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“Curcumin-An Old Spice” - A Healing Remedy for Oral Lesions



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Deepa Jose^{*a}, Soma Susan Varghese^b, Joseph Sebastian C^c, Pramod Philip Mathews^d

^a Lecturer, Department of Oral Pathology.

^b Reader, Department of Oral Pathology

^c: Lecturer, Department of Oral Pathology

^d: Professor, Department of Oral Pathology

Mar Baselios Dental College, Thankalom

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ABSTRACT

In Ayurveda, turmeric has been recommended for various medical conditions like wound healing, nausea, indigestion, inflammation, liver diseases, improving skin complexions, etc. Nowadays turmeric active ingredient curcumin is being researched immensely for its multiple health benefits. Curcumin, the main coloring agent of turmeric have numerous properties including its antioxidant, anti-inflammatory, antimicrobial and chemo-preventive effects. Researchers have shown that after the intake of curcumin, patients with several oral lesions like leukoplakia, lichen planus, submucous fibrosis and cancer have shown symptomatic improvement. Poor bioavailability is its major drawback, however, combination with various agents are improving its efficacy and bringing this promising natural product to the forefront. Hence, this paper highlights the importance of curcumin as a healing remedy for various oral lesions.



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INTRODUCTION

Humans have been using herbal plants as curing aid since time immemorial. Haridra or *Curcuma longa* or turmeric (Fig 1), botanically related to ginger (Family- Zingiberaceae) has usages in culinary, esthetic and medicinal fields.¹ The health benefits of turmeric has been recognized and can be used as an effective remedy along with a glass of warm milk for cold and flu, indigestion, wound healing, nausea etc. Turmeric powder can also help in healing oral ulcers, wounds and other skin infections including boils. In Ayurveda also, it is recommended for various medical conditions like diabetes, asthma, arthritis and also in various inflammatory conditions. Other than health related uses, it also plays a very important role in various fields like food, cosmetics and pharmaceutical industries.¹ Wide spectrum of therapeutic properties of curcumin is due to its antioxidant, antimicrobial, antiviral, anticarcinogenic, antimutagenic, anti-inflammatory, antiulcerogenic and anti coagulability effect.¹ The beneficiary concept of curcumin is affordable, noninvasive and has proven *in vitro* and *in vivo* experiments. Many experiments are going on these days to overcome the reduced bioavailability and to enhance the health benefits associated with Curcumin. Hence this paper highlights the importance of this old spice as a therapeutic agent.

CHEMICAL CONSTITUENTS OF TURMERIC

Turmeric constitutes carbohydrates (69.4%), protein (6.3%), fat (5.1%), minerals (3.5%), moisture (13.1%) and up to 5% essential oils.² Curcuminoids or components of turmeric includes mainly curcumin (diferuloylmethane 77%), demethoxycurcumin (17%), and Bisdemethoxy curcumin (3%).²

IMPORTANCE OF CURCUMIN:

Curcumin an active compound of turmeric derived from rhizome of *Curcuma longa* has been using from millennia in traditional medicine. Literature reveals a very rich scientific documentation describing curcumin not only as an anticancer, antioxidative and antiinflammatory compound but also as a potent detoxifying and antimicrobial agent.³ Knowledge regarding mechanism of action of curcumin at the cellular and molecular is emerging as a result of extensive research on its therapeutic properties. Curcumin at cellular level inhibits proliferation, induces apoptosis and at molecular level interacts with various signaling pathways like NF- kappa B transcription factor and adhesion molecules.

PHARMACOLOGICAL ACTIONS OF CURCUMIN

ANTIOXIDANT EFFECT

Curcumin can significantly lower and inhibit the generation of different forms of free radicals such as reactive oxygen and nitrogen species (ROS & RNS respectively), which play an important role in inflammation. It can also control the activity of enzymes which are active in neutralization of free radical such as GSH (Glutathione) catalase, and SOD enzymes, moreover it inhibits various ROS-generating enzymes. Since ROS have been implicated in the development of various pathological conditions, curcumin has the potential to control these diseases through its potent antioxidant activity.²

ANTICANCER EFFECT

Curcumin induces apoptosis and inhibits cell cycle progression by modulating signaling pathways leading to cell cycle regulation or directly alter cell cycle regulatory molecules. Curcumin also interacts with multiple cell signaling proteins and has proven its effect on proliferation, invasion, angiogenesis and metastasis in different cancers.²

ANTIMICROBIAL EFFECT

Curcumin has antibacterial action on several bacteria like *Streptococcus*, *Staphylococcus*, and *Lactobacillus* etc. It has shown antiviral effect on EBV and HIV virus. And curcumin has proven its antifungal effect also.²

