



CURCUMIN EFFECTS AND APPLICATION IN ORAL MEDICINE

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ABSTRACT

curcumin is a plant isolated polyphenol (*Curcuma longa*) L. (Zingiberaceae) compound found in South Asia. It has active constituent which account for 0.3-5.4% of raw turmeric. Curcumin is been widely used in Ayurvedic medicine for centuries. It has anti-inflammatory, antioxidant, analgesic, antifibrotic, antifungal, antiplatelets, antidiabetic, antimicrobial anticarcinogenic, antiviral therapeutic properties. In several studies it shows that there is improvement in oral medicine application like aphthous ulcer gingivitis, precancerous lesion and condition like oral submucous fibrosis, oral lichen planus, leukoplakia. etc.

KEYWORDS: Curcumin, anti-inflammatory, anti-oxidant, anticarcinogenic, antifibrotic.

INTRODUCTION

Curcumin has isolated first in 1815 by Vogel. It is crystallized by Daube and Lampe and co-workers elucidated structure in 1910.^[1]

Curcumin (diferuloylmethane) is a plant-isolated polyphenol (*Curcuma longa*) L. (Zingiberaceae) compound found in South Asia.^[2] Avonoid curcumin (diferuloylmethane) and various volatile oils such as turmerone, atlantone, and zingiberone are the active constituents of turmeric. Other components are sugars, proteins and resins. Curcumin is the best studied active constituent, which accounts for 0.3-5.4% of raw turmeric.^[3] The exact mechanism of action and determination of bioactive components has investigated for medicinal properties of turmeric and source of curcumin.^[4]

Curcumin has been used widely in ayurvedic medicine for centuries, as it is nontoxic and has a range of therapeutic properties including antioxidant, analgesic, anti-inflammatory, antiseptic, anticarcinogenic, chemotherapeutic, antiviral, antibacterial, antifungal and antiplatelet activity.^[5,6]

General Effects

Anti-Inflammatory Effect

Curcumin has anti-inflammatory effect by interrupting several inflammatory pathways.^[7] It regulates activation of some transcription factors like activating protein-1 (AP-1) and NF-κB instimulating monocytes and alveolar

macrophages and block cytokine expression. curcumin inhibits cytokine production.^[8] Certain studies has shown that Curcumin also has anti-rheumatic activity.^[9]

Antioxidant effect

Curcumin's antioxidant activity was reported in 1975.^[10] It acts as an oxygen-free radical scavenger,^[11,12,13] Curcumin has a powerful inhibitory effect in human keratinocytes and fibroblasts against H₂O₂-induced damage.^[14] Water-and fat-soluble extracts of turmeric and its curcumin portion exhibit strong antioxidant activity.^[15]

Anti-microbial effect

Curcumin has antibacterial activity against periodontopathic bacteria and found to be an effective agent for the prevention of periodontal diseases Curcumin has inhibition on the growth of *P. gingivalis*, *Prevotella intermedia*, *Fusobacterium nucleatum* and *Treponema denticola*.^[16] several bacteria like *Streptococcus*, *Staphylococcus*, *Lactobacillus*,^[17]

Anti-carcinogenic effect

Curcumin has the potential to inhibit carcinogenesis at three stages: tumor development, angiogenesis, and tumor growth.^[18] It induces apoptosis and prevents the progression of the cell cycle, both of which are instrumental in preventing the development of cancerous cells in smooth muscle cells of rats.^[19]

Antiviral effect

Curcumin has antiviral activity.^[20] It acts as an efficient protein transcription in Raji DR-LUC cells for Epstein-Barr virus (EBV) key activator Bam H fragment z left frame 1 (BZLF1).^[21] Most importantly, curcumin also exhibits anti-HIV activity (human immunodeficiency virus) by inhibiting the HIV-1 integrase required for viral replication.^[22,23]

