

Effect of Curcumin on de novo Plaque Formation: A Randomized Controlled Clinical Trial

Arun P Maradi¹, KKN Saranya², Ritika Chhalani³, Jayashree Sajjanar⁴, Arunkumar B. Sajjanar⁵, Fazal Ilahi Jamesha⁶

1-Reader, Dept of periodontics, Sri Ramakrishna Dental College Coimbatore, Tamil Nadu. 2,3,6-PG Students, Dept of Periodontics, Sri Ramakrishna Dental College Coimbatore, Tamilnadu. 4-Senior lecturer, Dept of prosthodontics, Swargiya Dadasaheb Kalmegh Smruti Dental College and Hospital, Wanadongri, Nagpur. 5-Reader, Dept Of Pedodontics & Preventive Dentistry, Swargiya Dadasaheb Kalmegh Smruti Dental College And Hospital Wanadongri, Nagpur.

Correspondence to:
Dr. Arun P Maradi, Reader, Dept of periodontics, Sri Ramakrishna dental college Coimbatore, Tamil Nadu.
Contact Us: www.ijohmr.com

ABSTRACT

Background: The major drawback of the products for chemical plaque control is the numerous side effects associated with their use. Turmeric, a rhizome of *Curcuma longa*, is a herb which has proven properties like anti-inflammatory, antioxidant, antimicrobial, hepatoprotective, immunostimulant, antiseptic, and antimutagenic. De novo plaque regrowth study is a typical first screening method for the evaluation of a new mouthrinse formulation. Hence in this study, the effect of curcumin on de novo plaque formation is evaluated and compared with chlorhexidine as positive control and water as negative control. **Methods:** 42 dental students volunteered for this double-blind, randomized, controlled clinical trial. Professional tooth cleaning was done in the preparatory phase, so that plaque score of 0 was obtained. After scaling, the students abstained from all mechanical measures of plaque control for 2 days but rinsed with mouth rinse alone [Water with flavoring agent/ Curcumin mouth rinse (0.1%)/ Chlorhexidine mouthrinse (Rexidin 0.2%)]. After 2 days, plaque scores were recorded using Turesky modified Quigley Hein plaque index (1970). **Results:** The mean plaque score after 2 days was 2.24 for water, 2.78 for curcumin, 2.4 for chlorhexidine. **Conclusion:** Hence, to conclude, there were no statistically significant differences among chlorhexidine, curcumin, and water in early plaque formation. Additional researches are required for assessing their influence in mature plaque formation on a large scale.

KEYWORDS: Curcumin, Plaque Control, Chlorhexidine

INTRODUCTION

Removing the plaque and preventing the accumulation of it are important for the prevention of inflammatory periodontal diseases. Despite the availability of various oral hygiene products, most people do not achieve total plaque removal. Studies that were done by Jespen in 1998, van der Weijden *et al.* in 1998, De la Rosa *et al.* in 1979 showed that less than half of the plaque is removed, leaving about 60% after brushing.¹ Various products for chemical plaque control are available in the market, but the major drawback of these products is the numerous side effects associated with their use. Turmeric, a rhizome of *Curcuma longa*, is a herb known for its medicinal properties. It has proven properties like anti-inflammatory, antioxidant, antimicrobial, hepatoprotective, immunostimulant, antiseptic, and antimutagenic.² De novo plaque regrowth study, comprising the substitution of mechanical plaque control by using mouth rinses is a typical first screening method for the evaluation of a new mouthrinse formulation (Addy & Moran 1997).³

Hence in this study, the effect of curcumin on de novo plaque formation is evaluated and compared with chlorhexidine as positive control and water as negative control.

MATERIALS AND METHODS

Subjects: 42 dental students volunteered for this double-blind, randomized, controlled clinical trial. The inclusion criteria were healthy subjects with at least 24 teeth and with no signs of gingivitis and periodontitis. The exclusion criteria were students with caries or extensive dental restorations and those who were exposed to systemic antibiotic treatment during the past 6 months.

