International Journal Dental and Medical Sciences Research
Volume 3, Issue 5, Sep-Oct 2021 pp 334-339 www.ijdmsrjournal.com ISSN: 2582-6018

Evaluation of Efficacy of Gel Containing Neem, Curcumin, Chitosan and Resveratrol as an Adjunct to Scaling and Root Planing In the Treatment of Chronic Gingivitis- A Pilot Study

1. Dr Noopur Narayane
2. Dr Rajesh Gaikwad
3. Dr Vaibhavi Nandgaonkar

[1,3] *Post graduate Student, Government Dental College and Hospital, Mumbai, Maharashtra*
[2] *Professor and Head of Department of Periodontology, Government Dental College and Hospital, Mumbai, Maharashtra*
Corresponding Author: Dr Vaibhavi Nandgaonkar,

Submitted: 01-09-2021 Revised: 09-09-2021 Accepted: 12-09-2021

ABSTRACT:
Background: Gingivitis is a form of periodontal disease that is prevalent in most adult population. It precedes periodontitis, an inflammatory disease that affects the periodontal supporting tissues of the teeth. Along with the mechanical debridement, adjunct can also be used but there are adverse effects of these conventional compounds hence the need of natural, biocompatible product arises. In this study, a gel containing curcumin, resveratrol, chitosan and neem is used as an adjunct to scaling and root planning.
Objective: To evaluate the efficacy of a gel containing curcumin, resveratrol, chitosan, neem as an adjunct to scaling and root planing.
Methodology: 20 patients with chronic gingivitis were selected and the patients were randomly allotted to either of the groups - Group A - Test Group, Group B – Control Group scaling and root planing was done in both the groups. group A individuals were made to apply the gel for one month. Parameters such as plaque index, gingival index and papillary bleeding index were assessed at baseline and after 1 month.
Results: On comparison of Group A and Group B, statistically significant difference was observed at 1 month interval.
Conclusion: Both groups reported a significant reduction in plaque index, gingival index and papillary bleeding index scores. Test group showed equally effective as the control group.
KEYWORDS: Gingivitis, antiplaque agents, curcumin, chitosan.

I. INTRODUCTION

Gingivitis is a most common form of periodontal disease with the prevalence of 85-90% in children and adult population.1,2 It is defined as inflammation of the gingiva in which the junctional epithelium remains attached to the tooth at its original level. It usually precedes periodontitis which is the inflammation of the supporting structures of the teeth including gingiva, periodontal ligament and alveolar bone. The prevention of gingivitis by daily and effective supragingival plaque control is necessary to arrest its progression into periodontitis.3

There are various modalities to treat gingival diseases and to arrest its progression to periodontitis but the mechanical plaque control therapy has a potential to maintain the adequate level of oral hygiene. However, clinical experience and population-based studies have shown that these methods have not been accurately practiced as they should be by large population. Therefore, the need for chemotherapeutic agents arises to improve the efficacy of routine mechanical plaque control methods.

Many chemical agents have been tested as adjuncts to mechanical methods which can reduce plaque-associated gingivitis. Chlorhexidine, Triclosan, Povidone iodine and various phenolic compounds have been used successfully as anti-plaque agents. However, side-effects such as allergy, discolouration of teeth and unpleasant taste can occur when these chemicals are used for an extended period of time. Also, wide scale misuse of such chemotherapeutic agents has been noticed which has made researchers to develop an interest in naturally derived anti-inflammatory and anti-infective agents.

These herbal medicines have been used since thousands of years. natural products such as neem, aloe vera, tulsi, cinnamon, cloves, turmeric, etc are commonly being used to treat various systemic ailments. These herbal products have been

used actively in dentistry too. In this study a gel constituting naturally derived products named Amfresh has been used, which contains neem, curcumin, chitosan and resveratrol.

