

**Review Article****MANAGEMENT OF PRE-CANCEROUS LESION BY TURMERIC- AN OVERVIEW****Nidhi Singh^{1*}, T.P.Chaturvedi², H.C.Baranwal³**¹Service Senior Resident, ²Head of Orthodontics Department, ³Professor, Faculty of Dental Sciences, IMS, Banaras Hindu University, Varanasi, Uttar Pradesh, India.**ABSTRACT**

Turmeric, “The Indian golden spice” is used since ancient times as therapeutic measure to cure disease and beauty enhancement. There are a variety of ways to use turmeric in dentistry, such as plaque detection system, pit and fissure sealant, intracanal medicament and subgingival irrigant, amongst which using it as a therapy for pre-cancerous lesion would be a pioneer in treatment modality. Pre-cancerous lesions can transform cancer, if not treated timely. Oral health being a crucial part of systemic health can be enhanced to many folds by using various parts of this medicinal plant. Present paper aims to enlighten the use of turmeric in various precancerous lesions because of its inherent property as anti-inflammatory, antioxidative and antineoplastic effects. It is simple to use and acceptable due to its taste and zero side effects. It is cost effective; hence make this herbal medicine an easy choice for patients and helps them to cure from precancerous lesions such as oral submucous fibrosis, oral lichen planus, oral leukoplakia and other tobacco-associated lesions also.

KEYWORDS: Turmeric, Oral Submucous Fibrosis, Oral leukoplakia, Oral Lichen Planus, Reverse Smoking.

INTRODUCTION

The herbal medicines are modern used in the treatment of various diseases. Many allopathic medicines used in modern medicine originated from medicinal plants. Turmeric is a perennial plant with orange oblong tubers 2 or 3 inches in length, one inch in diameter and pointed or tapering at one end. Dried form of it is into yellow powder. The yellow powder is similar to ginger and having bitter, slightly acrid, yet sweet taste^[1]. Scientific name of turmeric is *Circuma longa*, a member of the ginger family, Zingiberaceae. The Latin name is derived from “*Kirkum*”, which means ‘saffron’ in reference to the rhizome’s vibrant yellow-orange color.

Many people are familiar with turmeric as a traditional middle-eastern spice, but only few know about its medicinal importance. It has been in use since ancient times and various systems of medicine, and given a lot of importance. Later, the medicinal properties come to be known and its use is being widened. India is one of the largest producers of turmeric worldwide contributing 93.7% of total produce and it is cultivated in 150,000 hectares in India.^[2] The major constituent of the turmeric’s root is curcuminoids which is a volatile oil. Curcuminoids contain curcumin, demethoxycurcumin, 5-methoxycurcumin and dihydrocurcumin. Curcumin comprises various properties such as anti-

inflammatory^[3] antioxidant,^[4] antimicrobial, chemopreventive and chemotherapeutic properties,^[5,6] cardioprotective, neuroprotective.^[7,8]

Precancerous lesion of oral mucosa is also known as potentially malignant disorders, consists of a group of diseases which should be diagnosed in the early stage. The most common oral mucosal diseases that have high malignant transformation rate are oral submucous fibrosis, oral leukoplakia and oral lichen planus. Objective of the paper is to illuminate some of the unique pharmacological feature of the turmeric in curing of the white lesion (precancerous lesion).

Application of Curcumin in Dentistry

Circuma longa is considered of immense herbal importance in medicine. Now in dentistry, its use in various ways amongst which using as a treatment for precancerous lesion sounds fascinating as well as very feasible way of treating the disease worldwide and especially in developing countries, like India. In dentistry curcumin is used as pit and fissure sealant, dental plaque detection system, subgingival irrigant, and intracanal medicament.^[9] It can use in following ways for relief from dental problem also.^[10]

- Turmeric water as mouth wash gives immediate relief. It can be prepared by boiling 5 g of turmeric

powder, two cloves, and two dried leaves of guava in 200 g water.

- To make the gums and teeth strong, applying the powder of burnt turmeric pieces and bishop's weed seed on teeth and cleaning them.
- To get relieve from pain and swelling massaging the aching teeth with roasted, ground turmeric.
- In gingivitis and periodontitis, turmeric paste is used twice daily made from 1 tsp of turmeric with ½ tsp of salt and ½ tsp of mustard oil.