ANTI-INFLAMMATORY EFFECT

Curcumins anti-inflammatory mechanism controls various cellular signaling cascade which develops various diseases and condition. It downregulates various mediators of inflammation, such as cyclooxygenase-2 (COX-2), lipoxygenase (LOX), and inducible nitric oxide synthase (iNOS) thus has potent effect against inflammation.³

ANTIHYPERLIPIDEMIC EFFECT

Numerous experiments on animal models have proven that curcuminoids can lower low density lipoprotein cholesterol (LDL) by modulating the expression of genes and the activity of enzymes involved in lipoprotein metabolism. Curcumin has been shown to attenuate several aspects of metabolic syndrome by improving metabolism which eventually leads to a

reduction in plasma triglycerides, cholesterol and elevate HDL-C concentrations and especially visceral obesity.³

ROLE OF CURCUMIN IN CURING ORAL MUCOSAL LESIONS

1. ORAL PREMALIGNANT LESIONS:

Antioxidant, anti-inflammatory, pro-apoptotic, antiangiogenic, antiproliferative properties of curcumin are established facts following extensive researches over the years. Researchers have proven that after the intake of curcumin, patients with potentially malignant disorders have got symptomatic improvements. Curcumin possibly mediates its anti-pre-cancer activities by decreasing cellular oxidative stress, by increasing levels of vitamins C and E, and by preventing lipid peroxidation and DNA damage.⁵

2. ORAL SUBMUCOUS FIBROSIS:

Various treatment modalities were proposed for management of OSMF. Though, several invasive surgical procedures have been experimented to increase mouth opening, they are often followed by relapse. Clinical trials on OSMF cases with curcumin have confirmed its effectiveness in the reduction of clinical signs and symptoms. Furthermore, positive changes in the histopathological examination like reduced hyalinization of connective tissue, inflammatory cells and increase in number of blood vessels were also observed after treatment.⁶

3. ORAL CANCER.

Etiology of oral cancer is multifactorial and is progressed due to several alterations at genetic and epigenetic levels. Therapeutic agents like radiotherapy and chemotherapy are routinely used in cancer cases to reduce proliferation of tumor cells and further to prevent metastasis. However, these treatment modalities are mostly associated with side effects such as mucositis, immunosuppression, hair loss, damage to surrounding structures etc. As these therapies act by killing rapidly multiplying cells, in which both normal and malignant cells are hampered. It Curcumin can modify the expression and activity of various inflammatory cytokines, enzymes, transcription factors, and gene products linked with cell survival, proliferation, invasion, and angiogenesis.² Furthermore, curcumin in cell culture studies with carcinogen, has found to inhibit the proliferation of tumor cells. Therefore, curcumin can be

used as an adjuvant treatment modality either alone or in combination with chemotherapeutic agents or radiation.²

LIMITATIONS IN CURCUMIN RESEARCH

Curcumin is used as home remedy and also there is availability of curcumin capsule in the market (Fig 2). No apparent ill or undesirable effects were reported after using curcumin capsule thus far. Despite its efficacy and safety, the relative bioavailability has been highlighted as a major problem and curcumin has not yet approved as a therapeutic agent.⁷ Reduced bioavailability is owing to its high rate of metabolism, poor absorption, inactivity of metabolic products and rapid elimination from the body.⁷

FUTURE PROMISES

Nano formulations can block metabolic pathways of curcumin and appear to provide longer circulation, better permeability, resistance to metabolic processes thus improving its bioavailability.⁷ Recent studies are focusing on the design and development of nanoparticles, self-assemblies, nanogels, liposomes and complex fabrication for sustained and efficient curcumin delivery.⁹ Buccoadhesive curcumin tablets seems to be superior to oral conventional agents, as it has the potential to bypass the first pass metabolism and thus improving its efficacy as a potent therapeutic agent.⁸ Enhanced bioavailability of curcumin will bring this auspicious natural product to the lead and ultimately improve the patient compliance.⁸

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Figure No. 1: Shows Turmeric root; Figure No. 2: Shows Turmeric curcumin capsule bottle

<p><i>Image</i> <i>Author -1</i></p>	<p>Corresponding Author Dr Deepa Jose, <i>Lecturer, Department of Oral Pathology, Mar Baselios Dental College, Thankalom</i></p>
<p><i>Image</i> <i>Author -2</i></p>	<p>Dr Soma Susan Varghese <i>Professor, Department of Oral Pathology Mar Baselios Dental College, Thankalom</i></p>
<p><i>Image</i> <i>Author -3</i></p>	<p>Dr Joseph Sebastian C <i>Lecturer, Department of Oral Pathology Mar Baselios Dental College, Thankalom</i></p>
<p><i>Image</i> <i>Author -4</i></p>	<p>Dr Pramod Philip Mathews <i>Professor, Department of Oral Pathology Mar Baselios Dental College, Thankalom</i></p>