



CLINICAL EVALUATION OF THE EFFECT OF OXYGEN-RELEASING GEL AS AN ADJUNCT THERAPY TO SCALING AND ROOT PLANING IN CHRONIC PERIODONTITIS- A SPLIT-MOUTH RANDOMIZED CONTROL TRIAL

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ABSTRACT

Background: Aim. To evaluate the effect of oxygen-releasing gel as an adjunct to scaling and root planing in treating chronic periodontitis. **Material and Methods:** This observational study evaluated the adjunctive effect of an oxygen-releasing gel in the treatment of chronic periodontitis. A total of 12 patients (24 sites) were assigned to test and control groups in a split-mouth design. Clinical parameters, including Plaque Index, Gingival Index, Probing Depth, and Relative Attachment Level, were assessed. The test group received SRP with Blue M gel application, while the control group received SRP alone. Patients were re-evaluated after 3 months to assess clinical outcomes. **Results:** The study showed significant improvements in clinical parameters after treatment. Plaque Index, Gingival Index, pocket depth, and relative attachment level were all significantly reduced at the test sites treated with oxygen-releasing gel compared to control sites. These findings support the gel's effectiveness as an adjunct to scaling and root planing for chronic periodontitis. **Conclusion:** The study concludes that oxygen-releasing gel, when used alongside scaling and root planing, significantly improves clinical outcomes in chronic periodontitis.

KEYWORDS :

INTRODUCTION

Periodontitis is a chronic inflammatory disease affecting the tooth and its supporting structures, leading to bone and connective tissue loss.⁽¹⁾ Its development involves both periodontal pathogens and the host's immune response. While non-surgical treatment like scaling and root planing remains the gold standard, some patients may not respond adequately. To enhance treatment outcomes, adjunctive therapies have been introduced. Bluem® oral gel, a recent formulation developed by Peter Blijdrop. This gel contains ingredients like sodium perborate and lactoferrin, which work through a glucose-oxidase process. When the gel's honey-based sugars come into contact with saliva, hydrogen peroxide is released and breaks down into water and oxygen. The gradual release of low-concentration hydrogen peroxide effectively kills bacteria and improves wound healing by increasing oxygen levels in periodontal pockets, bleeding gums, and other oral wounds. This study highlights the potential benefits of oxygen-releasing gels as an adjunct in periodontal therapy, improving healing outcomes in challenging cases.⁽²⁾

MATERIALS AND METHOD

The study was conducted on subjects meeting the inclusion and exclusion criteria, who reported to the Department of Periodontics, V.S. Dental College & Hospital. All participants were informed that their participation was voluntary, and both verbal and written informed consent were obtained after the treatment protocol was thoroughly explained.

Study Design

The research was designed as an observational study, conducted over 12 months at V.S. Dental College & Hospital. A randomized sampling technique was employed to assign participants to two groups: the test group, which received scaling and root planing (SRP) with the application of an oxygen-releasing gel, and the control group, which received SRP alone. A total of 24 sites from 12 patients were included in the study.

Inclusion And Exclusion Criteria

Participants between 18 and 65 years of age, who were systemically healthy and demonstrated good oral hygiene, were included. Periodontal pockets with a probing depth of 5 mm or less bilaterally were considered for the study. Exclusion criteria comprised patients who were medically compromised, those using tobacco, individuals undergoing anticoagulant therapy for bleeding disorders, and patients on

bisphosphonates or immunosuppressant therapy.

Procedure And Data Collection

After receiving approval from the institutional ethics committee, patients who met the inclusion criteria were enrolled in the study. In the split-mouth study, pockets were randomly assigned to either the test or control group. Clinical parameters measured included the Plaque Index (Silness and Loe, 1964), Gingival Index (Loe, 1967), Probing Depth (PD), and Relative Attachment Level (RAL).

An acrylic stent was prepared for each patient based on their cast to ensure the precise measurement of relative attachment loss. (figure 1) After thorough SRP the probing depth was re-evaluated using a UNC-15 periodontal probe. In the test group, the oxygen-releasing gel was locally applied to the periodontal pockets (figure 2), which were then covered with Coe-Pak to retain the gel and prevent oral fluids from entering the pocket. (figure 3) Patients were recalled on the 7th day for evaluation and again at 3 months for further re-examination to assess clinical outcomes.

The methodology provided a structured approach to evaluating the adjunctive effect of oxygen-releasing gel in the treatment of chronic periodontitis, comparing its efficacy with SRP alone.



Figure 1: Pre-op probing depth & RAL



Figure 2: Blue M gel application



Figure 4: Coe pack placed for gel retention



Figure 5: Post 3 months probing depth &RAL

Statistical Analysis

Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk, NY: IBM Corp., will be used to perform statistical analyses.

Descriptivestatistics:

Descriptive analysis of all the explanatory and outcome parameters was done using frequency and proportions for categorical variables, whereas in Mean & SD for continuous variables.

Inferential Statistics:

Wilcoxon Signed Rank test was used to compare the mean PI, GI Scores, PD & RAL between the pre- and post-op period in Control & Test Sites.

Mann Whitney Test was used to compare the mean PD & RAL between Control & Test Sites during the pre- and post-op period. The level of significance was set at $p < 0.05$.