Curcumin as Anti-Pre-Cancerous Drug

B. Rai et al.^[11] observed that curcumin mediates its anti-pre-cancer activities on subjects with oral leukoplakia, oral submucous fibrosis or lichen planus by increasing levels of vitamin C or vitamin E and preventing lipid peroxidation and DNA damage. In recent review Reddy et al.^[12] have also described the role of curcumin as pre-cancer spice. Recently, Muhammad DA'I et al.^[13] observed apoptosis induction effect of curcumin and its analogs on cancer cell lines.

Curcumin in Oral Sub-Mucous Fibrosis

Oral sub-mucous fibrosis is a precancerous condition of the oral cavity. It is related with juxtaepithelial inflammatory reaction followed by a fibroelastic change of lamina propria with epithelial atrophy, leads to stiffness of the oral mucosa, trismus and inability to eat.^[14] The main causes of oral sub-mucous fibrosis are ingestion of areca nut, betal quid and tobacco. It is characterized by reduce mouth opening, burning sensation by taking hot and spicy food, and stiffness and blanching of the oral mucosa. It has been stated that the malignant transformation rate of oral sub-mucous fibrosis is around 27% over several years.^[15]

Turmeric can be used by the patient on regular basis as a mouth rinse and as a dietary supplement. Turmeric in the form of mouth wash has excellent anti-inflammatory, anti-oxidant property for the treatment of oral sub mucous fibrosis.^[16,17] Curcumin is a dual inhibitor of arachidonic acid metabolism and inhibits the products of inflammation such as prostaglandins and leukotrienes.^[18] It decreases histamine levels and increases the production of natural cortisone.^[19] It has fibrinolytic activity also by inhibition of lipid peroxidation, decrease cellular proliferation and thus inhibits collagen synthesis.^[20] The products which are involved in cellular proliferation (COX-2, cyclin D1, and c-myc), anti-apoptosis (IAP1, IAP2, XIAP, Bcl-2, Bcl-xL, Bfl-1/A1, TRAF1, and cellular cFLIP), and metastasis (VEGF, MMP-9, ICAM-1) were decreased by curcumin.^[21] Curcumin suppresses tumour necrosis factor (TNF) persuading NF-κB

activation and NF-κB-dependent reporter gene expression^[22]. It suppresses bleomycin induced pulmonary fibrosis in rats also.^[23]

Rao et al. reported the effect of curcumin, namely the scavenging effects on superoxide radicals, hydroxyl radicals, and lipid peroxidation, considered a major etiopathogenetic factor of OSMF.^[24] In the other study of Srivastava et al.^[25] and Yadav et al.^[26] found similar results that turmeric helps in reducing burning sensation. Hastak et al.^[27] were observed that in OSMF patient, number of micronuclei/100 cells in exfoliated oral mucosal cells was 10.2 ± 0.17 . This decreased to 3.9 ± 0.23 in group1 patients who received a total of 3g/day extracts of turmeric for 3 months. In group 2 patients, it was found 3.8 ± 0.23 who received 600mg turmeric oleoresin per day mixed in 3g extracts of turmeric in three equal doses and in group 3, this decreased to 2.7 ± 0.22 , who received 600mg turmeric oil per day mixed with 3g of extracts of turmeric for 3 months. A similar trend was seen in micronuclei/100 cells in circulating lymphocytes.

Curcumin in Oral Leukoplakia

The term leukoplakia is described as white plaque that does not rub off and cannot be clinically identified as another entity. It is the most commonly oral malignant disorder and present in both homogenous form and non-homogenous form.^[28]

It regulates the carcinogen-detoxifying enzymes such as glutathione S-transferases^[29, 30] antioxidation,^[31,32] and suppression of expression of the isoenzyme cyclooxygenase-2.^[33,34] It also has a high modulation of translational mechanism.^[35] Chiba et al.^[36] reported in their RCT study that the oral precancerous lesion of the curcumin group who received the curcumin in chewing gum form, were significantly smaller within six month that is $p < 0.05$. Another study was done by Rai et al.^[37] on curcumin as a caplet that 1g caplets ((900 mg curcumin, 80 mg desmethoxycurcumin, and 20 mg bisdesmethoxy curcumin) was very useful in increasing the level of vitamin C and vitamin E in salivary samples as well as in serum. They were also observed that MDA, 8-OHdG levels got decreased in salivary and serum samples.