Experimental design: All the students were given mouthwash which was blinded and assigned randomly in a sequential order. For example, the first student, the second student, and the third student were given Group A, Group B and Group C mouthwash respectively. This present study was accepted by the Institutional Review Board and Ethical Committee of Sri Ramakrishna Dental College and Hospital. Professional tooth cleaning was done in the preparatory phase. The plaque was disclosed with two-tone disclosing solution (Fig. 1) followed by scaling, so that plaque score of 0 was obtained (Fig. 2).

After scaling, the students abstained from all mechanical measures of plaque control for 2 days but rinsed with mouth rinse alone. The study was done in three groups-

- Group A – Water with flavoring agent,

How to cite this article:

Maradi AP, Saranya KKN, Chhalani R, Sajjanar J, Sajjanar AB, Jamesha FI. Effect of Curcumin on de novo Plaque Formation: A Randomized Controlled Clinical Trial. *Int J Oral Health Med Res* 2017;4(2):12-14.



Fig. 1. Plaque disclosed before scaling



Fig. 2. After scaling

- Group B – Curcumin mouth rinse (0.1%),
- Group C – Chlorhexidine mouthrinse (Rexidin 0.2%)

Preparation of curcumin mouth rinse: Curcumin mouth rinse was 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 4.⁴

After 2 days of experimental period, plaque scores were recorded after staining with two-tone dye solution (Fig. 3) using Turesky modified Quigley Hein plaque index (1970) (Table 1).⁵



Fig. 3. Plaque accumulation after 2 days

RESULTS

The mean plaque score after 2 days was 2.24 for water, 2.78 for curcumin, 2.4 for chlorhexidine. Anova test revealed that there were no significant differences among the three groups in the mean plaque score after 2 days. Fig. 4 represents the bar chart of mean plaque score after 2 days.

	GROUP A	GROUP B	GROUP C
Subjects	Mean plaque Score	Mean plaque Score	Mean plaque Score
Subject 1	2.55	1.82	2.18
Subject 2	3.04	2.64	3.21
Subject 3	3.98	3.20	2.11
Subject 4	1.61	2.55	2.21
Subject 5	1.39	3.07	3.32
Subject 6	1.38	2.68	1.45
Subject 7	2.73	2.14	1.48
Subject 8	2.36	3.07	2.30
Subject 9	2.70	0.94	2.52
Subject 10	2.54	3.93	2.38
Subject 11	1.73	3.34	2.82
Subject 12	1.13	3.00	2.20
Subject 13	1.78	3.07	2.75
Subject 14	2.50	3.40	2.60

Table 1. Mean plaque scores of different groups

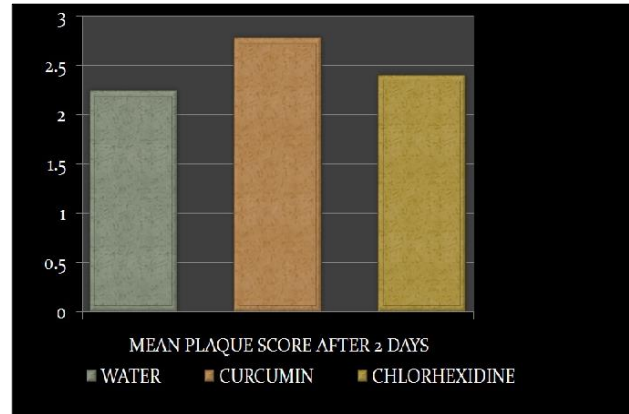


Fig. 4. Bar chart of mean plaque score after 2 days

DISCUSSION

De novo plaque regrowth study, involving the replacement of mechanical plaque control by mouth rinsing is a typical first screening method for the evaluation of a new mouthrinse formulation (Addy & Moran, 1997). To the best of our knowledge, none of the studies were done previously to evaluate the effect of curcumin mouthrinse on de novo plaque formation. The decision to assess 48-hour plaque accumulation was based on studies done by Quigley in 1962, Sharawy in 1966 which indicated the most rapid increase in plaque formation occurred within 2 days, with a tendency towards plateauing after 8 days.^{5,6}

