

Comparative Evaluation of Curcumin and Phenolic Mouthwashes Among Patients with Chronic Gingivitis

Dr. Keerthi T, Dr Grace Mary Joseph
Post Graduate(s)
AJ Institute of dental sciences and hospital
Mangalore, Karnataka
India

Dr. Sahana Purushotham
Reader
AJ Institute of dental sciences and hospital
Mangalore, Karnataka
India

Abstract:- The aim of this study was to assess the efficacy of 0.1% curcumin mouthwash and to compare it with phenolic mouthwash for its effect on gingival inflammation. Thirty subjects, aged between 30 and 55 years of age were recruited and randomly divided into two groups. In Group A, 15 subjects were advised curcumin mouthwash, while Group B subjects used phenolic mouth wash. The subjects were advised to use 10 ml of mouthwash for 30 seconds twice a day 30 min after brushing. Parameters were recorded for Gingival and Sulcus Bleeding Indices at baseline, 7th and 14th days along with subjective assessment. The intergroup comparison of the clinical parameters revealed curcumin and phenolic mouthwash showed statistically significant results with $P < 0.001$. Hence it can be concluded that curcumin can be effectively used as an adjunct to scaling and root planning.

Keywords:- Curcumin Mouthwash, Phenolic Mouthwash, Gingivitis.

I. INTRODUCTION

The two most common dental problems are dental caries and plaque formation, hence making effective plaque removal as indispensable part of oral hygiene regime using various mechanical plaque control methods like tooth brushing. However, mechanical

plaque control methods have its own limitations-patient's dexterity, accessibility and patient's education. Therefore, adjunctive chemical plaque control methods like the usage of mouthwash has been advised as an adjunct to mechanical plaque control. Chlorhexidine to date is the most effective anti plaque agent and is considered as the gold standard in chemical plaque control.¹ Even then, its use as an anti plaque agent is limited due to its potent side effects. Hence, search for alternative products have been going on for a decade-such as herbal and essential oil products. Several herbal extracts have been tested *in vitro* and *in vivo* to be provided as an adjunct to the mechanical plaque control. Of these, curcumin, or commonly called as Turmeric has been advocated as a potential choice for mouthwash due to its various beneficial effects such as anti

inflammatory, anti-microbial and immunostimulant properties. Various formulations of curcumin in the form of powder, paste, gel, and poultice has been extensively used proving its various pleiotropic effect.²

Listerine, a combination of phenol related essential oils is an effective mouthwash in reduction of dental plaques and oral bacterial counts. In comparison with a chlorhexidine based mouthwash, Listerine has had a similar antibacterial effect. Listerine has no proven side effects, which is one of its advantages.³ Literature has adequate proof stating separately the efficacy of the curcumin and essential mouthwashes as adequately similar to that of chlorhexidine.² As not many studies have been conducted comparing curcumin against phenolic mouthwashes, the present study has been designed to compare and evaluate the efficacy of curcumin with essential oil mouthwashes as an adjunct to scaling and root planing in moderate to severe gingivitis patients.

II. MATERIALS AND METHODS

The patients were selected from Out Patient Department of Periodontics, A.J. Institute of Dental Sciences, Mangalore, Karnataka. The patients included in the study were aged between 30 – 55 years and were systemically healthy patients. Patients who had undergone non surgical or surgical periodontal therapy in the last 6 months, with underlying systemic diseases and conditions, pregnant & lactating women, patients on antibiotics, diuretics, steroids, oral contraceptives or any other medication for the last 6 months, patients with the habit of smoking, tobacco chewing and alcohol consumption or those having allergic reactions to any indigenous drugs were excluded from the study.

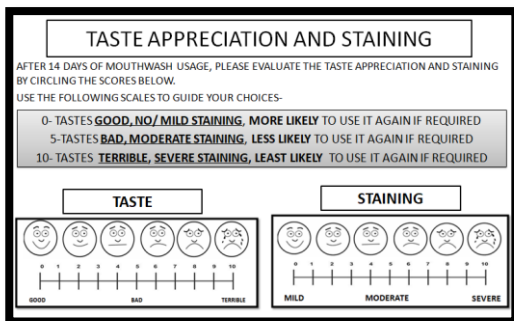
The study sample consisted of 30 subjects which were divided into two groups –

- Group A where Scaling and Root Planing along with curcumin mouthwash was administered
- Group B where Scaling and Root Planing along with phenolic mouthwash was administered.

