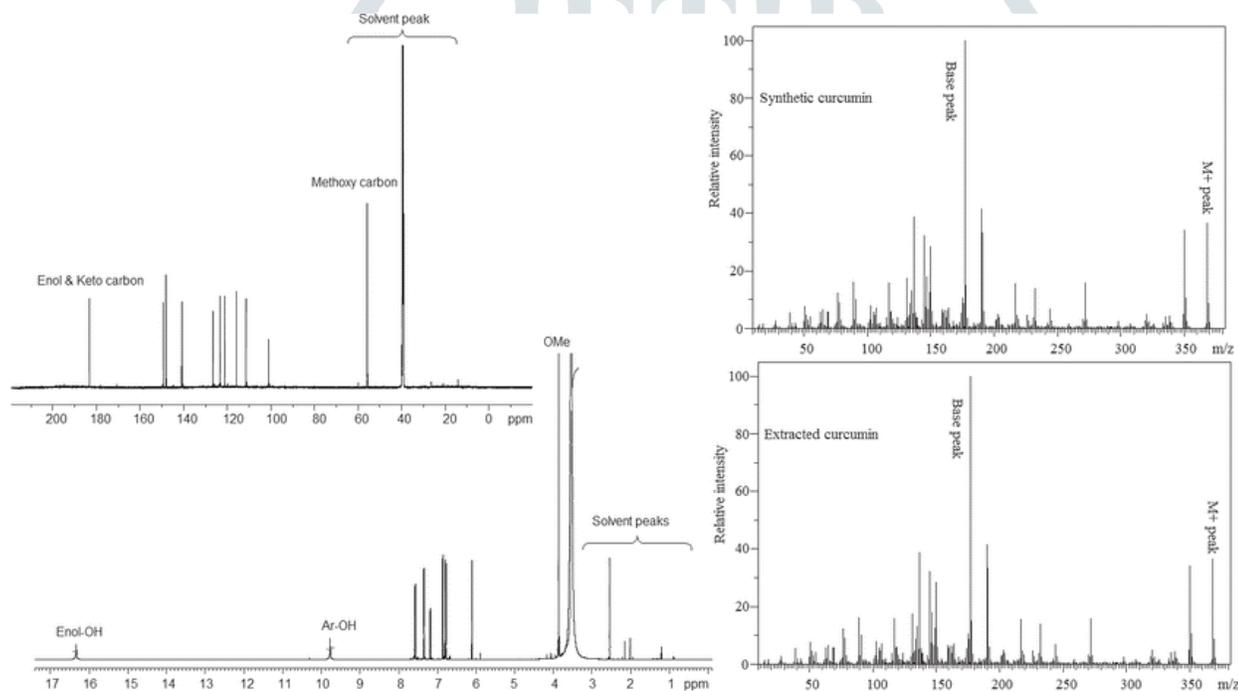
STRUCTURE OF CURCUMIN

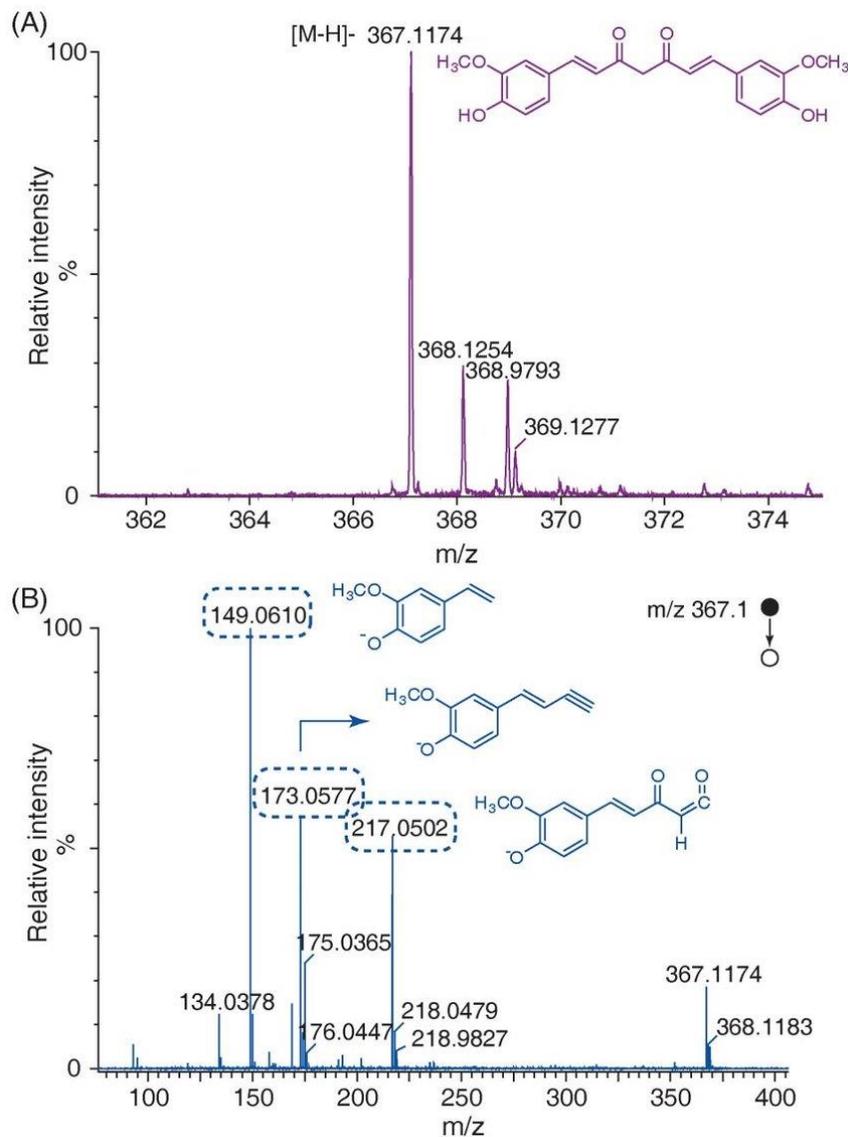


IV. SPECTRAL STUDIES OF CURCUMIN



IR SPECTRUM OF CURCUMIN

 ^{13}C -NMR AND ^1H -NMR OF CURCUMIN



MASS SPECTRA OF CURCUMIN

V. HEALTH BENEFITS OF TURMERIC

1. Turmeric fights inflammations

Turmeric contains the chemical curcumin. Curcumin and other chemicals in turmeric decreases swelling (inflammation). Because of this, turmeric is beneficial for treating conditions that involve inflammation.

2. Turmeric acts as antioxidant

Turmeric is a good source of natural flavonoids, which have been shown to have antioxidant activity, free radical-scavenging capacity, coronary heart disease preventive activities, and anticancer activities.

3. Turmeric help in patient suffering from depression .

Turmeric curcumin can helps to maintain your positivity, keeping in great spirits.

The curcumin in turmeric has been shown to support the production of dopamine and serotonin, brain neurotransmitters essential for a good mood and helps in depression .

4. Turmeric regulates blood sugar

The blood sugar balancing effects of turmeric make it a great option for those with type-1 or type-2 diabetes . It helps to lower blood-sugar levels and fight insulin resistance.

5. Turmeric reduces joint pain

Turmeric's main active component - curcumin is what gives the spice its yellow color. Curcumin has anti-inflammatory properties, making it a potential treatment for a number of health conditions, including reduced pain and increased ease of movement in people with osteoarthritis.

6. Turmeric detoxifies the Body

Turmeric helps support our organ's natural detoxification systems. It does this by thinning the bile. This allows the bile to flow more freely through the intestines and eliminate it from the body.

7. Turmeric boosts the Immune System

A strong immunity can help our body better fight off germs and viruses. Turmeric has been shown to increase the immunity-boosting proteins in the body.

8. Turmeric lowers cortisol Levels

