

Comparative evaluation of single application of 2% whole turmeric gel versus combination of 1.5% metronidazole and 0.5% chlorhexidine gel in chronic periodontitis patients - A Clinical trial

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Abstract

Objective: The objective of this study was to evaluate the comparative effect of curcumin and Metronidazole/ chlorhexidine gel in treating chronic periodontitis.

Materials and Methods: Twenty individuals of both sexes aged between 25 and 60 years diagnosed with chronic periodontitis and having pocket depths >5 mm bilaterally were selected for this study, in a split-mouth design. Examination of plaque index, probing pocket depth, and clinical attachment level was measured for each patient. The patients received a complete prophylaxis including scaling and root planing after which, both test gels were injected into the two experimental sites chosen, that had probing depth (PD) >5 mm and were located in symmetric quadrants. Pocket

PD, clinical attachment loss, and plaque index were recorded at days 0,21 and 45 days.

Results: After 45days evaluation, curcumin group as well as Metrogyl group showed a significant decrease in pocket PD, plaque index, and clinical attachment loss.

Conclusion: The results showed favorable outcome with curcumin as well as metrogyl group, thus both gels can be used as an adjunct to nonsurgical periodontal therapy.

Keywords: Curcumin, local drug delivery, Metronidazole / chlorhexidine gel etc.

Introduction

Periodontal disease is considered as an infection that involves both inflammatory and immune responses, which leads to increased pocket depth, clinical

attachment loss, as well as destruction of alveolar bone and cementum.^[1]

Primary etiological agent of periodontitis is bacterial plaque, which is primarily disrupted mechanically by scaling and root planning, however, several studies have shown that mechanical debridement alone sometimes remains insufficient in the removal of flora responsible for the periodontal diseases.^[2-3] Due to this reason chemical plaque removal agents as an adjuvant to mechanical therapy have gained popularity.^[4-6]

Localized antimicrobial therapy has aroused considerable interest because of the site-specific nature of periodontal infections; the higher concentration of antimicrobial agent sub-gingivally, lesser the side effects of systemic antibiotic use. Main advantages of local drug delivery include minimum systemic involvement, better patient compliance, and minimum discomfort. Local drug delivery releases the antimicrobial agent for an extended period at a steady pharmacological level. Among the antimicrobial agents, metronidazole, ornidazole, doxycycline, minocycline, chlorhexidine, stannous fluoride, and others have been applied sub-gingivally in gel forms or other sustained-release local delivery systems as varnishes, chips, or fibers.^[7]

Recently, there is renewed interest in the use of various herbal or Ayurvedic medicines for oral and dental health such as neem, curcuma longa Linn (turmeric), Punica granatum (pomegranate), Mangifera indica (mango), and Grita Kumara (aloe vera). Plants and natural products from time immemorial are used for their pharmacological applications, namely, anti-ulcerogenic, wound healing, anti-inflammatory, antimicrobial, and antioxidants.^[8] Curcuminoids (mixture of curcumin, desmethoxycurcumin, and bisdemethoxycurcumin) are considered as key active constituents of *C. longa* and are

reported to possess several biological activities. Antimicrobial properties of curcumin are likely due to its ability to inhibit bacterial lipopolysaccharide-induced cytokine expression and bacterial quorum sensing systems. Metronidazole is the most common broad-spectrum antibiotic, anti-anaerobic group. and is active against most of the periodontal pathogens like obligate Gram-negative anaerobes such as Porphyromonas gingival is, Prevotella intermedia, Fusobacterium, Selenomonas sputigena, Bacteroides forsythus, and the Gram-positive anaerobes such as Pepto streptococcus and Campylobacter rectus.^[9]

Chlorhexidine is the gold standard mouth rinse to treat periodontal diseases. It has a broad antiseptic spectrum and substantivity. It acts by directly altering the integrity of bacterial cell membrane.^[10-11] Its usage has shown effectiveness in reducing periodontal probing depth, clinical attachment loss, and bleeding on probing.^[12] However, its long term use may have detrimental effects like pigmentation of teeth and other intra-oral soft tissues, dulling of taste sensation, oral mucosal erosion.^[13] To the best of my knowledge, no studies have been reported to compare the efficacy of commercially available curcumin gel(Cure next) and metronidazole and chlorhexidine 1.5 and 0.5% combination gels(Metrogyl DG forte) in periodontitis. This study was done to evaluate and compare the clinical efficacy of these agents.

Aims and objectives

To evaluate the comparative effect of curcumin and Metronidazole/ chlorhexidine gel in treating chronic periodontitis as an adjuvant to scaling and root planning.

Materials and methods

Twenty individuals of both sexes aged between 25 and 60 years diagnosed with chronic periodontitis and

having pocket depths >5 mm bilaterally were selected for this study, in a split-mouth design.