Curcumin in Oral Lichen Planus

It is mucocutaneous disorder which is immunologically mediated. It mainly affects the skin, oral mucosa, nail, genital mucosa and scalp.^[38] In oral mucosa 80% is seen in the buccal mucosa, 65% in the tongue, 20% lips and 10% in the floor of mouth and palate.^[39] Oral lichen planus shows the malignant transformation of this condition up to 5.3%.^[40] Chainani-Wu et al.^[41,42] evaluates the efficacy and safety of curcumin in oral lichen planus subjects. In their 2012 study, subjects were randomized to

receive either placebo or curcuminoids at 600mg/day. The curcuminoids group revealed the greater reduction in clinical signs and symptoms as comparison with the placebo group and the adverse effects were uncommon in both groups.^[42]

In 2013, pilot study was done by Singh et al.^[43] They observed that, "subjects treated with extract of turmeric in the ointment form showed significant reduction in signs and symptoms of lesion which was applied as local application twice per day for a period of three months." They proved that curcumin was beneficial in the management of the cell mediated autoimmune disorder because of its immune modulatory effect.

Curcumin in Palatal Changes Associated with Reverse Smoking

Reverse smoking is a type of smoking where the burnt end of a hand rolled tobacco leaf is put in the mouth rather than until end of the cigar and the palatal changes described as the reaction of the palatal mucosa to reverse chutta smoking. It is more prevalent among females of Andhra Pradesh.^[44] It causes palatal keratosis, excrescences, erythematous areas, altered pigmentation, white or mixed red and white patches, and palatal ulcers. In 2012, Vijayalaxmi et al. evaluates the efficacy of curcumin on the palatal changes associated with reverse smoking.^[45]

CONCLUSION

Turmeric is very useful in the treatment of oral mucosal disorder. It has the property of anti-inflammatory, antioxidant, antimicrobial and chemopreventive agent. Present reviewed paper helps to enlighten the use of curcumin as an anti-precancerous spice. It is considered to be safe, inexpensive, easily available, non-toxic and effective alternative as compared to many other conventional drugs. Further researches are needed to confirm the proper and accurate dose of turmeric use as an anti-precancerous drug.