RESULTS

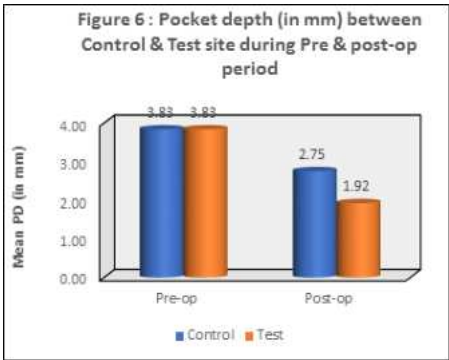
The mean Plaque Index (PI) scores during the post-operative period were significantly reduced (0.387 ± 0.260) compared to the pre-operative period (0.953 ± 0.334), with a mean difference of 0.567. This reduction in PI scores was statistically significant, with a p-value of < 0.001 (Table 1). Similarly, the mean Gingival Index (GI) scores in the post-operative period were significantly lower (0.698 ± 0.276) than during the pre-operative period (1.265 ± 0.350), with a mean difference of 0.568, also statistically significant at $p < 0.001$ (Table 2).

Table 1: Comparison of mean PI Scores between Pre & post-op period using Wilcoxon Signed Rank Test						
Parameters	Time	N	Mean	SD	Mean Diff	p-value
PI Scores	Pre-op	12	0.953	0.334	0.567	<0.001*
	Post-op	12	0.387	0.260		

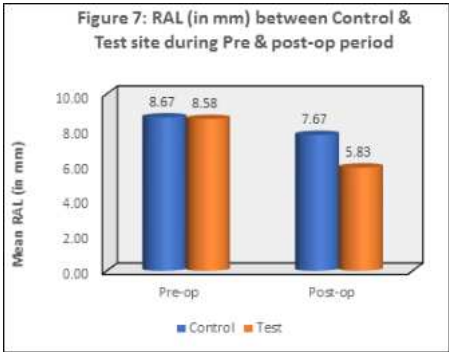
Table 2: Comparison of mean GI Scores between Pre & post-op period using the Wilcoxon Signed Rank Test						
Parameters	Time	N	Mean	SD	Mean Diff	p-value
GI Scores	Pre-op	12	1.265	0.350	0.568	<0.001*
	Post-op	12	0.698	0.276		

Regarding pocket depth, the mean pre-operative values for both the control and test sites were identical at 3.83 ± 0.72 and

3.83 ± 0.58 , respectively, with no statistically significant difference ($p = 1.00$) (Figure 6). However, in the postoperative period, the test site showed a significantly reduced pocket depth (1.92 ± 0.67) compared to the control site (2.75 ± 0.75), with a mean difference of 0.83 mm, which was statistically significant ($p = 0.009$).



For relative attachment level (RAL), the pre-operative values were similar between the control site (8.67 ± 1.78) and the test site (8.58 ± 1.93), with no statistically significant difference ($p = 0.91$). Post-operatively, the RAL at the test site was significantly lower (5.83 ± 1.59) compared to the control site (7.67 ± 1.72), with a mean difference of 1.84 mm, which was statistically significant ($p = 0.01$). (Figure 7)



These results indicate a significant improvement in clinical parameters at the test site following treatment with oxygen-releasing gel, supporting its effectiveness as an adjunct to scaling and root planing in the treatment of chronic periodontitis.

DISCUSSION

Chronic periodontitis, characterized by progressive loss of periodontal support due to bacterial plaque, has long been managed through scaling and root planing (SRP). However, recent developments in adjunctive therapies, such as local drug delivery systems, have shown promising results in enhancing the effectiveness of SRP. Among these, oxygen-releasing gels, particularly Blue-M Gel®, have emerged as a notable alternative due to their dual action in promoting bacterial reduction and wound healing.

The comparative studies reviewed highlight the efficacy of oxygen-releasing gels in managing chronic periodontitis. For instance, Koul et al. (2019) demonstrated that both Blue-M Gel® and chlorhexidine gel were equally effective in reducing gingival index (GI), pocket probing depth (PPD), and clinical attachment loss (CAL) in patients with periodontal pockets ≤ 5 mm. Significant bacterial reductions were also observed in both groups after 30 days.⁽²⁾ However, studies such as that of Bali et al. (2022) have shown superior outcomes with oxygen-releasing gels. In a split-mouth randomized controlled trial involving 22 sites, oxygen-releasing gels exhibited a statistically significant reduction in PPD and CAL when compared to 0.2% chlorhexidine gel. Importantly, wound

healing index (WHI) scores were also significantly better in the oxygen-releasing group, reflecting the gel's capacity to enhance tissue repair processes.⁽³⁾

Oxygen-releasing gels similarly target anaerobic bacteria in periodontal pockets, aligning with the findings from Kotwal et al. (2013), which suggested the advantages of using local agents for more comprehensive bacterial control.⁽⁴⁾

Asha et al.'s (2022) case report further underscored the role of high-concentrated oxygen gels in pocket depth reduction. This study showcased significant improvements in PPD reduction in a 28-year-old female patient, reinforcing the oxygen gel's effectiveness in supporting bacterial elimination and wound healing.⁽⁵⁾

CONCLUSION

In conclusion, evidence from multiple studies supports the clinical efficacy of oxygen-releasing gels as an adjunct to SRP. Oxygen-releasing gels offer comparable or superior bacterial reduction to traditional chlorhexidine gels and enhance tissue healing, making them a promising alternative in the non-surgical management of chronic periodontitis.

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