Consent forms from subjects were collected prior to the clinical examination, based on the inclusion and exclusion criteria mentioned above. Clinical parameters like bleeding on probing, Gingival Index (Sillness and Loe) and Modified Sulcus Bleeding Index (A.Mombelli) were assessed using Williams periodontal probe at baseline, 7th day and 14th day. On 14th day VAS scores for taste perception were assessed using a 3 point Likerts scale – tasted good, tasted bad, tasted terrible.

Treatment allocation was done using purposive sampling method and it was conducted in the form of double blinded trial. All the subjects received complete supragingival scaling to remove the plaque and calculus at baseline by one examiner while the mouthwash was prescribed by another examiner in order to reduce bias. The subjects were advised to use 10 ml of mouthwash for 30 seconds twice a day, 30 min after brushing. The subjects were instructed to withdraw the use of mouthwashes and report immediately if they experienced any side effects due to the use of mouthwashes. Patients were evaluated at baseline 7th and 14th day.

On the 14th day, all the patients received a visual analogue scale designed to evaluate their attitudes to the mouthrinse, which they had used. They were questioned about their appreciation of the taste of the mouthwash and the associated staining. They were asked to mark a point on a 10 cm long uncalibrated line with the negative extreme response (0) on the left and the positive extreme (10) at the right end.



III. RESULTS

Statistical analysis of the data was performed using SPSS 20.0. The continuous variables were presented as mean and standard deviation. Comparison categorical variables were performed using student t test. A p value<0.01 was considered statistically significant.



Fig 1 (A) and (B)- Pre operative and post operative assessment in Group A, respectively



Fig 2 (A) and (B)- Pre operative and post operative assessment in Group B, respectively

Table- 1 Showing pre post comparison in Modified Sulcus Bleeding Index in CurQ Fresh and Listerine group

group	Mean	N	Std. Deviation	Average difference	t value	P value
GROUP A	Base line	2.0000	15	.19272		
	Day14	1.4733	15	.17099	0.526	16.681
GROUP B	Base line	2.1200	15	.30519		
	Day14	1.2867	15	.15523	0.833	14.557

Modified Sulcus Bleeding Index score in curcumin group in the base line was 2±0.192 and on day 14 it was 1.473±0.170 with an average difference of 0.526 from base line to day14.

Modified sulcus bleeding index score in phenolic group in the base line was 2.12±0.305 and on day 14 it was 1.286±0.155 with an average difference of 0.833 from base line to day 14. The analysis showed significant difference in Sulcus bleeding index from baseline to day14 in Groups A and B with p<0.001.

Graph 1- : Intragroup comparative representation of Modified Sulcus Bleeding Index

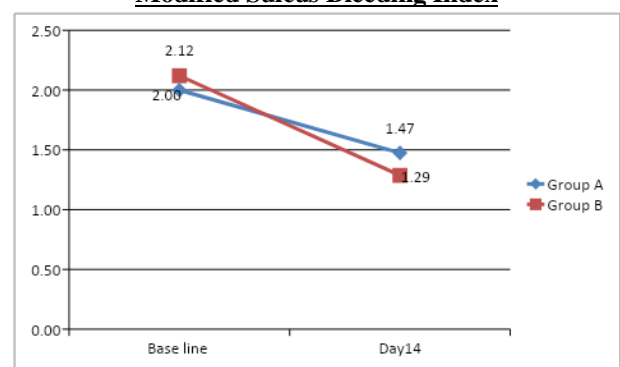


Table-2 Showing pre and post comparison in Gingival Index in Curcumin and Phenolic mouthwash group

Mouthwash	Mean	N	Std. Deviation	Average difference	t value	P value
<u>Curcumin</u>	Base line	1.9667	15	.25542		
	Day14	1.0133	15	.18074	0.953	24.995 P<0.001
<u>Phenolic</u>	Base line	2.0133	15	.41381		
	Day14	1.3000	15	.27516	0.713	9.023 P<0.001

Gingival index score in Cur Q Fresh group in the base line was 1.966±0.255 and on day 14 it was 1.0133±0.180 with an average difference of 0.953 from base line to day14. Gingival index score in Phenolic group in the base line was 2.013±0.413 and on day14 it was 1.3±0.275 with an average difference of 0.713 from base line to day14. The analysis showed significant difference in gingival index from baseline to day14 in Curcumin and Phenolic group with p<0.00.