Turmeric elevates neurotransmitters such as serotonin, while lowering stress hormones, such as cortisol, and is a potent antioxidant and anti-inflammatory. Curcumin also provides protection to the brain.

9. Turmeric against Cancer

The researchers suggest that turmeric stop the precancerous cells from growing into cancer. Another small study from 2008 suggests that curcumin, when taken at high levels, may help fight against pancreatic cancer cells.

10. Turmeric helps to lower Cholesterol

From these studies, it appears that turmeric mainly affects total cholesterol, LDL cholesterol, and triglyceride levels. One study conducted in rabbits fed a high-fat diet showed that turmeric appeared to lower LDL cholesterol levels and triglycerides, as well as preventing LDL from being oxidized.

11. Turmeric reduces Body Fat

Turmeric helps in losing weight by regulating sugar levels and further preventing insulin resistance. This results in excess fat that is not retained in the body.

12. Turmeric improves cardiovascular Health

Studies have shown that curcumin serves as a powerful antioxidant and anti-inflammatory. Since inflammation is a strong component in so many conditions, especially heart disease, the anti-inflammatory properties of curcumin make it a great addition to any heart healthy diet.

13. Turmeric calms the digestive System

Turmeric has been used to treat conditions, including colds, digestive problems, and infections. Its potential healing properties come from curcumin, which is an anti-inflammatory compound it contains. Turmeric has recently attracted attention for its potential to reduce IBS symptoms.

14. Turmeric sharpens memory

Researchers have found that a compound in turmeric gives curry its golden color it also helps to improve the mood and memory of older adults. Turmeric has been found to improve memory .

15. Turmeric lowers blood Pressure

Turmeric is natural blood thinner, the curcumin in turmeric has the ability to dilate the arteries. Because it relaxes blood vessels, it may reduce the risk of hypertension. Its anti-inflammatory properties also may help with overall cardiovascular functioning, which in turn helps maintain a healthy blood flow.

