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REVIEW ARTICLE

Turmeric: A Boon to Oral Health

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ABSTRACT

Turmeric, also called as *Curcuma longa*, is used as a flavoring agent, medicinal herb, and dye in Asian countries. In India where Ayurveda is a system of herbal medicine, turmeric is known for strengthening and warming the whole body. The main component in turmeric is curcumin, which has a wide range of properties, such as anti-inflammatory, antioxidant, antimutagenic, and antimicrobial. The main objective of this article is to review the importance and therapeutic properties of turmeric in oral health. Various databases like PubMed, Cochrane, Index Copernicus, EBESCO, etc., were searched to collect data about turmeric and oral health. The effectiveness of turmeric in the treatment of dental pain, periodontal diseases, oral cancers, and as a sealant, mouthwash, toothpaste, and subgingival as well as endodontic irrigant will be discussed.

Keywords: Anticancer, Oral health, Subgingival irrigant, Turmeric, Turmeric mouthwash.

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INTRODUCTION

Turmeric, the most common ingredient found in the Indian kitchen, is also known as "Indian Saffron."[1] Its importance as a home remedy for many ailments has been proven since long time and now it is gaining importance in modern medicine and dentistry.[2] The active ingredient curcumin is obtained from the rhizome *Curcuma longa* Linn.[3] The uses of turmeric, as mentioned in Ayurveda, are to treat eye infection, burns, acne, skin disease, and also as a bitter digestive and carminative.[4, 5] It possesses antioxidant, anti-inflammatory, antimicrobial, anticarcinogenic, and antimutagenic properties.[6]

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Turmeric plays a crucial role in dentistry, as it is useful in treating periodontal disease and oral cancers, and can be used as pit and fissure sealant, mouthwash, subgingival irrigant, local drug delivery system, and in other endodontic applications.[2]

CHEMICAL PROPERTIES

In 1815, Roughley isolated *C. longa* while its chemical structure was determined in 1973 by Whiting. It contains fats, proteins, minerals, carbohydrates, and moisture. The yellow color is due to curcumin (diferuloylmethane) (3–4%). It comprises curcumin I (94%), curcumin II (6%), and curcumin III (0.3%). Its melting point is 184°C, soluble in ethanol, and exists in solution as keto–enol tautomers.[7] Demethoxy and bisdemethoxy derivatives of curcumin have also been isolated.

PHARMACOKINETICS

Curcumin has poor oral bioavailability. Poor absorption in intestine, high metabolic rate, and rapid systemic elimination from body are responsible for its poor oral bioavailability.[2] Around 40 to 85% oral dose of curcumin passes unchanged from the gastrointestinal tract. In order to increase absorption and anti-inflammatory effect, curcumin is formulated with bormelain.[8]

TURMERIC: HERBAL MEDICINE

Turmeric has anti-inflammatory, antioxidant, anticarcinogenic, antiviral, and antimicrobial properties.[9] It also has potential therapeutic properties, which gives benefits in our day-to-day life. It is used as an antiseptic in disinfection of burns and cuts. It regulates insulin levels; thus, it has antidiabetic, antiapoptotic, antiangiogenic, and immunomodulatory properties. It prevents platelet aggregation (antithrombotic), cancer cell metastasis, and melanoma, and reduces chances of childhood leukemia. It also acts as natural painkiller due to its anti-inflammatory properties. Hence, it is used in the treatment of arthritis. It reduces blood cholesterol, helps in detoxification of liver and fat metabolism, strengthens the immune system, and also enhances wound healing. This makes turmeric a boon for many medical conditions.[10,11]

TURMERIC AND ORAL HEALTH

Turmeric, which is widely used for various medical conditions, is also being utilized in dentistry. Its anti-inflammatory

property helps in pain relief, gingivitis, and periodontitis. It is also used as colorant in pit-and-fissure sealant or in dental plaque detection system. Its chemopreventive activity is also beneficial in the treatment of premalignant lesions and conditions in the oral cavity.[12] Uses of this wonderful naturally available product are discussed below.

