

# Curcuma Longa for COVID-19: A Review

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## Abstract

*Curcuma longa*, Linn (Manjal) – Turmeric is a herb, a well known Siddha drug is used wide variety of Siddha formulations. It has wide spectrum of biological actions including anti-infectious, anti-inflammatory, anti-viral, Immuno-modulator, anti-microbial and anti-oxidant activity. Turmeric has been described in Siddha literatures, especially for the treatment of respiratory diseases and inflammatory diseases. COVID-19 is an infectious disease caused by a newly discovered Corona virus. Several studies revealed that turmeric is well tolerated at high dose without any toxic effects. Recent studies have proven the medicinal uses of Turmeric for respiratory diseases, liver diseases, diabetes, cancer, Alzheimer's disease and AIDS. Thus the turmeric may have the potential effect against COVID-19. This paper reviews the pharmacological properties, medicinal uses of Turmeric against COVID-19.

**Key words:** COVID-19, Siddha, Turmeric

## Introduction

Turmeric is a plant of ginger (Zingiferaceae) family, is native to Southeast Asia and is grown commercially in that region primarily in India. The plant measures up to 1 m high with a short stem. Turmeric is used as spice derived from the rhizomes of *Curcuma Longa*. Apart from the is used as spice, it is used as traditional medicine in

Asian countries such as India, Bangladesh and Pakistan. It plays a major role in Siddha, Ayurveda and Unani medicine. It has been used as home remedy for various diseases in India. Particularly in Siddha system of medicine, turmeric has been used widely. In India, it was traditionally used for skin diseases, Upper respiratory tract infection and digestive diseases. Turmeric contains

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more than 300 naturally occurring components. There is a compound within the turmeric root called curcumin. It has been in use for its medicinal benefits. The active constituents of the turmeric are the flavanoids, curcumin and volatile oils like tumerone, atlantone and zingiferone. Curcumin has anti-oxidant, anti-bacterial, anti-fungal, anti-viral, anti-fertility, hepatoprotective, wound healing and anti-inflammatory activities [1]. Turmeric has an

aromatic odor and bitter taste. COVID-19 is now a pandemic affecting many countries globally. It is an infectious disease caused by Corona virus. Till date, no standard medicine was discovered against COVID-19. Treatment is given based on their symptoms. *Curcuma longa* has been used traditionally as antimicrobial agent. It has been demonstrated that curcumin has a wide range of antiviral activity against different virus [2].

**Table no 1. Taxonomical Classification of *Curcuma longa***

Kingdom	Plantae
Sub kingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Liliopsida
Sub class	Zingiberidae
Order	Zingiberales
Family	Zingiberaceae
Genus	Curcuma
Species	Longa

**Figure 1: *Curcuma longa***



**Figure 2: Rhizome**



## Synonyms

Tamil	:	Manjal
Sanskrit	:	Haridra
English	:	Turmeric
Hindi	:	Haldi
Telugu	:	Pasupu
Malayalam	:	Mannal
Kannadam	:	Arisina.

## Types of Turmeric

1. Kappu manjal
2. Kari manjal

## Parts Used

Rhizome

## Organoleptic Characters

**Taste**– Kaarpu, Kaippu

**Character**– veppam

**Division** – Kaarpu

## Action

Aromatic, Carminative, Stimulant

Hapatic Tonic

## General Characteristics of Manjal

*“Ponniramam meni pulanaatramum pokum*

*Mannu puruda vasiyamam – pinniyezhum*

*Vaanthipitha thodamiyam vaathampom theepanamam*

*Koornta manjalin kizhankukku”.*

*- Agathiyar Gunavakadam*

Turmeric gives glowing to skin. It acts as a good appetizer. Turmeric cures vomiting, vatha, pitha and kapha diseases,

headache, sinusitis, rhinitis, inflammatory diseases and wounds<sup>[3]</sup>.

## Chemical Composition of Turmeric

Turmeric contains protein (6.3%), fat (5.1%), minerals (3.5%), moisture and carbohydrates (69.4%). Turmeric contains about 5% of diaryl heptanoid coloring materials known as curcuminoids. Curcumi

is responsible for the yellow color and comprises curcumin I, II and III. The volatile oil (5%) contains sesquiterpenes, sesquiterpine alcohols and ketones and monoterpenes.