Inclusion criteria

- Patients with a pocket depth of 5–7 mm in at least three nonadjacent sites in different quadrants of the mouth
- Systemically healthy controls
- Cooperative patients who could be motivated for further oral hygiene instructions
- Patients with ≥ 20 teeth
- Patients who gave consent to participate in the study.

Exclusion criteria

- Patients on antibiotic therapy from the past 1 month
- Pregnant or lactating women
- Patients smoking tobacco.
- History of surgical or nonsurgical periodontal therapy in the last 6 months
- Allergic to Metronidazole or Chlorhexidine or Curcumin

Examination of plaque index, probing pocket depth, and clinical attachment level was measured for each patient. All patients received a complete prophylaxis including scaling and root planing after which, both test gels were injected into the two experimental sites chosen, that had probing depth (PD) >5 mm and were located in symmetric quadrants. Two sites were categorised as Group A (Cure next gel) and Group B (Metrogyl DG forte gel) for convenience purpose. After insertion of the local drug delivery system, the region was secured with a periodontal pack, and patients were advised not to eat hard food that could traumatize the gingiva. They were also advised not to brush the treated areas for 12 h or floss or use interproximal cleaning devices for 10 days and not to use any mouthwash during the study. Patients were recalled on 7th day for periodontal pack removal.

Pocket PD, clinical attachment loss, and plaque index were recorded at days 0, 21 and 45 days.



Figure 1

Clinical parameters recorded

- Plaque Index (PI) (Silness and Loe, 1964),
- Gingival Index (GI) (Loe and Silness, 1963),
- Pocket depth, measured (with UNC-15 probe) from the crest of gingival margin to base of the sulcus, and
- Clinical attached level (cemento-enamel junction to the base of the pocket).

The study was approved by the Research Ethical Committee at Government Dental college, Srinagar. (No.: - ECC-GDC/0050, date: -6/2/2022).

Results

Statistical Methods

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean \pm SD. For inter-group analysis of data, Student's independent t-test was employed. A P-value of less than 0.05 was considered statistically significant.

Table 1 shows inter-group comparison of Curcumin (Group A) and Metronidazole/chlorhexidine (Group B) gels on plaque index at baseline, 21 and 45 days using paired t-test. No significant difference results were seen.

Table 1: Comparison based on Plaque Index (PI) in two groups

Time interval	Group A		Group B		P-value
	Mean	SD	Mean	SD	
0 Day	1.00	0.00	1.00	0.00	-
21 Days	1.00	0.00	1.00	0.00	-
45 Days	1.00	0.00	1.00	0.00	-

Table 2 shows inter-group comparison of Curcumin (Group A) and Metronidazole/chlorhexidine (Group B) gels on Gingival index at baseline, 21 and 45 days using paired t-test. No significant difference results were seen.

Table 2: Comparison based on Gingival Index (GI) in two groups

Time interval	Group A		Group B		P-value
	Mean	SD	Mean	SD	
0 Day	1.00	0.00	1.00	0.00	-
21 Days	0.00	0.00	0.00	0.00	-
45 Days	0.40	0.52	0.60	0.53	0.398

Table 3 shows inter-group comparison of Curcumin (Group A) and Metronidazole/chlorhexidine (Group B) gels on Probing pocket depth at baseline, 21 and 45 days using paired t-test. Probing pocket depths were reduced in both groups after 45 days but the difference in reduction in two groups was statistically insignificant.

Table 3: Comparison based on Probing Pocket Depth (PPD) in two groups

Time interval	Group A		Group B		P-value
	Mean	SD	Mean	SD	
0 Day	7.5	1.51	7.2	1.39	0.651
21 Days	6.7	1.49	6.4	1.27	0.634
45 Days	6.1	1.19	6.2	1.23	0.856

Table 4 shows inter-group comparison of Curcumin (Group A) and Metronidazole/chlorhexidine (Group B) gels on Clinical attachment level at baseline, 21 and 45 days using paired t-test. Although Clinical attachment

levels were statistically reduced in both groups after 45 days but the comparison in reduction between these two groups after 45 days was statistically not significant.

Table 4: Comparison based on Clinical Attachment Level (CAL) in two groups

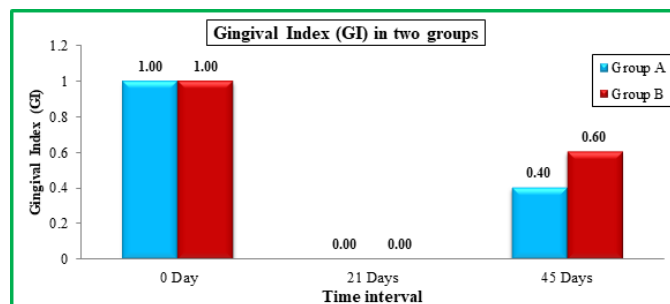
Time interval	Group A		Group B		P-value
	Mean	SD	Mean	SD	
0 Day	9.2	1.81	9.1	1.29	0.889
21 Days	8.2	1.81	8.4	1.17	0.773
45 Days	7.6	1.58	8.2	1.29	0.315