16. Turmeric helps to get a Better Sleep

Logging seven to eight hours of shut-eye is crucial for good health, as sleep deprivation can wreck havoc on everything from hormones to appetite. One animal-based study found curcumin helped protect 72-hour sleep deprived mice from the symptoms of sleep deprivation.

17. Turmeric works as an Antiseptic

Multiple studies done on the health benefits of turmeric have found that it has antibacterial and anti-fungal properties, making it useful to disinfect cuts and burns.

18. Turmeric act as natural headache remedy

Migraines tend to be caused by inflammation of blood vessels in the brain, and curcumin helps to relieve the pressure and helps in relieving headache .

19. Turmeric calms Eczema

Curcumin is effective in both eczema and psoriasis, with positive results with ingested curcumin. Other studies suggests that when curcumin is used topically it may benefit skin health.

20. Turmeric improves complexion

The health benefits of turmeric extend beyond internal health. The anti-inflammatory properties of turmeric can also boost the complexion when applied topically, boosting radiance and controlling oily skin.

VI . Conclusion

Curcumin has shown worldwide used for its complete benefits for health, which appear to act primarily through its anti-oxidant and anti-inflammatory mechanisms. These benefits are best achieved when curcumin is combined with agents such as, carbohydrates, piperine, which increases its bioavailability significantly. Research suggests that curcumin can help in the management of oxidative and inflammatory conditions, metabolic syndrome, anti-inflammatory, anxiety, and anti diabetic. Due to all these medicinal properties turmeric has been used for cure of different diseases and maintaining good health .

Above study concluded that Turmeric is highly beneficial for human health .

VII . Acknowledgement

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References

- 1.Xia, Q.; Zhao, K. Z.; Huang, Z. G.; Zhang, P.; Dong, T. X. X.; Li, S. P.; Tsim, K. W. K. Molecular Genetics and Chemical Assessment of Rhizome *Curcumae* in China. *J. Agric. Food Chem.* 2005, 53, 6019–6026.
- 2.Al-Reza, S. M.; Rahman, A.; Sattar, M. A.; Rahman, M. O.; Fida, H. M. Essential Oil Composition and Antioxidant Activities of *Curcuma aromatica* Salisb. *Food Chem. Toxicol.* 2010, 48, 1757–1760.
- 3.Xiang, Z.; Wang, X.; Cai, X.; Zeng, S. Metabolomics Study on Quality Control and Discrimination of Three *Curcuma* Species Based on Gas Chromatograph- Mass Spectrometry. *Phytochemical Anal.* 2011, 22, 411–418.
- 4.Abas, F.; Lajis, N. H.; Shaari, K.; Israf, D. A.; Stanslas, J.; Yusuf, U. K. A Labdane Diterpene Glucoside from the Rhizomes of *Curcuma mangga*. *J. Nat. Prod.* 2005, 68, 1090–1093.
- 5.Reddy, C. S.; Reddy, K. N.; Murthy, E. N.; Raju, V. S., Traditional Medicinal Plants in Seshachalam Hills, Andhra Pradesh, *Indian J. Med. Plants Res.*, 2009, 3(5), 408–412.

- 6.Saikia, B.; Borthakur, S. K., Use of Medicinal Plants in Animal Healthcare- A Case Study from Gohpur, Assam, Indian J. Trad. Know., 2010, 9(1), 49–51.
- 7.Devi, N. B.; Singh, P. K.; Das, A. K., Ethnomedicinal Utilization of Zingiberaceae in the Valley Districts of Manipur, J. Environ. Sci. Toxicol. Food Technol., 2014, 8(2), 21–23.
- 8.Larsen, K.; Ibrahim, H.; Khaw, S. H.; Saw, L. G. Gingers of Peninsular Malaysia and Singapore, Kota Kinabalu; Natural History Publication: Borneo, 1999; pp. 65.
- 9.Ahamefula, I.; Onwuka, G. I.; Chibuzo, N., Nutritional Composition of Tumeric (*Curcuma longa*) and Its Antimicrobial Properties, Int. J. Scientific Eng. Res., 2014, 5(10), 1085–1089.
- 10.Lekshmi, P. C.; Arimboor, R.; Indulekha, P. S.; Menon, A. N., Turmeric (*Curcuma longa* L.) Volatile Oil Inhibits Key Enzymes Linked to Type 2 Diabetes, Int. J. Food Sci. Nutr., 2012, 63(7), 832–834.
11. Liu, F.; Wang, Y.; Burkhart, T. A.; Gonzalez Penedo, M. F.; Ma, S. D.; Choi, W.; Lim, H. W.; Lee, H. Y., Effect of Balanced Low Pressure Drying of *Curcuma Longa* Leaf on Skin Immune Activation Activities, Bio-Medical Mater., 2014b, 24(6), 2025–2039.
12. Tewtrakul, S.; Subhadhirasakul, S. Anti-Allergic Activity of Some Selected Plants in the Zingiberaceae Family. J. Ethnopharmacol. 2007, 109, 535–538.

