

## Effectiveness of Curcuma Oral Gel as an Adjunct to Scaling and Root Planing in Patients with Gingivitis – A Short Clinical Trial



### Dental Science

**KEYWORDS :** Curcumin, Antibiotic, Oral health, Dental infection.

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#### ABSTRACT

*Curcumin (diferuloylmethane), a polyphenol extracted from the plant Curcuma longa, is widely used in South-east Asia, China and India in food preparation and for medicinal purposes. Turmeric (Curcuma longa) is an ancient dye, flavouring and medical herb, widely used in Asian countries. It is an herb that has been widely used in Indian medicine, cookery, and cosmetics. The main component of turmeric is curcumin. Curcumin has a surprisingly wide range of beneficial properties includes anti-inflammatory, antioxidant, antimicrobial, antiseptic, antimutagenic, immunostimulant, chemopreventive, chemotherapeutic activity etc.. The activity of curcumin derived from its complex chemistry as well as its ability to influence the multiple signaling pathways. Due to these properties it is useful in dentistry. To evaluate the effectiveness of curcuma oral gel as an adjunct to scaling and root planing procedure in patients with gingivitis over a period of 21 days a short term clinical trial was conducted. At day 0, 7, 14, 21 plaque index, gingival index and gingival bleeding index were recorded.*

#### Introduction:

Turmeric (*Curcuma longa*) is an ancient dye, flavoring and medicinal herb, widely used in Asian countries. The medicinal use of turmeric plant has been described in ancient Indian and Chinese thousands of years ago. In India, turmeric has been used primarily for arthritis and muscular disorders, whereas in China, it has been used as a topical analgesic and for conditions ranging from flatulence, colic, hepatitis and chest pain.<sup>1</sup> The main component of turmeric is curcumin. Beneficial properties - anti-inflammatory, antioxidant, antimicrobial, antiseptic, antimutagenic, immunostimulant, chemopreventive, chemotherapeutic activity etc.. Remarkably non-toxic and exhibits limited bioavailability. It has Complex chemistry as well as its ability to influence the multiple signaling pathways. It is therapeutic in dentistry.<sup>2</sup>

#### Chemical Composition:<sup>3,4,5</sup>

- First isolated by Vogel in 1842
- Structurally characterized by Lampe and Milobedeska in 1910.
- Synthesized and confirmed in 1913.
- Lipophilic molecule and rapidly permeates cell membranes.
- Affects the structure and function of cellular membranes.
- It contains protein (6.3%), fat (5.1%), minerals (3.5%), carbohydrates (69.4%) and moisture (13.1%).
- The essential oil obtained from the steam distillation of rhizomes has alpha-phellandrene (1%), sabinene (0.6%), cineol (1%), bornoel (0.5%), zingiberene (25%), sesquiterpenes (53%).
- Curcumin (3-4%) is responsible for the yellow color and comprises Curcumin I (94%), Curcumin II (6%) and Curcumin III (0.3%).
- The components of turmeric are known as Curcuminoids.
- Curcuminoids - 77% curcumin (diferuloyl methane), 18% demethoxycurcumin and 5% bisdemethoxycurcumin.
- It has melting point at 176-184°C.
- It forms a reddish brown salt with alkali and is soluble in ethanol, alkali, ketone, acetic acid and chloroform.

#### Mechanism of Action<sup>6</sup>

- Pleiotropic activities that are linked to its complex chemical properties.
- Ability to influence multiple signaling pathways.
- Survival pathways regulated by Nuclear Factor – kappa Beta (NF- $\kappa$ B), Protein kinase B (PKB/Akt) and growth factors

- Cytoprotective pathways dependent on Nuclear factor - 2 (Nrf2)
- Metastatic and angiogenic pathways
- Free radical scavenger
- Hydrogen donor
- Antioxidant activity
- Iron Chelator – binds to Iron and Copper

#### Curcumin – As a natural anti-inflammatory and antibacterial agent<sup>7</sup>

- Therapeutic effects - anti-inflammatory, antibacterial, antiviral, antifungal, antitumor, antispasmodic, antioxidant and hepatoprotective.
- Curcumin is found to generate hydroxyl radicals through Fenton reaction by reducing Fe<sup>3+</sup> to Fe<sup>2+</sup>.
- Stabilizes lysosomal membrane
- Causes uncoupling of oxidative phosphorylation.
- Lack of gastrointestinal side effects despite being an anti-inflammatory agent.

#### Study Design:

##### Subjects:

This comparative clinical study was carried out at the Department of Periodontology and Implantology, College of Dental Sciences and Research Centre. The present study was conducted for 21 days and subjects were selected from the Outpatient Department of Periodontics. The study protocol was explained to each potential subject.

A total of 30 volunteers to be selected for this 21 days short clinical trial. Subjects included in this study were in good general health and met the following criteria:

- Inclusion Criteria
- Exclusion Criteria

##### Inclusion criteria:

- Over 20 years of age
- No periodontal therapy in the last 6 months
- No antimicrobials for 1 month prior to study
- Moderate/severe gingivitis to mild periodontitis

##### Exclusion criteria:

- Patients suffering from any known systemic diseases
- Patient who had received any chemotherapeutic mouth rinses and oral irrigation during the past one month.
- Smokers, tobacco users and alcoholics.

##### Design:

The study model comprises of two groups:

Group 1 – only SRP (n = 15)

Group 2 - SRP with curcuma oral gel application (n = 15)

All the subjects participating in the study are well informed regarding the treatment and possible outcomes.

#### Material:

Scaling and root planing was done by ultrasonic instrumentation and Gracey curettes and commercially available Curcuma oral gel was used.

