Int J Pharm Bio Sci 2014 April ; 5(2) : (P) 366 - 369

Review Article **Pharmacology**

International Journal of Pharma and Bio Sciences **ISSN 0975-6299**

CURCUMIN ACTION AGAINST PRE-CANCEROUS LESION

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ABSTRACT

Oral precancerous lesions are one of the most common lesions present worldwide today. They are usually neglected by the common population when compared to cancerous lesion. However, they also may be extremely fatal which changes as cancer if left untreated at a very initial stage of the lesion. Early detection and treatment gives the best chance for its cure. The detection and diagnosis are currently based on clinical examination, histopathological evaluation. Several medications have been developed over the years for early cure of oral precancerous lesion. The purpose of this article is to review the available curcumin herbal to treat these precancerous lesions.

KEY WORDS: curcumin herbal, oral precancerous lesions, anti-oxidant, apoptosis

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INTRODUCTION

Extensive research within the past half-century has indicated that curcumin (diferuloylmethane), a yellow pigment in curry powder, exhibits anti-oxidant, anti-inflammatory, and pro-apoptotic activities. The anti-pre-cancer activities assigned to curcumin are mediated through an anti-oxidant and DNA protecting mechanism[1]. Values for serum and salivary vitamins C and E showed a significant decrease in oral leukoplakia, submucous fibrosis and lichen planus, in contrast to healthy individuals, but increased significantly in all groups subsequent to curcumin administration after clinical cure of lesions.Oral leukoplakia and submucous fibrosis are two major precancerous lesions, but only 8-10% of these lesions which ultimately become malignant[2] . The ability to clinically predict malignant transformation is limited and routine histopathological diagnosis has limited prognostic value. The presence of epithelial dysplasia is an important parameter used in the prognostication of leukoplakia. However, there are limitations in its usage where all lesions exhibiting dysplasia do not eventually become malignant and some may even regress, and carcinoma can develop from lesions in which epithelial dysplasia was not diagnosed in previous biopsies[3]. Therefore, it is necessary to develop other methods for predicting the malignant potential of pre-malignant lesions and preventive Curcumin, the principal curcuminoid found in turmeric, which is generally considered to be an active component. Other curcuminoids found in turmeric include demethoxycurcumin and bisdemethoxycurcumin.measures[4].

Antioxidant Activity

Curcumin is an effective scavenger of reactive oxygen species and reactive nitrogen species in the test tube *(in vitro)* [5, 6]. However, the finding that oral curcumin supplementation (3.6 g/day) for seven days decreased the number of oxidative DNA adducts in malignant colorectal tissue suggests that curcumin taken orally may reach sufficient concentrations in the gastrointestinal tract to inhibit oxidative DNA damage [5,6].

Anti-inflammatory Activity

The metabolism of arachidonic acid in cell membranes plays an important role in the inflammatory response by generating potent chemical messengers known as eicosanoids [7]. Curcumin has been found to inhibit PLA2, COX-2, and 5-LOX activities in cultured cells [8]. Although curcumin inhibited the catalytic activity of 5-LOX directly, it inhibited PLA2 by preventing its phosphorylation and COX-2 mainly by inhibiting its transcription. In inflammatory cells, such as macrophages, iNOS catalyzes the synthesis of nitric oxide, which can react with superoxide to form peroxynitrite, a reactive nitrogen species that can damage proteins and DNA. Curcumin has been found to inhibit NF-kB-dependent gene transcription[9] and the induction of COX-2 and iNOS in cell culture and animal studies [10,11]

Induction of Cell Cycle Arrest and Apoptosis

After a cell divides, it passes through a sequence of stages—collectively known as the cell cycle—before it can divide again. Following DNA damage, the cell cycle can be transiently arrested to allow for DNA repair or, if the damage cannot be repaired, for activation of pathways leading to cell death (apoptosis) [12]Curcumin has been found to induce cell-cycle arrest and apoptosis in a variety of cancer cell lines grown in culture [13-17]. The mechanisms by which curcumin induces apoptosis are varied but may include inhibitory effects on several cell-signaling pathways. However , studies have found that curcumin induces apoptosis in cancer cells. Curcumin inhibited apoptosis induced by the tumor suppressor protein p53 in cultured human colon cancer cells[18,19], and one study found that curcumin inhibited apoptosis induced by several chemotherapeutic agents in cultured breast cancer cells at concentrations of 1-10 micromoles/liter[20] The antiprecancerous effects of curcumin are mediated through an antioxidant mechanism. Serum and salivary vitamin C and E levels were found to increase, while MDA and 8-OHdG levels decreased in oral leukoplakia, submucousfibrosis and lichen-planus patients after intake of curcumin, as compared to pre-

treatment levels[1]. The mechanisms by which curcumin mediates its prooxidant effects remain unclear. It has been suggested that mitochondria play a role in curcumin-induced apoptosis. It is possible that curcumin activates the mitochondrial enzymes that lead to the production of reactive oxygen species (ROS) [21, 22.] The induction of ROS by curcumin may occur through its interaction with thioredoxinreductase, thus altering its activity to NADPH oxidase, which could lead to the production of ROS[23].The mechanism of action of TO in oncoprevention can be speculated to be through its antioxidant action and protection against DNA damage. An adverse effect on lipids was noticed in only one case in this study. Prakasunand et al have reported on the biochemical safety of turmeric, 3gms/day, in 54 cases of pepticulcer[24]

CONCLUSION

Curcumin acts against transcription factors, which are like a master switch," said lead researcher, Bharat Aggarwal. "Transcription factors regulate all the genes needed for tumors to form. When we make the genes inactive that are involved in the growth and invasion of cancer cells .Curcumin helps the body to destroy mutated cancer cells, so they cannot spread inthe body Thus curcumin is best herbal for treating pre-cancerous lesion.

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