Inflammatory Dental Conditions

Inflammation can be quickly relieved by using turmeric water (5 gm of turmeric powder with two cloves, two dried leaves of guava in 200 gm of water is boiled) as a mouth rinse. Pain and swelling can also be reduced by massaging roasted, ground turmeric on aching teeth. Gingivitis and periodontitis can be alleviated by using a paste containing 1 tsp of turmeric, ½ tsp of salt, and ½ tsp of mustard oil on the teeth and gums twice daily.[13] Waghmare et al[6] found that turmeric mouthwash can be used as an adjunct to mechanical plaque control in prevention and reduction of plaque and gingivitis. Yukie et al[14] found that toothpaste containing *C. longa* reduces gingivitis or mild periodontitis.

Anticariogenic Effect

Lee et al[15] found that essential oil from *C. longa* inhibits growth and acid production of *Streptococcus mutans* at a level of 0.5 to 4 mg/mL and, thus, has an anticariogenic effect. This property can make turmeric an important component in pit-and-fissure sealant.

Dental Plaque Detection

Dental plaque is barely visible to the naked eyes, as it is usually colorless. Turmeric can be used in the detection of plaque. It stains plaque to yellow color and helps in its detection.[16] The dental plaque detection system includes a dental plaque staining agent, which contains at least one agent selected from the yellow pigment of beni-koji, turmeric extracts, and curcumin; and a light-emitting apparatus, which outputs light having a wavelength within a range of 250 to 500 nm to an object in the oral cavity where the dental plaque staining agent is attached.[5]

Subgingival Irrigant

Studies conducted by Suhag et al[17] and Gottumukkala et al[18] showed that curcumin solution (1%) can be used as a subgingival irrigant as it reduces inflammation. Mean probing pocket depth in turmeric is less when compared with chlorhexidine and saline.

Endodontic Irrigant (Intracanal Medicament)

Turmeric can be used as an antibacterial agent in the treatment of infected root canal with added advantages of ease of availability, cost-effectiveness, and other biological activities. Studies have shown that turmeric has antimicrobial property against endodontic pathogens and can be used as potential endodontic irrigant/intracanal medicament.[19-22]

Local Drug Delivery System

Turmeric gel (2%) can be used as a local drug delivery system in addition to scaling and root planing in the treatment of periodontitis and, thus, reducing the pocket depth and gaining of clinical attachment levels. Multiple studies have tried to elaborate on the scope of turmeric as a local drug delivery system.[23-25]

Recurrent Aphthous Stomatitis

Recurrent aphthous stomatitis (RAS) is an inflammatory condition of unknown etiology, affecting the oral mucosa. Approximately about 20% of the population suffer from RAS in their lives. The disease mainly involves nonkeratinized mucosal surfaces and is characterized by single or multiple painful ulcers with periodic recurrence and healing. The appearance of ulcers is preceded by a prodrome of localized burning or pain which lasts for around 24 to 48 hours.[26] Turmeric was found to be helpful in reducing intensity of pain and size of aphthous ulcers.[27,28]

Precancerous Lesions and Conditions

Turmeric acts as effective agent in precancerous lesions and conditions by virtue of its antioxidant property and deoxyribonucleic acid protective mechanisms. It increases the levels of serum and salivary vitamins C and E in leukoplakia, and lichen planus, and oral submucous fibrosis.[29] Turmeric is a beneficial, easily available, and noninvasive form for the treatment of oral submucous fibrosis, and its use leads to a significant decrease in burning sensation.[30,31] Higher dosages of curcumin (up to 6000 mg/day) are effective in reduction of oral lichen planus symptoms in patients.[32]

Anticancer Agent

Turmeric inhibits the early stages of carcinogenesis due to its antioxidant and free radical properties. It has effect on several biological pathways involved in mutagenesis, oncogene expression, cell cycle regulation, apoptosis, tumorigenesis, and metastasis. Apart from this, turmeric arrests carcinomatous cells in the G2/M phase of cell cycle. Thus, it can be effective against various types of cancers.[33,34]

CONCLUSION

"Turmeric," the "Indian Saffron," is being widely used effectively in various medical conditions. It has shown

effects from improving general well-being to being a treatment component of some cancers. Its use in oral health is also documented in several studies. Its easy availability and affordability make it a suitable candidate for use in various oral health remedies, especially in developing countries such as India. The anti-inflammatory, antimicrobial, and anticancer properties of turmeric and its other multiple therapeutic applications can be utilized to a wide extent not only in dentistry, but also for overall oral health conditions. Further research is required to prove its exact role, optimal dosages, and other pharmacokinetic properties. Thus, with such a wide variety of therapeutic applications, "turmeric" can be considered to be a boon for oral health in the future.

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