Azadirachta indica commonly known as Neem has been used in India for its medicinal properties since time immemorial. Nimbidin, Azadirachtin and nimbinin are active compounds present in Neem which are responsible for antibacterial activity. It possesses anti inflammatory4, anti fungal5, anti oxidant6, anti carcinogenic7, immunomodulatory8 properties. From nimbidin other active constituents like nimbin, nimbinin, nimbidinin, nimbolide and nimbidic acid have been isolated which are responsible for its biological activities.9

Curcuma longa commonly known as turmeric, is indigenous to Southeast Asia and has been used in India since thousands of years. Components of tumeric are named curcuminoids, which include mainly curcumin (diferuloyl methane), demethoxycurcumin, and bisdemethoxycurcumin. Curcumin (diferuloylmethane) is a polyphenol derived from Curcuma longa plant. The active constituents of turmeric are the flavonoid curcumin (diferuloylmethane) and various volatile oils including tumerone, atlantone, and zingiberone. curcumin comprises 0.3-5.4% of raw turmeric. It has antimicrobial, antioxidant, astringent, and anti-inflammatory properties.

Chitosan is a linear copopolymer obtained by deacetylation of its parent polymer chitin. It has shown wide range of applications in biomedical and other industrial areas.10,11 Chitosan can be obtained from natural resources as well such as the exoskeletons of insects, arthropods, shellfish and cell walls of fungi. chitosan-based products can be used as antibiotics, anaesthetics, painkillers, growth promoters and biosensors.

Resveratrol is an anti-oxidant found in grapes, red wine, peanuts, and some woody plants. It has antimicrobial, antioxidant, anti-inflammatory, antiaging, anticarcinogenic, and neuroprotective properties

In this pilot study, the efficacy of a commercial gel named Amfresh (Apex Laboratories, PVT Ltd, Chennai, India) has been evaluated as an adjunct to scaling and root planning for the treatment of gingivitis.

II. MATERIALS AND METHODS

Total 20 patients who reported to the department of periodontology, in Government dental college and hospital, Mumbai, were enrolled in this pilot study after taking the informed consent. Systemically healthy patients diagnosed with chronic gingivitis with age of more than 21 years were included in this study, while smokers, tobacco chewers, pregnant or lactating mothers, strict vegetarians, under antibiotics in past 3 months were excluded from this study.

Baseline clinical parameters like plaque index, gingival index and full mouth papillary bleeding index were assessed at the first visit. Scaling and root planning with the ultrasonic scaler in a single visit was done in all 20 patients. Patients were then divided into two groups based on the randomisation by computer allocation.

Group A (10 patients): Test group. Patients were instructed to apply AmFresh gel twice daily on the gingiva for a month, after brushing and advised to leave it for at least 10 min after application and thereafter rinsed with water to clear any residual medication.

Group B (10 patients): Control group. Patients were instructed to brush twice daily. Proper brushing technique was demonstrated to both the groups. Patients were recalled after a month and clinical parameters were re assessed.

Statistical analysis:

Data obtained was compiled on a MS Office Excel Sheet (v 2010, Microsoft Redmond Campus, Redmond, Washington, United States). Data was subjected to statistical analysis using Statistical package for social sciences (SPSS v 21.0, IBM). Descriptive statistics like Mean & SD for numerical data had been depicted. Normality of numerical data was checked using Shapiro-Wilk test & was found that the data followed a normal curve; hence parametric tests have been used for comparisons. Inter group comparison was done using t test, while intra group comparison was done using paired t test. For all the statistical tests, $p<0.05$ was considered to be statistically significant, $p<0.01$ was considered to be statistically highly significant and $p>0.05$ was considered to be statistically nonsignificant difference, keeping α error at 5% and β error at 20%, thus giving a power to the study as 80%.

International Journal Dental and Medical Sciences Research
Volume 3, Issue 5, Sep-Oct 2021 pp 334-339 www.ijdmsrjournal.com ISSN: 2582-6018

III. RESULTS

Figure 1 and figure 2, shows the baseline and 1 month follow up pictures of group A and group B respectively.