In a study done by Amita *et al.* in 2012, 0.1% turmeric mouthwash was compared with 0.2% chlorhexidine gluconate in the prevention of plaque and gingivitis. It was concluded that chlorhexidine gluconate, as well as, turmeric mouthwash could be effectively used as an adjunct to mechanical plaque control in prevention of plaque and gingivitis.⁷

In a study done by Moran *et al.* in 2000, quaternary ammonium mouthrinses on a 4-day plaque regrowth was evaluated. In the study, chlorhexidine, benzalkonium chloride (BC) rinses (0.05% and 0.1% in 0.09% saline), cetyl pyridinium chloride (CPC) were compared. The mean plaque score was recorded after 4 days of plaque regrowth. The mean plaque score was 1.40, 2.29, 2.76, 2.80, 2.95 for chlorhexidine, CPC, BC (0.05%), BC (0.1%), water respectively.⁸

But in the present study, there were no statistically significant differences among the three groups in the

mean plaque scores which were evaluated after 2 days. This may be due to the short period of time used for re-evaluation (2 days) and a smaller sample size. Also, 42 volunteers who participated in this study has been divided into 3 experimental groups which are in contrast to the study done by Quirynen *et al.* (2001), in which 16 volunteers were subjected to four experimental periods to use different mouthrinse.⁹ Microbiological analysis to evaluate change in plaque quality was also not carried out.

CONCLUSION

It was concluded that there were no statistically significant differences among chlorhexidine, curcumin, and water in early plaque formation. Further studies are needed to evaluate their effect in mature plaque formation on a large scale. Also, the anti-inflammatory, antioxidant and antimicrobial effects of curcumin have to be investigated in upcoming studies.

REFERENCES

1. J.E. Stoeken, P.A. Versteeg, N.A.M. Rosema, M.F. Timmerman, U. van der Velden, and G.A. van der Weijden. Inhibition of "De Novo" Plaque Formation With 0.12% Chlorhexidine Spray Compared to 0.2% Spray and 0.2% Chlorhexidine Mouthwash. *J Periodontol* 2007;78:899-904.
2. Nagpal M, Sood S. Role of curcumin in systemic and oral health: An overview. *J Nat Sci Biol Med.* 2013;4(1):3-7.
3. Addy, M. & Moran, JM. Evaluation of oral hygiene products: science is true; don't be misled by the facts. *Periodontol* 2000;1997 Oct;15:40-51.
4. Waghmare PF, Chaudhary AU, Karhadkar VM, Jamkhande AS. Comparative evaluation of turmeric and chlorhexidine gluconate mouthwash in prevention of plaque formation and gingivitis: A clinical and microbiological study. *J Contemp Dent Pract.* 2011;12(4):221-4.
5. Samuel Turesky, Neville D. Gilmore, Irving Glickman. Reduced Plaque Formation by the Chloromethyl Analogue of Victamine C. *J Periodontol* 1970;41:41-3.
6. Sharawy AM, Sabharwah K, Socransky SS, Lobene RR. Quantitative study of plaque and calculus formation in normal and periodontally involved mouths. *J Periodontol* 1966;37:53-9.
7. Amita M. Mali, Roobal Behal, and Suhit S. Gilda. Comparative evaluation of 0.1% turmeric mouthwash with 0.2% chlorhexidine gluconate in prevention of plaque and gingivitis: A clinical and microbiological study. *J Indian Soc Periodontol.* 2012;16(3):386-91.
8. Moran J, Addy M, Jackson R, Newcombe RG. Comparative effects of quaternary ammonium mouthrinses on a 4 day plaque regrowth. *J Clin Periodontol* 2000;27:37-40.
9. Quirynen M, Avontrodt P, Peeters W, Pauwels M, Coucke W, Van Steenberghe D. Effect of different chlorhexidine formulations in mouthrinses on de novo plaque formation. *J Clin Periodontol* 2001;28:1127-1136.

Source of Support: Nil
Conflict of Interest: Nil