Graph 2- Intragroup comparative representation of Gingival Index score

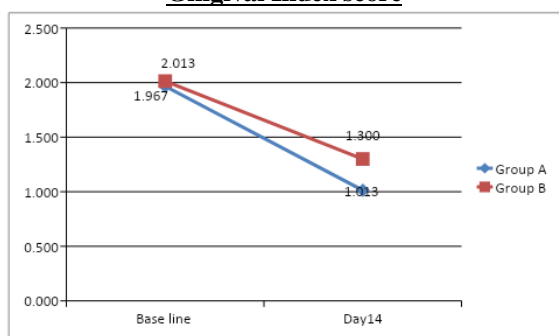


Table 3-Intergroup comparison in Gingival Index and Modified Sulcus Bleeding Index

	Group	N	Average difference	Std. Deviation	t value	P value
Gingival index	<u>Curcumin</u>	15	.9533	.15055	2.720	P<0.05
	<u>Phenolic</u>	15	.7133	.30675		
Modified Sulcus Bleeding Index	<u>Curcumin</u>	15	.5267	.12228	4.627	P<0.001
	<u>Phenolic</u>	15	.8333	.22573		

Comparison between the group shows gingival index difference from base line to day 14 is significantly more in Curcumin group as compared to Phenolic group (0.953 Vs 0.713). Modified Sulcus bleeding index is significantly more in Phenolic group as compared to Curcumin group(0.833 Vs 0.526).

Graph 3- Intergroup comparison for both Gingival Index and Modified Sulcus Bleeding Index

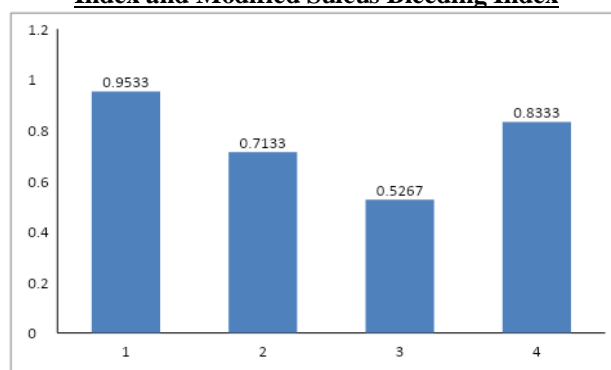
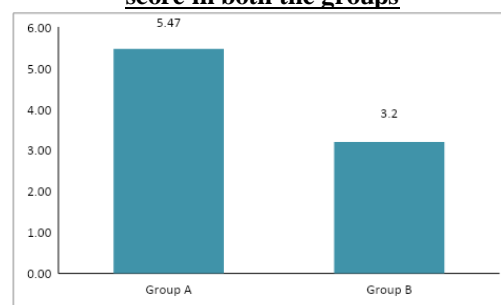


Table 4- Intergroup comparison of VAS scores in both the groups

Group	N	Mean	Std. Deviation	t value	P value
<u>Curcumin</u>	15	5.4667	1.50555	5.185	P<0.001
<u>Phenolic</u>	15	3.2000	.77460		

In Curcumin group, average VAS score was 5.466±1.505 and in Phenolic group it was 3.2±0.774. The analysis shows statistically significant difference in VAS score between the groups with p<0.001.

Graph 4- Intergroup comparison representation of VAS score in both the groups



IV. DISCUSSION

The implication of microbes and periodontal disease has long been linked in the disease pathogenesis of periodontitis. Hence there has been an increase in the use of antimicrobial medicines in the treatment of periodontal disorders, for which various chemical agents have been utilised in conjunction with mechanical therapy. Chlorhexidine (CHX) is considered as the gold standard anti-plaque and anti-gingivitis mouthwash⁴. However, the associated side effects like taste alteration and staining have led to the search of alternative mouthwashes with similar clinical efficacy. In the recent years, natural products have become more sought-after due to their potential usage free of any side effects.