Discussion

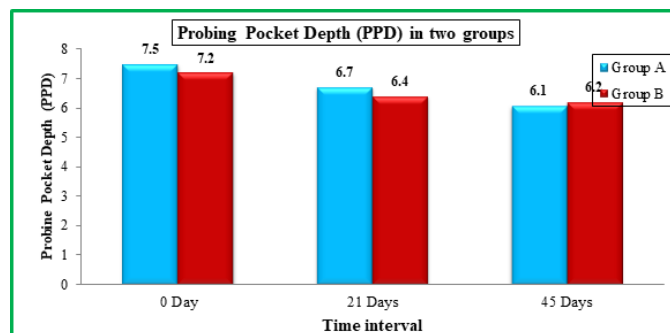
Periodontitis is a chronic inflammatory disease caused by interplay between the subgingival microbiota and the host tissue response which leads to the destruction of supporting structures of teeth. The treatment offered to the patient by the clinician may be nonsurgical, surgical, or a combination of both. Nonsurgical therapy includes both mechanical and chemotherapeutic approaches to minimize or eliminate the microbial biofilm. Thorough scaling and root planing (SRP) is required to prevent the recolonization of the subgingival area by periodontal pathogens. However, mechanical therapy may fail to eliminate the pathogenic bacteria completely because of their location within the gingival tissues or in areas inaccessible to periodontal instrumentation. The concept of locally delivering chemotherapeutic agents to the periodontal pocket as a method to treat periodontal disease has been studied for over few decades. Local drug delivery systems used as an adjunct to nonsurgical therapy has drastically improved the periodontal tissue condition. P. L. Ravishankar, Y. Pradeep Kumar et al (2017)^[14] conducted a study to evaluate the comparative effect of curcumin and ornidazole in treating chronic periodontitis. The selected patients received a complete prophylaxis including scaling and root planing after which, both test gels were injected into the two

experimental sites chosen, that had probing depth (PD) >5 mm and were located in symmetric quadrants. Pocket PD, clinical attachment loss, and plaque index were recorded at days 0 and 30. At 1-month evaluation, curcumin group showed a significant decrease in pocket PD, plaque index, and clinical attachment loss when compared to the ornidazole group. Abhilash a Singh, Raja Sridhar, Ravi Shrihatti, and Akash Mandloy (2018) [15] compared the effect of chlorhexidine (CHX) chip and turmeric chip as a local drug delivery (LDD) agent in the treatment of patients with chronic periodontitis. Both the treatment modalities with the application of LDD as an adjunct to SRP proved to be equally beneficial in the treatment of chronic periodontitis. Anupama Desai, Harish Kumar et al (2020) [16] compared the clinical efficacy of sub-gingivally delivered curcumin gel and Hexi gel as an adjunct to scaling and root planing in chronic periodontitis patients and they made the conclusion that the local application of curcumin gel when used in conjunction with SRP showed a significant improvement in periodontal parameters and has a beneficial effect in patients with chronic periodontitis.

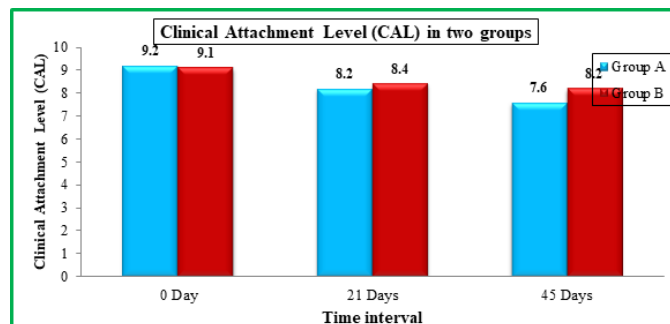
The present study aimed at comparing the clinical efficacy of two local drug delivery systems in gel forms – first, group-containing curcumin and other, group-containing combination of metronidazole and chlorhexidine in periodontitis. From the statistical perspective, both the treatment modalities as an adjunct to SRP proved to be equally beneficial in the treatment of chronic periodontitis as all parameters like gingival index, probing pocket depth and clinical attachment levels were reduced in both test gels.



Graph 1:



Graph 2:



Graph 3

Conclusion

Curcumin in the form of CURENEXT gel and Metronidazole (1.5%)/ Chlorhexidine (0.5%) in the form of METROGYL DG FORTE both in the form of local drug delivery showed beneficial effect on chronic periodontitis as an adjunct to scaling and root planing, However, a study on a large scale and thorough microbial evaluation would prove conclusive.

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