EFFECTS OF TURMERIC ON ORAL HEALTH: AN OVERVIEW

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ABSTRACT

Plants have been the major source of medicine since time immemorial. Turmeric, a rhizome of Curcuma longa, has been attributed a number of medicinal properties in the traditional system of medicine. Curcumin, a polyphenolic constituent, is the active ingredient in dietary spice turmeric. It is because of its presence that turmeric has proven properties like anti-inflammatory, antioxidant, antimicrobial, antiseptic, hepato protective, immune stimulant, and anti-mutagenic. It has a role in treatment of periodontal diseases and oral cancers. Turmeric can also be used as a pit and fissure sealant, mouthwash, and subgingival irrigant in various preparations. In gel form it is a component in local drugs delivery system. The objective of this article is to review the efficacy of turmeric herb in maintaining oral health.

KEYWORDS

Turmeric, herbal medicine, antimicrobial, oral health, mouthwash, dental infection.

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INTRODUCTION

Herbal medicines are drugs of plant origin which are used to attain or maintain a condition of good health and to treat diseases. Herbs which contain medicinal properties act as an effective source of treatment for diseases. Many drugs used in allopathic medicine have their origin in medicinal plants. Haridra or Curcuma longa Linn, commonly known as turmeric has been used for centuries as a spice and also in household remedy. The name turmeric appears to derive from the Latin, terra merita (merited earth) or turmeryte (1). It is known as Haldi in Hindi, Manjal in Tamil and Malayalam, and Pasupu in Telugu. Curcuma, the name of the genus is from an Arabic name of both saffron and turmeric. Turmeric is native to Tamilnadu and needs a temperature of about 20ºC – 30ºC and also considerable amount of rainfall.(2) In Ayurveda its usage is recommended for various medical indications like wound healing, nausea, indigestion, inflammation, liver diseases, improving skin complexion (3-5). Traditional use of turmeric is also described in several other countries (6, 7). Curcumin is an orange yellow crystalline powder.
This orange pulp present within the rhizome constitutes the source of turmeric medicinal powder (8). Minor amount of oils and resins naturally occurring in turmeric is usually present (9-17). The components of turmeric are named as curcuminoids. The active constituents of turmeric are the flavonoid curcumin and various volatile oils including tumerone, atlantone, and zingiberone. Other constituents include sugars, proteins, and resins. Curcumin has been used extensively in ayurvedic medicine for centuries, as it is nontoxic and has a variety of therapeutic properties including antioxidant, analgesic, anti-inflammatory, antiseptic activity, and anticarcinogenic activity (18). Due to its low rate of absorption, curcumin is often formulated with bromelain for increased absorption and enhanced anti-inflammatory effect (19, 20).

**Scientific classification of Turmeric:**

Binomial name: Curcuma longa

Kingdom: Plantae

- Angiosperms
- Monocots
- Commelinids

Order: Zingiberales

Family: Zingiberaceae

Genus: Curcuma

Species: C.longa

**PHYTOCHEMICAL ACTIVITY OF TURMERIC**

The major component, curcumin forms the most important fraction of turmeric.
Curcumin is soluble in curcumin is aliphatic, unsaturated, aryl group which can be substituted or not.

Composition of Turmeric: (21)

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>CONSTITUENTS</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curcumin(curcuminoids)</td>
<td>2-4%</td>
</tr>
<tr>
<td>2</td>
<td>Volatile(essential)oil</td>
<td>3-7%</td>
</tr>
<tr>
<td>3</td>
<td>Fiber</td>
<td>2-7%</td>
</tr>
<tr>
<td>4</td>
<td>Mineral Matter</td>
<td>3-7%</td>
</tr>
<tr>
<td>5</td>
<td>Protein</td>
<td>6-8%</td>
</tr>
<tr>
<td>6</td>
<td>Fat</td>
<td>5-10%</td>
</tr>
<tr>
<td>7</td>
<td>Moisture</td>
<td>6-13%</td>
</tr>
<tr>
<td>8</td>
<td>Carbohydrates</td>
<td>60-70%</td>
</tr>
</tbody>
</table>

THERAPEUTIC ACTIONS OF TURMERIC

Therapeutic effects of turmeric in turn depend on the therapeutic actions of curcumin (22).