Figure 1. Baseline and 1 month follow up of group A

At baseline **At 1 month follow up**

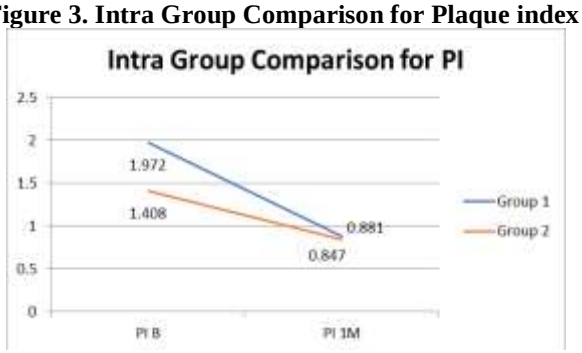
Figure 2. Baseline and 1 month follow up of group B

At baseline **At 1 month follow up**

Plaque index (PI) by Silness and Loe

In Group A, the value of mean plaque index at the baseline was 1.972 ± 0.579 and after one month it was 0.881 ± 0.204. In Group B, the value of mean plaque index at the baseline was 1.408 ± 0.646 and after one month it was 0.847 ± 0.241. On intragroup comparison (figure 3), statistically significant highly difference was seen in test group while statistically significant difference was seen in control group. On intergroup comparison, statistically nonsignificant difference was seen between the two groups.

Figure 3. Intra Group Comparison for Plaque index

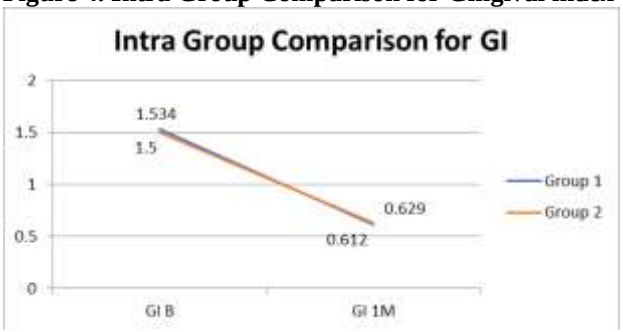


Gingival index (GI) by Loe and Silness

In Group A the value of mean gingival index at the baseline was 1.5340 ± 0.24869 and after one month it was 0.612 ± 0.323. there was statistically highly significant difference. In Group B, the value of mean gingival index at the baseline was 1.5 ± 0.43218 and after one month it was 0.629 ± 0.252. On intragroup comparison (figure 4), a statistically highly significant difference was seen for both the groups. On intergroup comparison, a statistically nonsignificant difference was seen between both the groups.

International Journal Dental and Medical Sciences Research
Volume 3, Issue 5, Sep-Oct 2021 pp 334-339 www.ijdmsrjournal.com ISSN: 2582-6018

Figure 4. Intra Group Comparison for Gingival index



Papillary bleeding index (by Saxer and Muhleman 1975)

In Group A, the value of mean papillary bleeding index at the baseline was 1.643 ± 0.439 and after one month it was 0.390 ± 0.276. In group B, the value of mean papillary bleeding index at the baseline was 1.503 ± 0.596 and after one month it was 0.564 ± 0.249. On intragroup comparison (figure 5), a statistically highly significant difference was seen in both the groups. On intergroup comparison, a statistically nonsignificant difference was seen between the two groups. Figure 6, shows the intergroup comparison of 2 groups for all the clinical parameters.

