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TURMERIC: THE SPICE KING OF HEALTH

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ABSTRACT

Turmeric, one of the most celebrated spices in the world of research, is a key ingredient in the kitchen of every Indian household. It has been gloriously described for its healing properties in ancient Indian and Chinese literature which has further instigated research to expand the spectrum of this indigenous herb. Several studies have illustrated the anti-inflammatory, antioxidant, anticarcinogenic and antimicrobial activity of turmeric which confirms its therapeutic potential to treat a wide variety of disorders. This systematic review underlines the surplus health benefits of turmeric and the scope of further research in these clinical scenarios.

KEYWORDS: turmeric, antiinflammatory activity, anticarcinogenic.

INTRODUCTION

Turmeric, or *Curcuma longa*, is one of the most common spices used in our daily cooking. It belongs to the family Zingiberaceae. It is a rhizome. This spice is native to India. Historically, turmeric has been used as a flavouring and medicinal agent. Turmeric gives the characteristic yellow colour to our food. Traditionally, turmeric has been used to heal a variety of disorders.

The Sanskrit name for Turmeric is Haridra. It is known as Haldi in Hindi, Manjal in Tamil and Arishina in Kannada. In the Ayurvedic tradition, turmeric, or “haldi” works well with all doshas, with its main action being to reduce mucus from the system.[1] In the United States of America, Turmeric has been granted “Generally Recognized as Safe” (GRAS) status by the FDA.

HISTORY OF USE OF TURMERIC

In India the use of medicinal plants is found in the Rig-Veda which was written between 4500-1600 BC.[2] It has been used in the treatment of jaundice.[3] It is known to be one of the oldest spices that have been used in Western and Southern parts of India for thousands of years.[4]

It has also been extensively used in Chinese medicine. It is considered as a sign of auspiciousness and is used during festivals and weddings. A paste made of turmeric and sandalwood is used by women for beautification of skin and to reduce blemishes. It is also regularly used by women daily while taking bath. It is applied to the doorstep of houses as it is considered to bring prosperity and also helps ward off various insects from entering the house.

It is known that the Arab traders had carried with them turmeric to Europe in the 13th century. Marco Polo was so impressed by turmeric that he had mentioned it as a vegetable that possesses properties of saffron, but actually is not saffron.[5] Hence it is known as Indian saffron.

TAXONOMY

Kingdom- Plantae
Class- Liliospida
Sub class- Commelinids
Order- Zingiberales
Family- Zingiberaceae
Genus- Curcuma
Species- Curcuma longa

ACTIVE CONSTITUENTS

The active constituents of turmeric are the flavonoid Curcuminoids which is a mixture of curcumin (diferuloylmethane), monodexmethoxycurcumin and bisdesmethoxycurcumin Curcumin makes up approximately 90% of the curcuminoid content in turmeric. Other constituents include sugars, proteins and resins. The active constituent is curcumin, which comprises0.3-5.4% of raw turmeric.[6] Turmeric is comprised of a group of three curcuminoids: curcumin (diferuloylmethane), demethoxycurcumin, and bisdemethoxycurcumin, as well as volatile oils (tumerone, atlantone, and zingiberone),

sugars, proteins, and resins. The Curcumin is a lipophilic polyphenol that is nearly insoluble in water but is quite stable in the acidic pH of the stomach.[7]

The phenolic groups help to eliminate oxygen-derived free radicals. Pharmacokinetic, studies have demonstrated that 40-85% of an oral dose of curcumin passes through the gastrointestinal tract unchanged. Due to its low rate of absorption, curcumin is often formulated with bromelain for increased absorption and enhanced anti-inflammatory effect.[8]

PHARMACOLOGICAL ACTION AND USES

The rhizome, or root, of Turmeric is the part used medicinally. Curcumin is the most well studied constituent.

Anti Inflammatory Activity

Oral administration of *Curcuma longa* significantly reduced inflammatory swelling.[9] *C. longa's* anti-inflammatory properties may be due to its ability to inhibit both biosynthesis of inflammatory prostaglandins from arachidonic acid and neutrophil function during inflammatory states. Curcuminoids also inhibit LOX, COX, phospholipases, leukotrienes, prostaglandins, thromboxane, nitric oxide elastase, hyaluronidase, collagenase, monocyte chemoattractant protein-1, interferon inducible protein, TNF and interleukin-12. Hispolon analogues, which lack one aromatic unit in relation to curcumin, also exhibited enhanced anti-inflammatory and anti-proliferative activities.[10] The beneficial effect of curcumin (anti-inflammatory compound) in sepsis appears to be mediated by the up regulation of PPAR-γ, leading to the suppression of pro inflammatory cytokine, TNF-α expression and release.[11] It is also known to reduce inflammation in patients with Rheumatoid arthritis.

