

# Turmeric Milk: An Elixir

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## Introduction

Turmeric (*Curcuma longa* L. rhizome) is a tropical South Asian spice that is used as a condiment, food preservative, and traditional treatment for a variety of ailments. This Zingiberaceae spice is widely cultivated in the tropics and known by several names, including haldi, bhadra, pitika, mehagni, terremerite, and others. Turmeric has been used in India for about 2500 years, and was earlier employed as a colouring agent. Over the decades, the medicinal benefits of this spice have been gradually emerged. Turmeric is both a stimulant and a carminative, making it one of the most powerful natural remedies. In most cases, the rhizome is the most widely used component of the plant. Turmeric has also been utilised in the preparation of dental powders and pastes. It comes in a variety of forms and alleviates the symptoms of asthma and cough.

Curcumin, the main component of turmeric has two phenolic groups and one diketone moiety in its

structure. Its diketone groups may bind transition metal ions, resulting in metal complexes with enzyme-mimetic antioxidant properties. Curcumin has been shown to protect lipids and proteins against oxidative stress-induced oxidation by lowering levels of malondialdehyde, protein carbonyls, nitrotyrosines, and thiols. It exhibits a wide range of biological actions, including antidiabetic, antibacterial, anti-inflammatory, and antioxidant properties, has been shown to be useful against neurological illnesses. Curcumin has been demonstrated to be effective against anaemia, cancer, diabetes, digestion, food poisoning, gallstones, indigestion, irritable bowel syndrome, parasites, poor circulation, and wounds, among other conditions. Monoterpenes, sesquiterpenes, curcuminoids, alkaloids, and sterols are a few of the other substances found in turmeric.

*C. longa* contains protein, fat, minerals, carbohydrates and moisture (**Table 1**). The essential oil obtained by steam distillation of turmeric rhizome contains several chemical constituents such as  $\alpha$ -phellandrene, sabinene, cineol, borneol, zingiberene and sesquiterpenes (**Table 2**). Curcumin (diferuloylmethane) is responsible for the vibrant yellow colour and includes curcumin I (94%), curcumin II (6%) and curcumin III (0.3%). Turmeric milk also contains ginger, cinnamon, honey, and black pepper, in addition to turmeric. Compositions of these ingredients are shown in the **Tables 3-6**. Bioactive components in these ingredients have been reported to have anti-inflammatory, anti-oxidant, anti-carcinogenic, antimutagenic, anti-coagulant, anti-fertility, anti-diabetic, antibacterial, anti-fungal, anti-protozoal, anti-viral, anti-fibrotic, anti-venom, anti-ulcer, hypotensive, and hypocholesteremic properties.

Milk is a complete food with a fairly high concentration of important nutrients. Milk is good for our health and protects us from a variety of ailments. Fortifying milk with herbs or spices has become increasingly popular in recent years. Spices are known to be high in minerals and have therapeutic qualities. Turmeric milk or haldi doodh is a common beverage in India that has

**Table 1: Composition of Turmeric**

Composition	(%)
Protein	6.3
Fat	5.1
Minerals	3.5
Carbohydrates	69.4
Moisture	13.1
Essential oil	5.8

**Table 2: Components of the Turmeric Oil**

Composition	(%)
$\alpha$ -phellandrene	1.0
Sabinene	0.6
Borneol	0.5
Cineol	1.0
Zingiberene	25.0
Sesquiterpenes	53.0

Turmeric milk is an ancient ayurvedic beverage that has been used for centuries as a traditional medicine. It can be prepared easily at home using commonly available spices. When consumed before going to bed, this drink ensures a sound sleep. Among many potential health benefits, the most notable are its antioxidant, anti-inflammatory, and cognitive functions. Turmeric is known to have antioxidant properties in both fat-soluble and water-soluble forms. Consuming turmeric milk daily helps rejuvenate the skin cells from within. Its antioxidant properties help prevent early aging, wrinkles and fine lines of the skin. Turmeric is both a stimulant and a carminative, making it one of the most powerful natural remedies. In most cases, the rhizome is the most widely used component of the plant. It has also been utilised in the preparation of dental powders and pastes.

been used for centuries as a healing elixir. Turmeric milk is not only easy to make, but it is also delicious and comforting. In Ayurveda, cow milk, or any other kind of milk for that matter, is considered to be the best vehicle for curcumin delivery. The fat in milk enhances stability and absorption of this oil-soluble compound.