Figure 5. Intra Group Comparison for papillary bleeding index

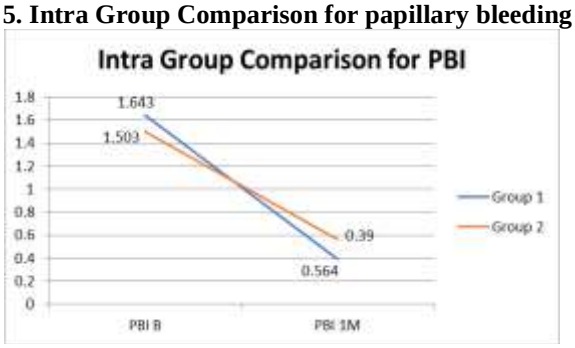
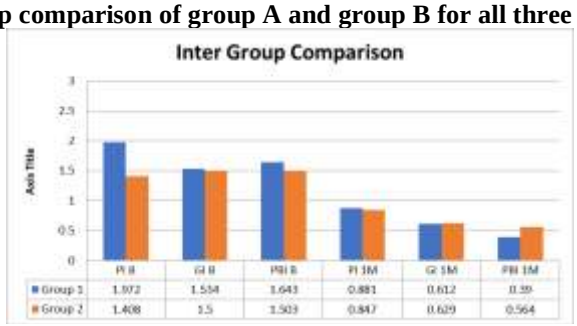


Figure 6. Intergroup comparison of group A and group B for all three clinical parameters



IV. DISCUSSION

Plaque is the main local factor that leads to inflammation of the gingival tissues that leads to plaque induced gingivitis. Gingivitis is a reversible form therefore it is important to arrest its progression into the periodontitis which is an irreversible form of periodontal disease that can ultimately cause alveolar bone loss and eventually tooth loss. Mechanical therapy has been proven to be effective in the disruption of the plaque biofilm. Various chemical agents like chlorhexidine, a gold standard as a chemical plaque control agent, is used as an adjunct to mechanical therapy, but has various disadvantages like discoloration of teeth, taste alteration. Therefore, a need of various antiplaque agents arises which has lesser or no side effects like naturally derived products have been used since ages and are known to show minimal

side effects. Therefore, in this pilot study we tried to evaluate the efficacy of Amfresh that contains neem, curcumin, chitosan and resveratrol as an adjunct to scaling and root planing in the treatment of gingivitis.

In a study by Rojanapanthu P et al16, curcumin gel showed a significant reduction in subgingival microorganisms. Another study by HN Farzana et al17 compared curcuma gel with chlorhexidine gel showed a significant reduction in gingivitis in the test group without any mechanical therapy. Anotherr study by Singh V et al.18 compared curcumin gel with chlorhexidine gel and the study showed chlorhexidine gel was more effective as an antiplaque agent.

A study by Martins ICF et al19 showed efficient the mucoadhesive property of resveratrol loaded tablets for the local application in oral cavity. Khazaei S et al 20 in their review mentioned the potential resveratrol as a promotor of osteogenesis along with its anti-inflammatory and analgesic properties can be used as a nonsurgical treatment for periodontitis. Akincibay et al 21 studied chitosan gel as a local drug delivery agent and the reduction in PD values were observed as 1.21 mm in the treatment of chronic periodontitis. Costa22 who showed that chitosan possessed a S. mutans adherence reducing percentage of almost 100%. Sarasam23 showed that chitosan films were capable of reducing S. mutans to negligible levels. an in vitro study by Busscher24 stated that chitosan treated microbial biofilms presented a decrease in viability by a factor of 3x when in comparison with a control. The results of this studies show the potential of chitosan as an antiplaque agent.

In a study by Pai et al25 a mucoadhesive gel containing neem extract was compared with chlorhexidine gel where it showed reduction in plaque index and salivary bacterial count. A study by Balappanavar AY26 compared 2% neem mouthwash with 0.2% chlorhexidine and 0.5% tea mouthwash, the result showed significant reduction in plaque when compared with chlorhexidine. Botelho et al.27 concluded that Azadirachta indica is highly efficacious in the treatment of periodontal disease thus exhibiting its biocompatibility with human periodontal fibroblast.