Antioxidant Activity

An *in vitro* study measuring the effect of curcumin on endothelial heme oxygenase-1, an inducible stress protein, was conducted utilizing bovine aortic endothelial cells. Incubation with curcumin resulted in enhanced cellular resistance to oxidative damage.[12] Curcumin inhibits the mutagenicity of cigarette smoke in a dose-dependent manner. Curcumin is only antimutagenic against mutagens which require metabolic activation.

Curcumin reduces the testicular damage caused by exposure to di-n-butylphthalate (DBP), by increase in Glutathione (GSH), testosterone levels and glucose-6-phosphate dehydrogenase

(G6PD) activity and decrease in malondialdehyde (MDA) levels. These properties may be due to intrinsic antioxidative abilities of curcumin.[13]

Anticarcinogenic Activity

Curcumin can protect DNA against single strand breaks induced by single oxygen.[14] Curcumin has shown anti-proliferative effect in multiple cancers, and is an inhibitor of the transcription factor NF-B and downstream gene products (including c-myc, Bcl-2, COX- 2, NOS, Cyclin D1, TNF-a, interleukins and MMP-9). In addition, molecules involved in tumor growth, angiogenesis and metastasis.[15] Curcumin affects a variety of growth factor receptors and cell adhesion A phase I/II clinical trial enrolled 21 gemcitabine (Gemzar) resistant patients with advanced pancreatic cancer.[16] All patients received 8g curcumin daily in combination with gemcitabine. No dose-limiting toxicities were observed and the toxicity profile was comparable with that of gemcitabine, therefore the combination was determined not to increase toxicity. In contrast, several subjects reported an improvement of cancer or chemotherapy-related symptoms after starting curcumin.

A placebo-controlled clinical trial randomized 126 patients with colorectal cancer to either receive curcumin or placebo.[17] All patients also received surgery followed by radiotherapy, chemotherapy, chemoradiotherapy, or no additional therapy. The body weight of Curcumin patients increased (approx. 4%) vs. weight loss of 6% in placebo group ($p<0.05$). This was thought to be due to a significant 60% reduction of TNF-α in the curcumin group ($p<0.5$), as TNF-α causes cancer cachexia. However, there is some evidence that curcumin inhibits the activity of certain chemotherapy drugs.

The above studies show that turmeric can play an active role in the treatment of various malignancies. Further research is however required to expand its spectrum of usage.

Antimicrobial Activity

Turmeric extract and the essential oil of *Curcuma longa* inhibit the growth of a variety of bacteria, parasites, and pathogenic fungi. A study of chicks infected with the caecal parasite *Eimera maxima* demonstrated that diets supplemented with turmeric resulted in a reduction in small intestinal lesion scores and improved weight gain.[18] Turmeric is said to be *Krimihara* (anthelmintic) and *Krimighn*a (destroyer of worms) in Ayurvedic lexicons. The juice of turmeric has anti-helminthic property on internal use. In the rural areas of Nepal, turmeric powder or paste boiled in water with a little common salt is taken as an anti helminthic

Curcumin has also been found to have moderate activity against *Plasmodium falciparum* and *Leishmania major* organisms.[19]

Antidiabetic Activity

Wickenberg *et al.* 2010.[20] studied the effects of turmeric on postprandial plasma glucose and insulin in healthy subjects; they found out that the ingestion of 6g *C. longa* had no significant effect on the glucose response. The change in insulin was significantly higher 30min and 60min after the Oral Glucose Tolerance Test (OGTT) and insulin AUCs were also significantly higher after the ingestion of *C. longa* after the OGTT.

Antiallergic Activity

Curcumin inhibited compound 48/80-induced systemic anaphylaxis *in vitro* and anti-DNP immunoglobulin E (IgE) mediated passive cutaneous anaphylactoid response *in viv*o. Curcumin has the ability to inhibit nonspecific and specific mast cell-dependent allergic reactions.[21]

Dermatological Activity

According to Ayurveda, turmeric is *Vranahara* (ulcer healing), *Varnya* (improve complexion), *Tvakdoshahara* (cure skin diseases), and *Kandoohara* (cure itching).

Hepato Protective Activity

Turmeric has been used in the treatment of jaundice.Volatile oils present in turmeric are known to possess anti inflammatory properties.[22]

Ophthalmic Activity

Turmeric is indicated in traditional medicine in catarrahal and purulent ophthalmia, conjunctivitis. Central Food Technological Research Institute, Mysore, isolated a water soluble peptide (0.1% of dry weight) from turmeric, having antioxidant activity.[23]

CONCLUSION

Turmeric is one of the most commonly used spices in the Indian kitchen. It has numerous therapeutic uses. It continues to be one of the most common home remedy for a variety of minor ailments. Further research can yield valuable data regarding the therapeutic potential of this wonder herb and the dose in which it needs to be consumed to yield these beneficial effects.

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