Turmeric milk has been around for centuries, but its popularity is recently on the rise. To boost the immunity of individuals in the current COVID-19 scenario, several dairy industries have recently come up with unique turmeric milk formulations that include turmeric, ginger, and cinnamon as an adjuvant in milk and milk products. The price of a litre of turmeric milk generally varies from ₹150 to ₹300, depending on the brand one chooses. Some of the reputed companies that manufactures turmeric milk are Amul, Mother Dairy, Heritage, Verka, MILMA and gaia etc. (Fig. 1). This article elaborates the virtues of turmeric when added to milk which is referred as turmeric milk. It goes through the procedures for preparing turmeric milk and its health benefits in terms of prevention and treatment of various illnesses as reported in the literature.

**Fig. 1: Range of Turmeric Milks Available in the Market**



### Preparation of Turmeric Milk

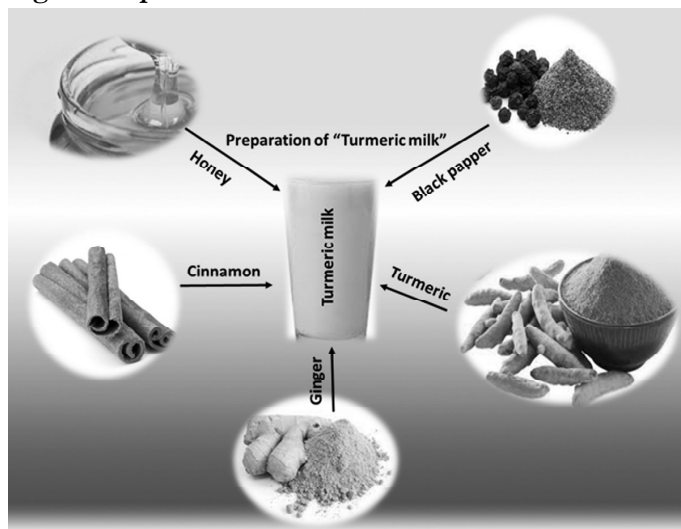
Turmeric milk is a popular Indian beverage made with turmeric, which gives it a yellow or gold colour. **Table 7** and **Fig. 2** presents the ingredients which are used for the preparation of turmeric milk.

To prepare turmeric milk, add all ingredients at their respective levels as shown in the **Table 7** in a saucepan and bring to boil the contents over medium-high heat while stirring constantly. Reduce the heat and simmer for 5 minutes or until the color becomes bright

**Table 3: Chemical Composition of Honey per 100 g**

Composition	(g)	Minerals	(mg)	Vitamins	(mg)
Fructose	38.2	Calcium	3-31	Ascorbic acid	2.2-2.5
Glucose	31.3	Potassium	40.0-3500.0	Thiamin	0.0-0.01
Sucrose	0.7	Copper	0.02-0.60	Riboflavin	0.01-0.02
Other disaccharides	5.0	Iron	0.03-4.00	Niacin	0.1-0.2
Water	17.1	Magnesium	0.7-13.0	Pantothenic acid	0.02-0.11
Organic acids	0.5	Manganese	0.02-2.0	Pyridoxine (B6)	0.01-0.32
Proteins, amino acids	0.3	Phosphorus	2.0-15.0		

**Fig. 2: Preparation of Turmeric Milk**



yellow-orange. Turmeric milk will last for about 5 days in the refrigerator.

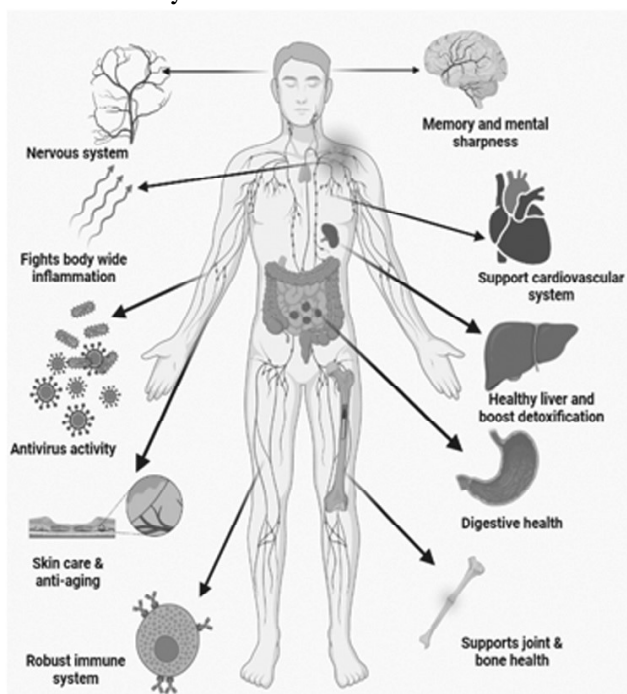
**Health Benefits of Turmeric Milk**

The biological functions of the turmeric milk in treating various conditions which has been reported in literature are shown in **Fig. 3**. The potential benefits of turmeric milk include the following: -