- It protects against free radical damage because it is a strong antioxidant (23).

- It lowers the histamine level and stimulates the production of natural cortisone from adrenal glands. Thus it has a major role in reducing inflammation (24).

- It protects the liver from a number of toxic compounds such as carbon tetrachloride (25, 26), galactosamine (27), acetaminophen (28) and Aspergillus aflatoxin (29).

- It prevents clumping of platelets, which in turn improves blood circulation and may also help protect against atherosclerosis (30).

- Turmeric also acts as an anti mutagenic, as it potentially helps prevent new cancers that are caused by chemotherapy or radiation used to treat existing cancers. It effectively inhibits metastasis of melanoma cells (31, 32).

- Curcumin which is the major constituent in turmeric has the ability to inhibit HIV in test tubes, though human trials are to be done to determine if there exist any usefulness for treating humans with this condition (33, 34).

- Turmeric in the diet may prevent pain from arthritis, bursitis, and tendonitis (35).
- Intake of turmeric increases the production of enzymes that digest fats and sugars and also stop cholesterol from forming gallstones, thus helpful for people with indigestion but not as effective as antacids (29, 36, 37).
- Researches indicate a possible benefit of oral curcumin supplementation for chronic anterior uveitis (inflammation of the iris and middle coat of the eyeball) (38).
• Turmeric is exceedingly useful in the treatment of some urinary disorders such as diabetes mellitus (39).
• When applied to the skin and exposed to sunlight, turmeric is strongly anti-bacterial and it can be used to treat parasitic infections as well.
• In case of smallpox and chickenpox, turmeric is applied as a powder or as a paste to facilitate the process of scabbing (40, 41).

DENTAL APPLICATIONS OF TURMERIC

Turmeric can be used in following ways to provide relief from certain dental problems.

Dental Pain

Massaging the aching teeth with roasted, ground turmeric eliminates pain and swelling.

Peridontal Problems

A paste made from 1 tsp of turmeric, ½ tsp of salt and ½ tsp of mustard oil can be used to treat gingivitis and periodontitis. It is recommended to rub the teeth and gums with this paste twice a day (18).

Dental-Plaque Detection System

Caries are thought to be infectious diseases caused by microbes present in dental plaques and it is known that the removal of dental plaques is highly important for the health of oral cavities. However, dental plaques are not easy to identify by the naked eye. So plaques are generally stained with dental-plaque staining agents, which contain dyes, to reveal their location. The dental-plaque detection system includes a dental-plaque staining agent, which contains turmeric extracts and curcumin; and a light-emitting apparatus, which gives out 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 (42).

Pit and Fissure Sealant

It has been found that tinted pit and fissure sealant is used for applying on tooth surfaces in order to prevent or reduce the incidence of dental caries. This sealant can be produced from a composition containing acrylic monomer and at least one colorant selected from the group consisting of Annatto extract, turmeric extract, and β-Apo-8-Carotenal (43).

Mouth wash

In a study made by Waghmare et al. about 100 subjects were randomly selected. Both gingival index and plaque index were recorded at 0, 14, and 21 days. It was found that chlorhexidine gluconate as well as turmeric mouthwash can be effectively used as in addition to mechanical plaque control methods in the prevention of plaque and gingivitis. Turmeric mouthwash prepared by dissolving 10 mg of curcumin extract in 100 ml of distilled water and 0.005% of flavoring agent peppermint oil with pH adjusted to 4 was found to be as effective as most widely used chlorhexidine mouthwash. Though chlorhexidine gluconate is further more effective when anti
plaque property was considered. The effect of turmeric observed may be because of its anti-inflammatory action. Reduction in total microbial count was observed in both the groups. (44)