Listerine is the prototype first generational antibacterial mouthrinse, which is a simple combination of phenol and essential oil. W.D. Miller promoted the usage of Listerine as a “very useful and active antiseptic” against oral

microorganisms almost a century ago. The phenol content is known to have antibacterial effect, while the essential oils present are plant-derived volatile aromatic molecules with anti-inflammatory, antibacterial, and antioxidant qualities. Research suggests that oxygenated terpenoids found in the essential oils diffuse within the bacterial cell membrane, irreversibly damaging it, and causing cell death.⁵ As many short term and long term studies have been carried out comparing the usage of Listerine to that of chlorhexidine, this study was carried out to compare Listerine with another commercially available herbal mouthwash containing curcumin.

In this case report, given the small sample size, comparison of curcumin mouthwash was carried out against another FDA approved mouthwash- Listerine.

Curcumin, a commonly consumed herbal formulation in the form of turmeric, has been suggested as a clinically efficacious component of mouthwash to reduce plaque and gingivitis. Curcumin has been consumed as a dietary supplement for centuries and is considered pharmacologically safe.⁶ In ayurvedic medicine, it has been widely used for its antioxidant, anti-inflammatory, analgesic, antiseptic, and antimalarial properties.⁶ Various studies (Bombdial et al, 2017; Izui et al, 2016)^{7,8} have already been conducted stating its antibacterial efficacy against periodontopathogens and its potential use in the treatment of periodontal disease.

In the present study, efficacy of curcumin and phenolic mouthwashes along with mechanical plaque control on moderate to severe gingivitis patients was evaluated. Under the clinical parameters, gingival index was shown to have significant improvement in the group using Listerine when compared to that using Cur Q Fresh. This is in conjunction with various studies conducted by various authors over the last decade suggesting the potential anti gingivitis action of Listerine. The adjunctive use of an Essential Oil-containing mouthrinse offers a clinically significant and meaningful additional benefit in reducing plaque and gingivitis, according to a study to which measured its additional benefit in reducing plaque and gingivitis in patients who brush and floss regularly.⁸

The modified Sulcus bleeding index however showed significant reduction in the group using Cur Q Fresh , potentially due to the anti inflammatory property of curcumin. Muglikar et al. ⁹ compared the effects on the gingival index and plaque index of oral rinses with chlorhexidine and curcumin as adjuvants for SRP on a weekly basis for three weeks, observing similar effects of these two substances, which were more beneficial than SRP alone. Chatterjee et al. also obtained similar results for curcumin versus chlorhexidine oral rinses, in terms of gingival bleeding, plaque index, and gingival index; curcumin was well tolerated, biocompatible, and acceptable in taste.¹⁰ A study by Chainani-Wu showed that curcumin, in addition to its mechanical therapeutic strategies, can be used as a complementary therapy to reduce inflammation; poorer results were observed for the plaque index.¹¹

In this study, we also checked the VAS score for patients' acceptability based on the taste. The observation from the present study from subjective criteria stated that bitter taste was experienced by few subjects using curcumin mouthwash, with statistically significant difference when compared to that of phenolic mouthwash. This is in accordance with a study conducted by Chatterjee et al ¹⁰ who also showed bitter taste associated with curcumin mouthwash. No side effects were reported by the subjects on the usage of these two mouthwashes.

However, patient's acceptability was relatively better with curcumin subjectively on the basis of it being a naturally derived mouthwash when compared to that of phenolic mouthwash.

V. CONCLUSION

The results obtained from the present clinical trial, proves the anti-gingivitis efficacy of curcumin mouthwash. It could, therefore, be used as an adjunct to mechanical therapy and is comparable with the usage of essential oils mouthwash. However additional trials with larger sample sizes are required to standardize the dose of curcumin and the formulation to have a regular usage in the field of periodontology.

LIMITATIONS

- Small sample size
- No evidence on standardization of dosage and formulation of curcumin mouthwash
- Substantivity of curcumin not well defined

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