**Table 2. Pharmacological Properties of Turmeric**

Component	Concentration
Benzene derivatives – Eugenol	8%
(E) Caryophyllene	2%
Ar-curcumene	1.5%
$\alpha$ Zingiberene	2.8%
$\beta$ -Sesquiphellandrene	2.8%
Ar-turmerone	22.7%
Turmerone	26%
Curlone	16.8%

Recent studies proven, that the turmeric contains anti-bacterial, anti-viral, Immunomodulator, anti-oxidant, anti-fungal, anti-carcinogenic, anti-diabetic, anti-fertility, anti-venom, anti-asthmatic, Hepatoprotective, anti-depressant, anti-inflammatory, and photo-protector activity<sup>[4]</sup>.

**Table 3: Pharmacological activity of Compounds of *C. longa***

Compound / extract	Biological activity
Turmeric powder Ethanol extract	Anti – inflammatory, Wound healing Anti-protozoan
Volatile oil	Anti – inflammatory, Anti-bacterial Anti-fungal
Curcumin	Anti-viral, Anti-bacterial, Anti-protozoan Anti-oxidant, Anti-carcinogenic
Sodium curcumin	Anti-bacterial, Anti - inflammatory
Methyl curcumin	Anti-protozoan
Demethoxy curcumin	Anti-oxidant

**Anti-inflammatory activity**

Turmeric is attributed with anti-inflammatory action. It cures the causative factors and pathological changes of inflammation. Curcumin inhibit both biosynthesis of inflammatory prostaglandins from arachidonic acid and neutrophil function during inflammatory states <sup>[5]</sup>. Curcumin inhibit a number of inflammatory molecules including phospholipase, lipoxygenase, COX-2, leukotrienes, thromboxane, prostaglandins, collagenase, elastase, hyaluronadase, tumor necrosis factor and interleukin-12. In vitro and in vivo studies have proven, that curcumin decreases the acute and chronic inflammation <sup>[6]</sup>.

**Anti-viral activity**

Curcumin have anti-viral activity. It plays a major role in inhibiting the Epstein Barr virus and also has anti-HIV activity. Different bi-conjugates of curcumin namely, di-O-trypto phanylphenylalaline curcumin, di-O-decanoyl curcuminn, di-O-pamitoyl curcumin, di-O-bis folyl curcumin, 4-O-ethyl-O-gamma folyl curcumin acts against many viruses including Para influenza virus-3(PIV-3), Vesicular stomatitis virus, Herpes simplex virus, Respiratory syncytial virus(RSV). Curcumin inhibit the HIV-1 LTR directed gene expression without any major effects on cell viability. It acts against the Influenza viruses PR8, H1N1 and H6N1. In vitro study of curcumin and its derivatives acts against Herpes simplex virus type 1<sup>[7]</sup>.

Curcumin as anti-viral product has been used intra-vaginally by women for protection against sexually transmitted herpes virus. Curcumin exhibited against the coxsackie virus by reduction of viral RNA expression. Aqueous extract of *Curcuma longa* rhizome has the anti-viral effect on Hepatitis B virus. It also decreases the production of HBV particles. Hepatitis B virus replication is decreased by extract of *Curcuma longa*. Curcumin has the inhibitory activity against the human papilloma virus HPV-16 and HPV-18. Japanese encephalitis virus (JEV) is a cause of acute encephalopathy in children and leads to death. Curcumin reduce the production of infectious viral particles through the inhibition of ubiquitin-proteasome system. It also inhibits the exhibition of human T-cell leukemia virus type-1<sup>[8]</sup>.

#### **Anti-bacterial activity**

Bacterial infections are important cause for infectious diseases. The anti-bacterial study on aqueous extract of *C. longa* rhizome described the MIC (Minimum inhibitory concentration) value of 4-16g/L against Staph. aureus, Klebsiella and E.coli. The methanol extract of turmeric demonstrated MIC value of 16µg/mL and 128µg/ml against Bacillus subtilis and Staph.aureus respectively. Curcumin revealed the MIC value between 5 and 50µg/mL against Helicobacter pylori<sup>[9]</sup>.

#### **Anti-fungal activity**

Ether and chloroform extracts of *C.longa are* acts against Aspergillus flavus and Penicillium digitatum. 0.8 And 1.0 g/gL of turmeric powder inhibits the fungal contamination. Methanol extract of turmeric with MIC value of 256µg/mL demonstrated the anti-fungal activity against Candida albicans. Curcumin at 500mg/L had anti-fungal activity against R.solani and P.infestans.