**Sub gingival irrigant**

In a study conducted by Suhag *et al.*, periodontal sites were treated on day 0 (baseline) by a single episode of scaling and root planing. Subsequently selected sites were irrigated (triple irrigation regimen) with saline (0.9%), chlorhexidine (0.2%), curcumin (1%), or served as non-irrigated control sites on day 0 (baseline) immediately following instrumentation. Triple irrigation regimen was repeated for the next 5 consecutive days and on days 15 and 21. Clinical parameters recorded were probing pocket depth (PPD), bleeding on probing (BOP), and redness for 200 sites in 20 patients with chronic periodontitis. The results indicated that the irrigated sites had significant improvement in all parameters as compared with the non-irrigated sites on days 2, 3, 4, and 5. The curcumin group showed significant reduction in BOP (100%) and redness (96%) when compared with the chlorhexidine group and saline group on day 5. However, the difference between groups was not significant at the next recall visits. Mean PPD reduction was significantly greater for the curcumin group than all other groups on all post-treatment days. Thus, 1% curcumin solution can cause better resolution of inflammatory signs than chlorhexidine and saline irrigation as a subgingival irrigant (45).

**Precancerous lesions**

It has a major role in the treatment of various precancerous conditions like oral submucous fibrosis, leukoplakia, and lichen planus. Turmeric extract and turmeric oil have demonstrated oncopreventive activity in *in vitro* and *in vivo* animal experiments. The local symptoms of burning sensation and pain were reduced and partial reversal of opening of the mouth was also observed. (46)

**Recurrent Aphthous Stomatitis**

Recurrent Aphthous Stomatitis (RAS) is an inflammatory condition of unknown etiology affecting the oral mucosa. Approximately about 20% of the population suffers from RAS sometime in their lives. The disease mainly involves non-keratinized 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 with lasts for around 24-48 hours. The peak age of onset is between 10 and 19 years and may continue throughout life. Reports have shown that in patients who used conventional antiseptic gel, the lesion healed only after the period of time as in previous attacks. They experienced no early reduction in pain or frequency of recurrence. The patients who used *curcumin* oil reported that ulcers started healing earlier than in previous attacks; there was also early reduction in pain. A follow up for one year has shown no recurrence in these patients. (47)

**Influence on Human Gingival Fibroblasts**

Several studies have also revealed apoptosis of human primary gingival fibroblasts (hPGF) cells at lower doses like 1, 10 and 25μM of curcumin but at higher doses like 50, 60, 75 and 100μM, was statistically significant high apoptosis was noted. They have also found that the effect of
curcumin treated normal human fibroblasts and microvascular endothelial cells (hMVEC) using MTT assay and observed that lower doses of curcumin stimulated the proliferation of normal human fibroblasts and hMVED, whereas higher doses inhibited it. According to other authors curcumin treated hPGF cells exhibited maximum and significant apoptosis at 75μM and showed a decrease in cell population and shrinkage of cell size and morphologic alterations in basal cell carcinoma cells after treatment with 50nM curcumin & found cell shrinkage, disappearance of microvilli and appearance of membrane blebbing. (13, 48)

CONCLUSION

Thus turmeric is considered a safe, non-toxic, and effective herb that can act as an alternative for many conventional drugs due to its enormous therapeutic properties on various systems of our body. The use of plants and herbs for dental care is a very common indigenous system of medicine and we must include it in our everyday life. Curcumin (1, 7-bis [4-hydroxy-3-methoxyphenyl]-1, 6-heptadiene-3, 5-Dione) is the most active constituent of turmeric curcuminoids obtained from the rhizome of Curcuma longa. Curcumin is classified as a polyphenol compound that gives turmeric its bright yellow colour. Curcumin holds a high place in Ayurvedic medicine as a “detoxifier of the body,” and today, science has documented several diseased conditions that can be healed by the active ingredients of turmeric. Besides being a popular dietary supplement, it is used as a food colouring agent. However, there is scarcity of information and research in this field. There are many uses of turmeric in dentistry. The use of plants and herbs for dental care is a very common indigenous system of medicine and we must include it in our everyday life rather than depending on other synthetic drugs which may have certain side effects. Further researches are to be carried out to determine the bioavailability and bio-efficacy of turmeric.

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