REFERENCES

1. Chaturvedi TP. Uses of turmeric in dentistry: An update. *Indian J Dent Res* 2009;20:107-9.
2. Sasikumar B. Genetic resources of curcuma: diversity characterization and utilization. *Plant Res* 2005;3:230-51.
3. Ramirez-Bosca A., et al. "Antioxidant curcuma extracts decreases the blood lipid peroxide levels of human subjects". *Age* 20.3 (1995):165-168.
4. Ammon HP., et al. "Mechanism of anti-inflammatory actions of curcumine and boswellic acids". *Journal of Ethnopharmacology* 38.2-3 (1993): 113-119.
5. Butt, M. S., & Sultan, M. T. (2009). Green tea: nature's defense against malignancies. *Critical reviews in food science and nutrition*, 49(5), 463- 473.
6. Zain, R. B. (2001). Cultural and dietary risk factors of oral cancer and precancer—a brief overview. *Oral oncology*, 37(3), 205-210.
7. Aggarwal BB, Sundaram C, Malani N, Ichikawa H. Curcumin: The Indian solid gold. *Adv Exp Med Biol* 2007;595:1-75.
8. Benhur, V. (2015). Natural pharmacons in the treatment of oral mucosal lesions. *World journal of pharmaceutical research*, 4, 327-337.
9. Devaraj SD, Neelakantan P. Curcumin - Pharmacological actions and its role in dentistry. *Asian J Pharm Res Health Care* 2013;6:19-22.
10. PDR for herbal medicines. 2nd ed. Montvale. NJ: Medical Economics Company; 2000. p. 776.
11. Rai B, Kaur J, Jacobs R, Singh J. Possible action mechanism for curcumin in pre-cancerous lesions based on serum and salivary markers of oxidative stress. *J Oral Sci.* 2010 Jun;52(2):251-6.
12. Mohan N, Rajashekhar RN, Kaiser J. Spicy anti-cancer spices: A review. *Int J Pharm Pharm Sci* 2015;7:1-6.
13. Da'i M, Andi S, Edi M, Jenie UA, Masashi K. Apoptosis induction effect of curcumin and its analogs pentagamavunon-0 and pentagama vunon-1 on cancer cell lines. *Asian J Pharm Clin Res* 2017;10:373-6.
14. Pindborg JJ, Sirsat SM. Oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol* 1966;22:764-79.
15. Brennan PA, Arakeri G. Oral submucous fibrosis-an increasing global healthcare problem. *J Oral Pathol Med* 2017;46:405.
16. Deepa DA, Anita B, Sreelatha KT. Comparative study of the efficacy of curcumin and turmeric oil as chemoprotective agents in oral submucous fibrosis: A clinical and histopathological evaluation. *JIAOMR.* 2010;22:88-92.
17. Hastak, K., et al. "Effect of turmeric oil and turmeric oleoresin on cytogenetic damage in patients suffering from oral submucous fibrosis." *Cancer letters* 116.2 (1997): 265-269.
18. Bar-Sela G, Epelbaum R, Schaffer M. Curcumin as an anti-cancer agent: Review of the gap between basic and clinical applications. *Curr Med Chem* 2010;17:190-7.
19. Prachi N Gaikwad, Janaki Iyer, Prathamesh Fulsundar and Rachna Darak. A Review of Various Allied Therapies for Treatment of Oral Submucous Fibrosis. *EC Dental Science* 2018; 17.11: 1964-1972.
20. Li CJ, Zhang LJ, Dezube BJ, Crumpacker CS, Pardee AB. Three inhibitors of type 1 human immunodeficiency virus long terminal repeat-directed gene expression and virus replication. *Proc Natl Acad Sci U S A* 1993;90:1839-42.
21. Bierhaus A, Zhang Y, Quehenberger P, Luther T, Haase M, Müller M, et al. The dietary pigment curcumin reduces endothelial tissue factor gene expression by inhibiting binding of AP-1 to the DNA and activation of NF-kappa B. *Thromb Haemost* 1997;77:772-82.
22. Bierhaus A, Zhang Y, Quehenberger P, Luther T, Haase M, Müller M, et al. The dietary pigment curcumin reduces endothelial tissue factor gene expression by inhibiting binding of AP-1 to the DNA and activation of NF-kappa B. *Thromb Haemost* 1997;77:772-82.