#### **Immuno-modulator activity**

Curcumin has archived the potential therapeutic interest to cure immune related, metabolic diseases and cancer. It involves various biological transcription factors NF-AT, AP-1, p53 and kinase. It primarily affects the innate and adaptive immunity. Curcumin modulates the function of T-cells, B-cells, dendritic cells, macrophages, monocytes and neutrophils<sup>[10]</sup>. Proliferation of rat thymocytes could be inhibited by curcumin and similar anti-proliferative effects of curcumin on conA-stimulated jurkat T-cell were observed. Curcumin affects the viability of proliferating T-cells severely than quiescent T-cells. It also inhibits the dendritic cell maturation and immune-stimulatory functions. Feeding of curcumin for 5 weeks in rats enhance the antibody activity and no effects on NK cells. Curcumin inhibit the tumor necrosis factor

alpha induce adhesion of monocytes on human endothelial cells<sup>[11]</sup>.

### **Turmeric in respiratory diseases**

In the treatment of bronchial asthma, the volatile oil of turmeric has been used as oral drug. Rhizome is effective against whooping cough and dyspnea. Parched and powdered form of rhizome is given in bronchitis. Fresh juice of rhizome also given for bronchitis<sup>[12]</sup>. Respiratory diseases such as asthma, bronchitis, bronchiectasis and tropical eosinophilia revealed, that turmeric plays a vital role as an adjuvant in relaxing the airway obstruction. Curcumin has anti-asthmatic property and it had been tested in animals<sup>[13]</sup>.

### **Toxicity**

No studies in either animals or human have discovered any toxicity with turmeric. It is clear that turmeric is non toxic even at very high doses. Turmeric oil was administered orally to healthy volunteers for 3 months in a phase I clinical study. No side effects were noticed in 3 months on body weight, blood pressure, haematological, renal and hepatic functions<sup>[14]</sup>.

### ***Curcuma longa* in Siddha Medicine**

Turmeric is a anti-kapha drug (phlegmatic conditions known as *kapham*). It is a main ingredient in variety of Siddha medicine. In the condition of *Neertram*

(sinusitis) and *salathodam* (rhinitis), inhalation of burning turmeric fumes (*Manjal kombu pugai* - Fumigation) cause mucous discharge from nose and gives instant relief<sup>[15]</sup>. *Manjal Kuliyal* - a traditional method of bathing, which removes *kapham* and bad odor from the body<sup>[16]</sup>. Turmeric rhizome decoction is used for gargling in sore throat and throat infection and a piece of burnt rhizome is also given for chewing. Turmeric powder and salt is a excellent combination for gargling in throat infections. Turmeric is a main ingredient in “*Neerkovai Mathirai*” used to treat sinusitis, cold and headache. Turmeric and Notchi (*Vitex negundo*) is boiled with water and inhale the steam (Fomentation), which gives instant relief from cold and kapha induced fever<sup>[17]</sup>.

Based on Siddha literatures, drugs with Kaarpu suvai (Pungent taste) are significantly reduce Kapham (Phlegm). Cold, cough, sneezing, rhinitis and headache are major symptoms of COVID-19, and are mainly induced by Kapham. Hence, Turmeric may reduce the cardinal symptoms of COVID-19.

### **Discussion**

The COVID-19 pandemic has tightened its grip on India. The World Health Organization has declared the ongoing outbreak as global public health emergency. The WHO has also recommended inclusion of

traditional medicine as treatment in this pandemic period. It is an opportune time for modern medicine and AYUSH medicine should come together and develop an integrated approach for the management of COVID-19. In India there is precedence of treating chikungunya and Dengue with Siddha medicines. In Siddha, many single drug or compound formulation were mentioned to boost up immunity, one among them is turmeric. Effect of turmeric is well explained and documented for its activities in Siddha system of medicine. Turmeric is also widely used in cosmetology as well. In the treatment of GIT disorders, like gastric ulcer, dyspepsia, IBS, Crohn's disease and ulcerative colitis, turmeric plays a major role. It has already been proven for its anti-diabetic and anti-inflammatory activity. It is one of the best anti-oxidant. Turmeric reduces several risk factors including cholesterol, triglycerides. Turmeric decoction mainly used for jaundice. *Curcuma longa* has been used to treat wide

range of ailments. Turmeric is proving beneficial effect in the treatment of viral diseases. Further studies will conduct to prove a better research on turmeric against viral infections.

### Conclusion

Turmeric has been used in Siddha system, since ancient times with various purposes. Although lot of studies done on turmeric, no studies for drug development have been carried out yet. A study conducted in Jawaharlal Nehru Centre for advanced scientific Research proven that turmeric plays a vital role against HIV/AIDS. Consequently, the agents that can modulate the immune system and fights against the virus. Curcumin is one such agent and has potential effect to treat COVID-19. Several researches have been conducted on turmeric; this review will give new ideas to utilize turmeric in various diseases. In future, Turmeric may find a novel drug to control various viral infections including COVID-19.

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