- **Antioxidant Activity**

Curcumin, the active ingredient of turmeric in turmeric milk has been shown to have strong medicinal properties.

**Fig. 3: Health Benefits of Turmeric Milk on Human Body**



**Table 4: Chemical Composition of Cinnamon**

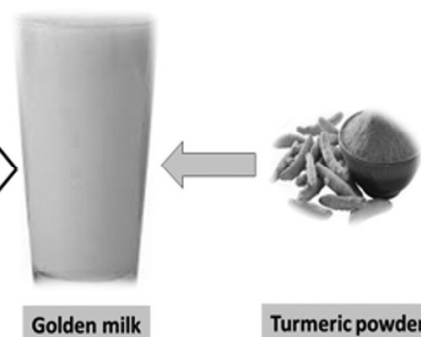
Composition	(%)
Eugenol	70.00 to 95.00
Cinnamaldehyde	65.00 to 80.00
Camphor	60.00
<i>trans</i> -cinnamyl acetate	42.00 to 54.00
Terpene hydrocarbons	78.00
<i>alpha</i> -Bergamotene	27.38
(E)-cinnamyl acetate	41.98
<i>trans</i> - <i>alpha</i> -bergamotene	7.97

**Table 5: Chemical Composition of Ginger Root**

Composition	(%)
Moisture	38.02
Protein	6.09
Crude fat	3.92
Crude fibre	28.00
Vitamin C	6.85
Carbohydrate	14.76
crude Ash	2.36

**Table 6: Composition of Black Pepper**

Composition	(%)
Oleoresin Content	10.6
Piperine Content	5.8
Essential Oil	1.7
Water Content	11.0



**Table 7: Recipe for the Preparation of Turmeric Milk**

Components	Quantity
Whole milk	250 ml
Turmeric	5 g
Honey	7 g
Ginger powder	1.4 g
Powdered cinnamon	1.4 g
Black pepper (optional)	100 mg

Curcumin at 3% by weight in turmeric can act as anti-inflammatory agent protecting our bodies against free radicals that cause damage due to their high antioxidant strength compared with other spices or herbs. Turmeric also stimulate body's own enzymes responsible for fighting off any illness/injury while stimulating immune system function at same time.

● **Anti-inflammatory Activity**

The spice turmeric used in turmeric milk is one of the most powerful natural anti-inflammatory ingredients around. Efficacy of turmeric as an anti-inflammatory agent has been well documented in experimental models such as inflammation and rheumatoid arthritis. Its potency is attributed to its curcuminoids content. Curcumin is the major curcuminoid present in turmeric and demethoxycurcumin and bisdemethoxycurcumin are minor components.

*In vitro* studies have shown that curcumin, demethoxycurcumin and bisdemethoxycurcumin have anti-inflammatory potential. Inflammation is a result of a complex mix of proinflammatory and anti-inflammatory cytokines. Curcumin inhibits inflammation by modulating both these kinds of molecules. In one study, researchers compared curcumin to phenylbutazone, a anti-arthritis drug. Phenylbutazone is used as a standard for comparison because it belongs to the nonsteroidal anti-inflammatory drug (NSAID) group. Curcumin was found to be more potent than phenylbutazone in reducing inflammation. The inflammation-related enzymes COX-1 and COX-2 are present mainly in the synovial tissue of joints affected by rheumatoid arthritis. Curcumin inhibits inflammation by suppressing their activity. It does so by intercalating into the lipid rafts where these enzymes reside. It also stimulates endocannabinoids that exert anti-inflammatory effects.

● Supporting brain function and improving memory

India has the lowest dementia rate in existence because its population consumes turmeric daily in one or the other form throughout their lifetime which prevents inflammation of brain and improvement in the memory.

