

Clinical Evaluation of the Efficacy of Curcumin as a Lozenge as an Adjunct to Scaling in the Treatment of Chronic Gingivitis

Dhruv Patel^{1*}, Nisha Verlianey², Rajeev Chitguppi³ and Ajay Kakar³

¹YMT Dental College and Hospital, Navi Mumbai, India

²Assistant Professor, Department of Periodontics, Government Dental College and Hospital, Jabalpur, India

³Periodontist, Mumbai, India

*Corresponding Author: Dhruv Patel, YMT Dental College and Hospital, Navi Mumbai, India.

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Abstract

Gingivitis and by extension periodontitis, ranks as the most frequently occurring disease of the oral cavity. It is also the precursor to various, more severe oral health problems and is a contributing factor to dental caries through plaque accumulation. Conventional methods for treatment of gingivitis include mechanical and/or chemical procedures, of which scaling has been proven to be most effective. Chemicals used in conjunction with scaling have, in the past, caused iatrogenic staining of teeth which is unsightly and non-desirable to the patient. Curcumin application through TurmNova lozenges may potentially prove to be an effective adjunct to scaling and be more acceptable to patients considering the widespread use of turmeric and the fact that it does not have any harmful effects. This study demonstrates the benefits of turmeric lozenges used as an adjunct to periodontal therapy in chronic gingivitis cases.

Keywords: Curcumin; Lozenge; Chronic Gingivitis

Introduction

Bacterial plaque is the primary aetiological agent in periodontal diseases - gingivitis and periodontitis [1], and mechanical plaque control by scaling and root planing (SRP) remains the fundamental periodontal procedure to provide the basis for all forms of periodontal therapy [2]. In addition to this, several home care modalities have been recommended as accessories to mechanical methods like tooth brushing, interdental cleaning aids and oral irrigation in the management of plaque-associated gingivitis [3]. Chlorhexidine, Triclosan, Povidone iodine and various phenolic compounds have been used successfully as anti-plaque agents [3,4]. However, when used for a longer time duration, these chemicals have demonstrated varied side effects ranging from allergy, tooth staining, discoloration of tongue to taste alterations [5]. Hence, there is a need for alternative medicines that are not only safe and economical but could also provide a product already enmeshed within the traditional Indian setup [6].

Medicinal plants and their derivatives have been widely used all over the world as medicinal, salustic or functional foods. Spices and condiments have been used traditionally as curative and preventive agents in countries like India, China and South Asia with strong roles in its cultural heritage. Turmeric, neem, aloe vera, clove, cinnamon are among the common herbal products used in dentistry [5]. Among these, turmeric is evidenced to have numerous therapeutic properties and has been exploited for skin treatments and general health purposes.

Curcumin, a dietary polyphenolic compound, has demonstrated potent antibacterial activity against a number of pathogenic bacteria like *Staphylococcus aureus* and *Streptococcus epidermidis*. A study conducted by Singh., *et al.* revealed significant antibacterial activity of essential oil fractions even at low concentration (20 mg/mL) on pathogenic drug-resistant clinical isolate of *Staphylococcus aureus* as compared to gentamycin (30 mg/mL).

Stabilizing curcumin with microencapsulation to obtain microcapsule curcumin was found to be very efficient against some foodborne pathogens and spoilage organisms such as *Escherichia coli*, *Yersinia enterocolitica*, *Staphylococcus aureus*, *Bacillus subtilis*, *B cereus*, *Aspergillus niger*, *Penicillium notatum* and *Saccharomyces cerevisiae*.

Aim of the Study

The current study aims to clinically compare the efficacy of locally administered curcumin as a lozenge, as an adjunct to scaling, in the management of chronic gingivitis. We evaluated the efficacy of curcumin when administered as a lozenge, as an adjunct to scaling, in the management of chronic gingivitis.

Materials and Methods

25 subjects were collected randomly from the out patient department of periodontology based on the following criteria: Subjects within the age group of 18 - 55 years of either sex, who were systemically healthy and cooperative, with a minimum of 20 permanent teeth present in their dentition. Clinically they had moderate to severe chronic gingivitis having probing depth \leq 3 mm.

Smokers and tobacco chewers (as per AHA guidelines), subjects who had taken antibiotics, anti-inflammatory drugs or nutritional supplements in the previous 3 months or who were currently on any of these medicines, pregnant and lactating women and those using oral contraceptive pills, subjects with a history of periodontal therapy undertaken in the past 6 months and subjects with a known hypersensitivity to curcumin were excluded from the study.

This study was conducted only after the subjects gave their verbal and written consent after being informed about the study protocol in a language best understood by them. All the observations of the study were recorded by a single examiner.

After their informed consent, detailed case history and clinical data were obtained, all subjects underwent thorough periodontal debridement done by an ultrasonic scaler. The patients were recalled 2 weeks after scaling and their plaque score was recorded using the Quigley-Hain Plaque Index.

Next, each patient was given TurmNova lozenges, to be used twice daily, for a further 2 weeks. The patients were strictly instructed not to alter their oral hygiene maintenance habits at any point during the period of the survey, and their consent was taken. The second recall was again after 2 weeks, and their plaque score was again calculated using the Quigley Hain Plaque Index.

Results

First visit (Scaling): 3/11/18

Second visit (Probing): 18/11/18

Third visit (Probing post TurmNova): 3/12/18.