23. Punithavathi D, Venkatesan N, Babu M. Curcumin inhibition of bleomycin-induced pulmonary fibrosis in rats. *Br J Pharmacol* 2000;131:169-72.
24. Rao DS, Sekhara NC, Satyanarayana MN, Srinivasan M. Effect of curcumin on serum and liver cholesterol levels in the rat. *J Nutr* 1970; 100:1307-15.
25. Srivastava A, Agarwal R, Chaturvedi TP, Chandra A, Singh OP. Clinical evaluation of the role of tulsi and turmeric in the management of oral submucous fibrosis: A pilot, prospective observational study. *J Ayurveda Integr Med* 2015; 6:45-9.
26. Yadav M, Aravinda K, Saxena VS, Srinivas K, Ratnakar P, Gupta J, et al. Comparison of curcumin with intralesional steroid injections in oral submucous fibrosis - A randomized, open-label interventional study. *J Oral Biol Craniofac Res* 2014;4:169-73.
27. Hastak K, Jakhi SD, More C, John A, Ghaisas SD, Bhide SV. Therapeutic response to turmeric oil and turmeric oleoresin in oral submucous fibrosis patient. *Amala Res Bull* 1998;18:23-8.
28. Greenberg MS, Glick M, Ship JD. *Burket's Oral Medicine*. 11th ed. Hamilton (Canada): Elsevier; 2008. P. 85-8.
29. Piper JT, Singhal SS, Salameh MS, Torman RT, Awasthi YC, Awasthi S, et al. Mechanisms of anticarcinogenic properties of curcumin: The effect of curcumin on glutathione linked detoxification enzymes in rat liver. *Int J Biochem Cell Biol* 1998;30:445-56.
30. Susan M, Rao MN. Induction of glutathione S-transferase activity by curcumin in mice. *Arzneimittelforschung* 1992;42:962-4.
31. Jovanovic SV, Steenken S, Boone CW, Simic MG. H-Atom transfer is a preferred antioxidant mechanism of curcumin. *J Am Chem Soc* 1998; 121: 9677-81.
32. Sharma RA, Ireson CR, Verschoyle RD, Hill KA, Williams ML, Leuratti C, et al. Effects of dietary curcumin on glutathione S-transferase and malondialdehyde-DNA adducts in rat liver and colon mucosa: Relationship with drug levels. *Clin Cancer Res* 2001;7:1452-8.
33. Plummer SM, Holloway KA, Manson MM, Munks RJ, Kaptein A, Farrow S, et al. Inhibition of cyclooxygenase 2 expression in colon cells by the chemopreventive agent curcumin involves inhibition of NF-kappaB activation via the NIK/IKK signalling complex. *Oncogene* 1999; 18:6013-20.
34. Plummer SM, Hill KA, Festing MF, Steward WP, Gescher AJ, Sharma RA, et al. Clinical development of leukocyte cyclooxygenase 2 activity as a systemic biomarker for cancer chemopreventive agents. *Cancer Epidemiol Biomarkers Prev* 2001;10:1295-9.
35. Chakravarti N, Kadara H, Yoon DJ, Shay JW, Myers JN, Lotan D, et al. Differential inhibition of protein translation machinery by curcumin in normal, immortalized, and malignant oral epithelial cells. *Cancer Prev Res (Phila)* 2010;3:331-8.
36. Chiba I, Takeshima M, Abiko Y, Kobayashi H, Muthumala M, Sugiura C, et al. Curcumin is an effective chemopreventive substance for betel quid chewer's oral precancer in Sri Lanka. *Cancer Prev Res* 2012;5:4.
37. Rai B, Kaur J, Jacobs R, Singh J. Possible action mechanism for curcumin in pre-cancerous lesions based on serum and salivary markers of oxidative stress. *J Oral Sci* 2010;52:251-6.
38. Rajendran R, Sivapadasundaram B. *Textbook of Oral Pathology*. 7th ed. New Delhi, India: Elsevier; 2012. p. 808-12.
39. Krupaa RJ, Sankari SL, Masthan KM, Rajesh E. Oral lichen planus: An overview. *J Pharm Bioallied Sci* 2015;7:S158-61.
40. Ismail SB, Kumar SK, Zain RB. Oral lichen planus and lichenoid reactions: Etiopathogenesis, diagnosis, management and malignant transformation. *J Oral Sci* 2007;49:89-106.
41. Chainani-Wu N, Silverman S Jr, Reingold A, Bostrom A, Mc Culloch C, Lozada-Nur F, et al. A randomized, placebo-controlled, double-blind clinical trial of curcuminoids in oral lichen planus. *Phytomedicine* 2007;14:437-46.
42. Chainani-Wu N, Madden E, Lozada-Nur F, Silverman S Jr. High-dose curcuminoids are efficacious in the reduction in symptoms and signs of oral lichen planus. *J Am Acad Dermatol* 2012; 66:752-60.
43. Singh V, Pal M, Gupta S, Tiwari SK, Malkunje L, Das S, et al. Turmeric - A new treatment option for lichen planus: A pilot study. *Natl J Maxillofac Surg* 2013; 4:198-201.
44. Pindborg JJ, Mehta FS, Gupta PC, Daftary DK, Smith CJ. Reverse smoking in Andhra Pradesh, India: A study of palatal lesions among 10,169 villagers. *Br J Cancer* 1971; 25:10-20.
45. Vijayalaxmi N, Reddy RS, Ramesh T, Saimadhavi N, Reddy RL, Swapna LA. Efficacy of curcumin in treating palatal changes associated with reverse smoking. *Arch Oral Res* 2012;8:47-54

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