The research on rats has shown that curcumin provides many neuroprotective properties, including improvement in cognition and neurogenesis. It can increase levels of brain-derived neurotrophic factor (BDNF) which helps with new neuron development as well fighting various degenerative processes happening within the human central nervous system such as depression or Alzheimer's disease related memory loss among other things. Consuming turmeric may delay or even prevent these diseases by raising levels of this important chemical messenger responsible for managing how efficiently certain neurons function. Turmeric's ability to increase BDNF levels not only helps improve memory, but can also delay or reverse brain diseases and age-related brain dysfunction.

● **Preventing Heart Disease**

Curcumin, the key ingredient of turmeric in turmeric milk has been shown to help improve heart health by lowering blood pressure and cholesterol levels. It can also reduce inflammation which is important for preventing strokes as well. The curcuminoids found in turmeric have been shown to prevent atherosclerosis. This build-up of plaque occurs due to oxidative stress caused by free radicals present in oxidized LDL cholesterol particles-small enough to penetrate artery walls. Turmeric has been found to prevent this accumulation from taking place within veins (preventative) as well as break up existing plaques (curative). It not only prevents the build-up of plaque and cholesterol within existing arteries, but also cause new blood vessels to grow. Curcumin is also believed to improve the function of the endothelium, the layer of cells that lines the inside of blood vessels. It has been shown that curcumin can protect against lipopolysaccharide (LPS)-induced toxicity to endothelial cells, which can also protect against atherosclerosis and related conditions.

● **Lowering Blood Sugar Levels**

According to several studies, drinking turmeric milk can assist persons with type 2 diabetes and lower their fasting blood sugar levels. One of the ways by which turmeric in turmeric milk helps to manage diabetes is by reducing inflammation in the body. Inflammation is linked with insulin resistance, which is a key factor in the development of type 2 diabetes. Turmeric also helps to improve the function of pancreatic beta cells, which are responsible for producing insulin. Another way using which turmeric lowers blood sugar levels as has been reported by the researchers is by influencing the gut microbes. When people take curcumin, it influences their gut microbes to perform certain chemical reactions. In turn, this affects how the body handles glucose and

improves insulin resistance, hence improving type 2 diabetes symptoms. This suggests that taking curcumin supplements or adding more curry to diet could be a good move for diabetics. However, more research is needed to prove that the chemicals in turmeric milk can help lower blood sugar.

#### ● **Boosting the Immune System**

Curcumin, the key ingredient of turmeric in turmeric milk has been reported to be as antibacterial, antiviral and antifungal. Curcumin has been found to have potent antibacterial activity against numerous pathogenic gram positive and gram-negative bacteria including “E coli” which is a common cause of traveler’s diarrhea, *Helicobacter pylori* (a leading cause of ulcers), methicillin-resistant *S aureus* (MRSA) strains, “*Streptococcus pneumoniae*”, “*Listeria monocytogenes*” among others. Turmeric milk is commonly used to treat common ailments such as the common cold. It can modify moods by positively affecting cytokine levels within both central (brain) or peripheral sites such that they are less likely to cause inflammation related issues like depression symptoms due to NF- $\kappa$  B activation which leads to improved cognitive function too. One study showed that curcumin boosts the immune system by increasing antibody production and white blood cells responsible for destroying germs. Turmeric milk consumption may be especially useful for those who are recovering from illness because it increases white blood cell count as well as antibody production.

#### ● **Improving Bone Health**

Turmeric in turmeric milk has been reported to increase the bone density. Therapeutic potential of curcumin in osteoporosis has recently been demonstrated both *in vitro* and *in vivo*. In animal models of this condition, it was demonstrated to enhance several aspects of bone health by altering various processes in osteoclast activation and differentiation, as well as enhancing mineral density and bone mechanical characteristics. Inhibition of nuclear factor kappa B (NF B) and receptor activator of NF-B ligand (RANKL), NO production, ROS formation, and synthesis of pro-inflammatory cytokines are probable involved pathways.

Curcumin has been found to prevent bone degeneration and promote favourable changes in bone turnover; the significance of pro-inflammatory cytokines like TNF- $\alpha$  and IL-6 in these effects has also been proven. Curcumin was also found to be beneficial against glucocorticoid-induced osteoporosis in a rat model. Curcumin inhibited the dose-dependent reduction of osteoblast proliferative potential caused by dexamethasone. Further, it increased the amounts of transcription factors

that promote osteoblast differentiation. Actions of curcumin were shown to be mediated by the Wnt signalling pathway, which is known to influence osteoblastogenesis and bone formation.