In our pilot study we have used a gel that contained 1% neem, 0.05% curcumin, 1% chitosan and 1% resveratrol (Amfresh) for the treatment of chronic gingivitis showed a highly significant results after a month of application when compared with the baseline clinical parameters. Also, patients reported the taste of gel as quite acceptable despite the fact of having neem and chitosan which is known to change the taste of food product due to its astringent property as reported by Bento28. there was no discoloration or any other side effects noted in the test group. However, the drawback of the study was the smaller sample size. Also, investigators were aware of the possibility of Hawthorne bias that might have motivated patients to improve their oral hygiene practices. More studies with a larger population are required. A randomised clinical trial with a control group assigned to the gold standard anti plaque agent that is chlorhexidine can give more significant results.

V. CONCLUSION

Amfresh gel proved out to be effective in reduction of plaque index, gingival index and papillary bleeding index within the limitation of this study, it proved to be efficient in the treatment of chronic gingivitis with no side effects. Patient's acceptance and the improvement in the clinical parameters suggest that it can be used as an adjunct to the mechanical therapy.

REFERENCES:

[1]. Philstrom BL, Ammons WF. Treatment of gingivitis and periodontitis.Research, science and therapy committee of the American academy of periodontology. J Periodontol 1997;68:1246‑53.
[2]. Löe H, Schiott CR. The effect of mouthrinses and topical application of chlorhexidine on the development of dental plaque and gingivitis in man. J Periodontal Res 1970;5:79‑83.
[3]. Bakdash B. Current patterns of oral hygiene product use and practices. Periodontal. 2000;1995(8):11–4.
[4]. Tidjani MA, Dupont C, Wepierre J. Anti-inflammatory activity of Azadirachta indica. Planta Med Phytother. 1989;23:259–66.
[5]. Jacobson M. Pharmacological and toxicological effects of Neem and China berry on Warm blooded animals. Neem Newslett. 1986;3:39–43.
[6]. Rao AD, Devi KN, Thyagaraju KJ. Ayurtox for body Detoxification. Enzyme Inhib. 1998;14:85–6.
[7]. Arivazhagan S, Balasenthil S, Nagini S. Modulatory effects of Garlic and Neem leaf extracts on N-methyl-N′-nitro-N-nitrosog uanidine (MNNG)-induced oxidative stress in Wistar rats. Cell Biochem Funct. 2000;18:17–21.
[8]. van der Nat JM, Klerx JP, van Dijk H, de Silva KT, Labadie RP. Immunomodulatory activity of an aqueous extract of Azadirachta indica stem bark. J Ethnopharmacol. 1987;19:125–31.
[9]. Sharma P, Tomar L, Bachwani M, Bansal V. Review on Neem (Azadirechta indica): Thousand Problem One Solution. Int Res J Pharm. 2011;2:97–102.