#### Clinical Parameters:

The criteria used for clinical evaluation:

- Plaque index (Sillness P. and Loe H., 1964)
- Gingival index (Loe H. and Sillness P., 1963)
- Gingival Bleeding index (Ainamo and Bay, 1975)

Each tooth is divided into 4 surfaces-3 buccal surfaces and 1 lingual surface. Each surface to be recorded as an individual site.

#### Methodology:

- Supragingival scaling is done using ultrasonic instrument.
- A single episode of SRP is performed for both the groups on day 0, such that all surfaces were clean and smooth.
- Patient is prescribed the application of curcuma oral gel on the gums which is kept for 10 minutes then to be rinsed out.
- This procedure is repeated twice daily for the next 21 days. Patient is kept on 3 month follow up visit.

#### Re-evaluation:

- Plaque index, gingival index and gingival bleeding index to be re-evaluated on day 7, 14, 21.
- Results obtained are analyzed statistically using student 't' - test.

#### Results

After the supragingival scaling was done with ultrasonic instrument and application of curcuma gel for over 21 days, results were observed and noted. In this present study, on comparing the plaque index score at baseline-day 0 and day 21 highly significant improvement was seen in group 2 (\*\*p<0.001).

Similarly, when the gingival index and the gingival bleeding index scores were compared at baseline- day 0 and day 21 for group 2, highly significant improvement was seen (\*\*p<0.001). The intergroup comparison at day 21 showed there was significant change in the plaque index scores and gingival bleeding index scores (\*p<0.05) whereas, no significant change was seen for the gingival index scores.

**Table 1- Comparison of Plaque Index between two groups on baseline and day 21**

	Baseline – Day 0 (Mean ± SD)	Day 21 (Mean ± SD)	p - value
SRP + Curcuma Oral Gel	1.90 ± 0.37	0.50 ± 0.16	**
Only SRP	1.68 ± 0.19	0.71 ± 0.18	*
p - value	N.S.	*	

Significant --> \*, Highly Significant --> \*\*, N.S. --> Not Significant

**Table 2- Comparison of Gingival Index between two groups at baseline and day 21**

	Baseline – Day 0 (Mean ± SD)	Day 21 (Mean ± SD)	p - value
SRP+ Curcuma Oral Gel	1.28 ± 0.24	0.41 ± 0.15	**
Only SRP	1.01 ± 0.41	0.36 ± 0.13	*
p - value	N.S.	N.S.	

Significant --> \*, Highly Significant --> \*\*, N.S. --> Not Significant

**Table 3 - Comparison of Gingival Bleeding Index between two groups at baseline and day 21**

	Baseline – Day 0 (Mean ± SD)	Day 21 (Mean ± SD)	p - value
SRP+ Curcuma Oral Gel	53.96 ± 7.94	6.06 ± 1.18	**
Only SRP	55.87 ± 7.13	23.08 ± 6.07	*
p - value	N.S.	*	

Significant --> \*, Highly Significant --> \*\*, N.S. --> Not Significant

#### Discussion:

Curcumin has been studied widely in the literature over the years. Curcumin has been cited to have qualities such as anti – inflammatory, anti – bacterial, anti – fungal, anti – viral, anti – oxidant and wound healing.<sup>6</sup> This short clinical control trial aims at evaluating the efficacy of Curcumin as an adjunct to SRP and to compare it with only SRP. The results of our study show a significant improvement in all the clinical parameters in both groups. A thorough good quality SRP has a greater impact on the clinical findings irrespective of the adjunctive treatment procedures.<sup>8</sup>

However, there have been a few studies which have been performed to assess the clinical and microbiological efficacy of curcumin irrigation as an adjunct to scaling and root planing. A randomized control trial conducted in 2013, used 1% of curcumin solution for subgingival irrigation and the microbiological and clinical parameters were assessed in patients with chronic periodontitis. The study showed that curcumin subgingival irrigation has moderate beneficial effect, but its substantivity needs to be improved to prevent bacterial re-colonization.<sup>9</sup>

A study conducted by BR Anuraddha et al (2015)<sup>10</sup> evaluated the anti – inflammatory effect of curcumin gel as an adjunct to scaling and root planing. Thirty patients either male or female with chronic localized or generalized periodontitis aged between 25 and 60 years with pocket depth of 5-7 mm affecting at least two nonadjacent sites were included. In the experimental site scaling and root planing was performed, followed by placement of the curcumin gel and periodontal pack application. In the control site, subgingival scaling alone was performed followed by periodontal pack application. Parameters included were: Plaque index (PI), gingival index (GI), probing depth (PD) and clinical attachment loss. These parameters were recorded on day 0, 30 and 45 days. Results concluded that the curcumin was effective when used as an adjunct to scaling and root planing.

A clinical and microbiological study conducted by Nagasri M et al (2015)<sup>11</sup> evaluated the efficacy of curcumin as an adjunct to scaling and root planing in chronic periodontitis

patients. The results revealed that there was improvement in the clinical parameters of plaque index, gingival index, probing depth and clinical attachment levels. Microbial assessment showed reduction in *P. gingivalis*, *T. forsyntia* and *T. denticola* in plaque samples.

In the present study, the Plaque Index scores were highly significant in group 2 over a period of 21days, where as they were significant between the two groups at any time interval. The Gingival Index scores were highly significant in group 2 over a period of 21days, where as they were not significant between the two groups at the end of 21 days. The Gingival Bleeding Index scores were highly significant in group 2 over a period of 21days, where as they were significant between the two groups at the end of 21days.

#### Conclusion:

The results of this study shows mild to moderate beneficiary effect of Curcumin application with SRP as compared to SRP alone. However, a longer duration of study with a bigger sample size is required for more accurate results.

Thus, Curcumin can be undoubtedly used as a routine professional or home care regime, which improves its antibacterial properties and thus shows better results.

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