#### ● **Therapeutic Potential in Ageing-related Disorders**

Curcumin can help with atherosclerosis, type 2 diabetes, cardiovascular and neurological disorders, osteoporosis, rheumatoid arthritis, age-related renal and eye illnesses, as well as a variety of malignancies. Several clinical trials have been conducted over the last decade to investigate its potential for extending life expectancy. For example, a meta-analysis found that curcumin supplementation can significantly lower circulating interleukin 6 (IL-6) concentrations, which is thought to be a key player in inflammatory responses; surprisingly, the most pronounced effects were seen in patients with higher levels of systemic inflammation. One of the main reasons why turmeric milk reduces the signs of ageing is because it is high in antioxidants. These antioxidants help to protect the body against free radicals, which can damage cells and lead to premature ageing. Another benefit of turmeric milk is that it is anti-inflammatory. Inflammation can cause damage to cells and lead to wrinkles and other signs of ageing. Turmeric milk helps to reduce inflammation and therefore reduces the signs of ageing. Turmeric milk is also believed to boost the metabolism. This means that one can burn up calories and fat more quickly, helping to lose weight and reduce the build-up of toxins in the body.

#### ● **Neurodegenerative Disorders**

According to mounting evidence, oxidative stress and associated systemic inflammation may play a key role in the development and progression of neurodegenerative diseases. Curcumin has neuroprotective properties against neuroinflammation, neurodegeneration, and oxidative stress. It also inhibits the neuropathological process of Alzheimer’s disease (AD) by inhibiting amyloid  $\beta$  production. It has powerful antioxidant, anti-inflammatory, and antibacterial capabilities, as well as autophagy-modulatory properties, which contribute to its neuroprotective qualities. Studies have shown that curcumin can cross the blood brain barrier where it exerts protective effects in cerebral ischemia-reperfusion injury by inhibiting apoptosis in neurons.

#### ● **Effective Against Viruses**

In one of the study, curcumin, the key ingredient of turmeric in turmeric milk inhibited Zika and Chikungunya viruses as well as herpes simplex virus and dengue virus. It also inhibited the integrase and

protease enzymes of the human immunodeficiency virus (HIV), implying that it had anti-AIDS properties also. Though it has not been conclusively proven, there is evidence to suggest that the curcumin in turmeric milk may help prevent COVID-19 infection. Curcumin is known for its ability to boost the immune system, and it has been shown to be effective at preventing and modulating cytokine storm in severe cases of COVID-19. However, more studies are needed to determine the optimal dose, formulation, and timing of administration for both prevention of infection and severe COVID-19.

### ● Liver Detoxification

The curcumin, found in turmeric of turmeric milk has been reported to cleanse the liver by eliminating the toxins. Curcumin inhibits lipid peroxidation by blocking free radicals that cause oxidation, thus helping to protect the liver from damage brought about by toxins. In addition, curcumin also helps in regenerating the cells of the liver as it increases the expression of glutathione peroxidase as has been reported both *in vitro* and *in vivo* studies. This helps to improve the function of the liver. Curcumin in milk induces rGST 8-8, an isozyme with high activity toward 4-HNE, a highly cytotoxic by-product of lipid peroxidation. Glutathione peroxidase (GPx) activity towards cumene hydroperoxide in liver was also found to be increased in a saturable manner with respect to curcumin dose. In addition, curcumin appears to induce enzymes involved in the detoxification of electrophilic by-products of lipid peroxidation. Curcumin also reduces damage to the liver following long-term consumption of alcohol. It does this by enhancing certain enzymes that are essential for breaking down alcohol.

### Conclusion

Turmeric milk is an ancient ayurvedic beverage that has been used for centuries as a traditional medicine. It can be prepared easily at home using commonly available spices. When consumed before going to bed, this drink ensures a sound sleep. Among many potential health benefits, the most notable are its antioxidant, anti-inflammatory, and cognitive functions. Turmeric is

known to have antioxidant properties in both fat-soluble and water-soluble forms. Consuming turmeric milk daily helps rejuvenate the skin cells from within. Its antioxidant properties help prevent early aging, wrinkles and fine lines of the skin. It is a great stress buster and relieves tension and anxiety. It improves vision, eyesight, and strengthens the eye muscles. It also has the ability to improve memory, heart disease risk factors, osteoporosis, blood sugar levels, immune system function and age-related disorders. Thus, turmeric milk is an elixir that can help improve overall health and well-being, making it a great choice for those who are looking for ways to improve their health.

### References

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