Antifibrotic effect

Curcumin act as fibrinolytic agents in Chinese medicine.^[24] It has three properties like inhibition of lipid peroxidation, checking cellular proliferation and inhibition of collagen synthesis.^[25] Several studies show significant of curcumin in increasing mouth opening of oral submucous fibrosis patient.^[26] Curcumin suppresses bleomycin-induced pulmonary fibrosis in rats.^[27]

Antidiabetic effect

Curcumin stop galactose-induced cataract formation at very low doses.^[28] Curcumin reduces advanced glycation end products which makes complications in diabetes mellitus.^[29]

Cardiovascular effect

The protective effects of Turmeric on the cardiovascular system include lower cholesterol and triglyceride levels, lower lipoprotein (LDL) susceptibility to lipid peroxidation.^[30]

Antiplatelet aggregation effect

It has been demonstrated that platelets do not clump together, which in turn enhances circulation.^[31]

Application in Oral Medicine**Aphthous Ulcers**

Manifara conducted a randomized double-blind clinical study of aphthous ulcers. Curcumin gel (2% Curcumin) and placebo gel was given. The results showed that Curcumin gel significantly reduced pain severity and aphthous ulcer size compared with placebo.^[32]

Gingivitis

Many studies.^[33,34,35] have shown that Turmeric mouthwash has effectively used as an adjunct to mechanical plaque control in prevention of dental plaque and gingivitis in dentistry field.

Recurrent Aphthous Stomatitis

Curcumin oil has shown that size of ulcer reduced after applying. It has also reported that healing is faster as compared to previous ulcer.^[36]

Mucositis

Patil assessed the effectiveness and safety of curcumin mouthwash in reducing the severity of signs and symptoms of oral mucositis caused by radiochemotherapy in patients with cancer.^[37] Curcumin

mouthwash was well tolerated and managed effectively for the signs and symptoms of oral mucositis.^[38]

Precancerous disorder

Curcumin plays an important role in the treatment of various precancerous disorders such as oral submucous fibrosis, leukoplakia and oral lichen planus. Turmeric extract and oil have demonstrated in vitro and in vivo animal studies cancer preventive activity.^[39,27]

Rai *et al.*,^[40] Curcumin efficacy previously reported when administered orally to treat precancerous lesions at a dose of up to 8 g / day. The results showed that 25 patients with oral leukoplakia had substantial symptomatic relief and also that the clinical size of the lesion via curcumin care. 4w. Curcumin increased the local level of vitamin C and E while decreasing lipid peroxidation and DNA damage to patients with precancerous lesions, suggesting that the anti-precancerous effect was achieved through antioxidant and pro-oxidant pathways.

Chainani-Wu *et al.*,^[41] shows that curcuminoids at 6000 mg / d in 3 divided doses has well tolerated and shows efficacy in the control of oral Lichen planus signs and symptoms.

Curcumin treatment of between oral squamous cell carcinoma (SCC-25 cells) and periodontal ligament fibroblasts (PDL) has significant result in a decrease in tumor cell migration and invasiveness, reversal of epithelial-to-mesenchymal transition (EMT) in tumor cells, and a decrease in the gene expression and synthesis of EMT mediators in fibroblasts.^[42]

Agarwal N *et al.*, performed a study to check the effects of turmeric in oral submucous fibrosis patients. An improvement in mouth opening and burning sensation was noticed.^[43]

Yadav M *et al.* conducted a study in oral submucous fibrosis patients to compare curcumin with intralesional steroid injections. Improvement of burning sensation, interincisal distance and tongue protrusion were tested and it was found that burning sensation, interincisal distance and tongue protrusion improved markedly.^[44]

CONCLUSION

Curcumin is a safe, non-toxic, effective and affordable substitute for many conventional medications used in oral infection. It suggested to be used as an alternative to the traditional corticosteroid treatment for the control of precancerous lesions and condition. Curcumin can be the new hope for getting relief from oral lesions. Its role in the treatment of precancerous and cancerous lesion is quite promising but there is less information and research in this field. More studies has to be conducted for getting more benefits in application of curcumin.

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