Plaque scores

Intragroup comparison through the paired t-test of the plaque scores revealed that the mean measured before the Turmnova application (1.74 ± 0.42) showed a significant reduction after two weeks of Turmnova application (0.95 ± 0.33) with the difference being highly statistically significant ($p < 0.001$).

Patient Name (Age/Sex)	Plaque Score before Turmnova Application	Plaque Score after Turmnova Application
P.M (20/F)	2.52	0.75
S.R (22/M)	1.3	0.41
S.W (22/M)	1.13	0.75
S.N (21/F)	1.5	0.69
R.B (19/M)	1.3	0.8
B.P (18/F)	2.19	0.5
M.D. (19/F)	2.3	1.05
J.M (19/F)	1.52	1.05
A.S (18/F)	2.19	0.88
S.M (19/F)	2.05	1.58
V.P (21/M)	1.38	0.41
S.S (F/19)	2.5	1.7
P.P (19/M)	1.7	1.5
M.S (22/M)	1.47	1.16
A.P (22/F)	1.7	1.19
K.D (20/M)	1.75	1.16
M.K (18/M)	1.19	1.0
P.S (19/M)	1.5	1.16
Z.S (20/F)	1.71	0.91
M.S (23/M)	1.38	0.72
B.Z (22/F)	1.55	0.88
A.S (22/M)	2.19	0.58
M.Ki (21/F)	1.19	0.75
R.S (20/M)	2.11	0.97
N.S (20/M)	2.27	1.22

Table: Intragroup comparison of Plaque Index at different time intervals.

Clinical Parameter	Study timeline	Quigley Hain Plaque Index Score (N = 25)
2 Weeks after Scaling but before the application of Turmnova	Day 0	1.74 ± 0.42
2 Weeks after the application of Turmnova	Day 15	0.95 ± 0.33

Discussion

Periodontal diseases, including gingivitis and periodontitis [1] are amongst the most prevalent oral health problems which may lead to severe oral conditions as well as tooth loss [7]. Gingivitis is defined as the inflammation of the gingiva, primarily due to either accumulation of plaque or inability to remove plaque. Plaque-associated gingivitis is an interaction between the microorganisms found in the dental plaque biofilm and the inflammatory host response. Chronic gingivitis is the more prevalent form of gingivitis, which is painless, develops slowly and is of a long duration. Microbial plaque is considered to be the primary etiologic agent for gingivitis. Gingivitis is completely reversible in otherwise healthy individuals within weeks following the removal of local factors and reduction of the microbial load around the tooth. Although progression is not predictable, the prevention of gingivitis in the individual population is still the first step towards preventing periodontitis [7]. Mechanical plaque control by scaling and root planing (SRP) remains the fundamental periodontal procedure to provide the basis for all forms of periodontal therapy [2].

The use of turmeric dates back nearly 4000 years, to the Vedic culture of India. It has been used throughout the Indian history as food colour agent, flavouring agent and preparation of traditional remedies and religious ceremonies. Since turmeric has antimicrobial, antioxidant, astringent and other useful properties, it is useful in dentistry also [8]. Turmeric, otherwise known as *Curcuma longa*, is a member of the ginger family, Zingiberaceae. The Latin name is derived from the Persian word, 'kirkum', which means saffron, in reference to the rhizomes vibrant yellow-orange color [9]. Turmeric (haldi), a rhizome of *Curcuma longa*, is a flavorful yellow-orange spice. Its plant is three feet in height and has lance-shaped leaves and spikes of yellow flowers that grow in a fleshy rhizome or in an underground stem. An orange pulp contained inside the rhizome constitutes the source of turmeric medicinal powder [10].

Components of turmeric are named curcuminoids. The active constituents of turmeric are the flavonoid curcumin (diferuloylmethane) which comprises 0.3 - 5.4% of raw turmeric and various volatile oils including tumerone, atlantone and zingiberone. Other constituents include sugars, proteins, and resins [5]. To overcome the adverse effects caused by the various chemical agents, curcumin can be employed in the management of gingivitis. The anti-inflammatory property of turmeric has been studied and has demonstrated a significant reduction in inflammation.

The results of the study were highly encouraging. All 25 of the participants displayed a marked reduction of plaque as evidenced by their scores on the Quigley Hain index before and after consumption of TurmNova lozenges.

Intragroup comparison through the paired t-test showing highly significant ($p < 0.001$) reduction in the mean plaque scores from the stage prior to TurmNova application (1.74 ± 0.42) to two weeks of TurmNova application (0.95 ± 0.33) without any change in the oral hygiene maintenance habits and the pre-existing conditions, it can be safely presumed that the reason for the plaque score reduction was due to the *Curcuma* extracts present in the TurmNova lozenges.

Conclusion

Although a favourable conclusion may be drawn based on the results of this study, a sample size of 25 individuals does not adequately mirror the diverse population present worldwide. Therefore, the results of this study cannot be extrapolated to the general population, and the efficacy of TurmNova may vary if a larger sample size is taken. It can indubitably be inferred, though, that curcumin does have a salubrious influence on the oral cavity and there were no negative effects observed on any subject following the use of TurmNova lozenges.

Future Directions

A larger sample studied as a parallel arm randomized controlled trial that compares Oral prophylaxis plus TurmNova (test group) and Scaling only without TurmNova application (control group) is needed to draw better conclusions.

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Conflict of Interest

There is no conflict of interest.

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