[10]. M. Dash, et al., Chitosan—A versatile semi-synthetic polymer in biomedical applications. Prog. Polym. Sci. 36, 981 (2011)
[11]. L. Casettari, et al., Biomedical applications of amino acid-modifiedchitosans: A review. Biomaterials 33, 7565 (2012).
[12]. A. Sionkowska, Current research on the blends of natural and synthetic polymers as new biomaterials: Review. Prog. Polym. Sci. 36,1254, 2011
[13]. M. Prabaharan, Prospects of biosensors based on chitosan matrices. Journal of Chitin and Chitosan Science 1, 2 (2013).
[14]. Jang, M.; Cai, L.; Udeani, G. O.; Slowing, K. V.; Thomas, C. F.; Beecher, C. W. W.; Fong, H. H. S.; Farnsworth, N. R.; Kinghorn, A. D.;Mehta, R. G.; Moon, R. C.; Pezzuto, J. M. Science 1997, 275, 218−220.
[15]. Cottart, C. H.; Nivet-Antoine, V.; Laguillier-Morizot, C.;Beaudeux, J. L. Mol. Nutr. Food Res. 2010, 54, 7−16.
[16]. Rojanapanthu P, Gritsanapan W, Sirriat M. Clinical evaluation of curcuma oral gel as a topical applicant in the treatment of plaque induced gingivitis. The journal of nutritional biochemistry. 1992;5:9-15.
[17]. H Nilofer Farjana, S C Chandrasekaran, Bagavad Gita. curcumin Effect of Oral Curcuma Gel in Gingivitis Management - A Pilot Study Journal of Clinical and Diagnostic Research. 2014 Dec, Vol-8(12): ZC08-ZC10
[18]. Singh V, Pathak AK, Pal M, Sareen S, Goel K. Comparative evaluation of topical application of turmeric gel and 0.2% chlorhexidine gluconate gel in prevention of gingivitis. Natl J Maxillo fac Surg 2015;6:67-71.
[19]. Martins ICF, Raposo NRB, Mockdeci HR, Polonini HC, de Oliveira Ferreira A, Fabri GMC, das Gracas Afonso Miranda Chaves M. Delivering Resveratrol on the Buccal Mucosa Using Mucoadhesive Tablets: A Potential Treatment Strategy for Inflammatory Oral Lesions. Curr Drug Deliv. 2018 Feb 14;15(2):254-259.
[20]. Khazaei S, Khazaei M, Kazemi S, Yaghini J.Resveratrol as a supplemental treatment for periodontitis; Dental Research Journal, Sep 2012, Vol 9 (5)
[21]. Akıncıbay, H., Şenel, S., & Yetkin Ay, Z. (2007). Application of chitosan gel in the treatment of chronic periodontitis. Journal of Biomedical Materials Research Part B: Applied Biomaterials, 80B(2), 290–296. doi:10.1002/jbm.b.30596
[22]. E. M. Costa, et al., Study of the effects of chitosan upon streptococcus mutans adherence and biofilm formation. Anaerobe 20, 27 (2013).
[23]. A. R. Sarasam, R. K. Krishnaswamy, and S. V. Madihally, Blending chitosan with polycaprolactone: Effects on physicochemical and antibacterial properties. Biomacromolecules 7, 1131 (2006).
[24]. H. J. Busscher, et al., Influence of a chitosan on oral bacterial adhesion and growth in vitro. Eur. J. Oral Sci. 116, 493 (2008).
[25]. Pai MR, Acharya LD, Udupa N. Evaluation of antiplaque activity of Azadirachta Indica leaf extract gel-A 6-week clinical study. J Ethnopharmacol. 2004;90:99–103.
[26]. .Balappanavar AY, Sardana V, Singh M. Comparison of the effectiveness of 0.5% tea, 2% neem and 0.2% chlorhexidine mouthwashes on oral health: A randomized control trial. Indian J Dent Res 2013;24:26-34
[27]. Botelho MA, Santos RA, Martins JG, Carvalho CO, Paz MC, Azenha C, et al. Efficacy of a mouthrinse based on leaves of the neem tree (Azadirachta indica) in the treatment of patients with chronic gingivitis: A doubleblind, randomized, controlled trial. J Med Plant Res. 2008;2:341–6.
[28]. R. A. Bento, et al., Sensory evaluation and inhibition of Listeria monocytogenes in bovine pâté added of chitosan from mucor rouxii.LWT-Food Science and Technology 44, 588 (2011).

Plaque index (PI) by Silness and Loe

In Group A, the value of mean plaque index at the baseline was 1.972 □ 0.579 and after one month it was 0.881 □ 0.204. In Group B, the value of mean plaque index at the baseline was 1.408 □ 0.646 and after one month it was 0.847 □ 0.241. On intragroup comparison (figure 3), statistically significant highly difference was seen in test group while statistically significant difference was seen in control group. On intergroup comparison, statistically nonsignificant difference was seen between the two groups.

Figure 3. Intra Group Comparison for Plaque index