

Original Research Article

# Effectiveness of Hydrogen Peroxide as a sub gingival irrigant - A clinical study

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## Abstract

**Introduction:** Periodontitis a chronic inflammatory disease results in the destruction of tooth supporting tissues, eventually progresses to tooth loss. Non-surgical periodontal therapy in form of scaling and root planning although considered as a gold standard, does not completely eradicate periodontal pathogens. Limitation of access and bacterial invasion of periodontal tissues being the main reason and hence the demand for an adjunctive measure is necessitated. Sub gingival irrigation interferes with various plaque components predominantly anaerobic bacterial flora which is known to initiate and perpetuate periodontal destruction. The aim of this study is to investigate the effect of sub gingival irrigation with 3% H<sub>2</sub>O<sub>2</sub> compared to normal saline.

**Material and methods:** 20 patients were taken for the study. After scaling and root planing, quadrants in each patient's mouth were randomly treated two with 20 ml 3% H<sub>2</sub>O<sub>2</sub> sub gingival irrigation and the other two with normal saline. Sub gingival irrigation was performed at baseline and after 1 and 2 weeks. The clinical parameters were recorded at baseline at the end of week 3 and at the end of week 5.

**Results:** Results showed that sub gingival irrigation with 3% H<sub>2</sub>O<sub>2</sub> produced a significant reduction in gingival bleeding, pocket depths and a significant gain in clinical attachment level compared to the control.

**Conclusion:** The results of the present study conclude that that sub gingival irrigation with 3% H<sub>2</sub>O<sub>2</sub> results in inflammation control manifested as decreased gingival bleeding, reduction in pocket depth and gain in relative attachment levels.

## Key words

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Periodontitis, Hydrogen peroxide, Normal saline.

## Introduction

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Periodontitis is a major health issue in different populations since ages [1] and bacterial plaque is considered as the main etiological factor in its pathogenesis. Treatment of periodontitis is based on destroying the bacterial plaque [2]. Scaling and root planing (SRP), the gold standard in the treatment of periodontal diseases, does not completely debride sub gingival plaque and calculus thus complete eradication of periodontal pathogens does not take place [3] showing variable results. Difficulty in gaining access to deep pockets and bacterial invasion of periodontal tissues accounts for the variable results necessitating the use of local or systemic antimicrobial agents [4]. Chlorhexidine, the most potent and most commonly used agent has unfavourable side effects, which demands the need for alternative agents [5]. Hydrogen peroxide alone or in combination with salts has been used as an effective sub gingival irrigant since years ago. H<sub>2</sub>O<sub>2</sub> levels above 1%.shows a wide spectrum of antimicrobial activity against bacteria, yeasts, fungi, viruses and spores [6]. Considering the fact that periodontitis is predominated by anaerobic bacteria and the destructive effects of free oxygen radicals of H<sub>2</sub>O<sub>2</sub> [7], Pocket irrigation with 3% H<sub>2</sub>O<sub>2</sub> has been widely used as a sub gingival irrigant. This clinical study is sought to investigate the effect of sub gingival irrigation with H<sub>2</sub>O<sub>2</sub> compared to normal saline.

## Materials and methods

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Twenty patients who had been referred to the Department of Periodontics, Govt. Dental College and Hospital Srinagar, were enrolled in this study after signing consent forms and fulfilling the inclusion and exclusion criteria.

## Inclusion criteria

- Mild to moderate chronic periodontitis with pocket depths of 3–5 mm

## Exclusion criteria

- Any systematic diseases such as diabetes, blood pressure, and hematologic, cardiovascular or renal disorders.
- Patient has used antibiotics or any kind of mouth rinses in the previous 3 months.

Following clinical indices of patients were recorded at baseline, 3 weeks and 5 weeks

- Relative attachment level (Relative distance between the base of a pocket and a fixed reference point (horizontal notch) on the stent) [8]
- Pocket depth (by William's probe)
- And gingival bleeding (Ainano and Bay's method).

For gingival sulcus bleeding, the probe is gently moved through the margins around a tooth; after 10 seconds presence or absence of bleeding is evaluated.

The first phase of treatment, consisting of OHI and full-mouth Scaling and root planing (SRP), was performed on each patient and was carried out using a using magneto-strictive scaler. Two quadrants in each patient's mouth were randomly treated with 20 ml 3% H<sub>2</sub>O<sub>2</sub> sub gingival irrigation and the other two quadrants with normal saline. Sub gingival irrigation was performed at baseline and after 1 and 2 weeks. The clinical parameters were recorded at baseline at the end of week 3 and at the end of week 5. The recorded data was compiled and entered in a spread sheet (Microsoft Excel) and then

exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Data was expressed as Mean±SD. Student's independent t-test was employed for intergroup comparison of various periodontal parameters and for intra-group comparison; paired t-test was applied. A P-value of less than 0.05 was considered statistically significant. All P-values were two tailed.

## Results

According to the results of this study, the mean difference between periodontal parameters (Gingival bleeding index, Pocket depth and Relative attachment level) of two groups that is Hydrogen peroxide group; Group A and Normal saline group; Group B at baseline is statistically non-significant (**Table - 1**).

**Table - 1:** Comparison based on gingival bleeding index (GBI), pocket depth (PD) and relative attachment levels (RAL) at baseline among two groups.

| Parameter | Group 1 |      | Group 2 |      | P-value <sup>@</sup> |
|-----------|---------|------|---------|------|----------------------|
|           | Mean    | SD   | Mean    | SD   |                      |
| GBI       | 29.0    | 2.49 | 29.3    | 2.50 | 0.791                |
| PD        | 3.3     | 0.82 | 3.8     | 0.63 | 0.145                |
| RAL       | 9.9     | 0.99 | 10.3    | 1.25 | 0.439                |

**Table - 2:** Intra-group comparison of various periodontal parameters at 3 and 5 weeks in Group 1.

| Periodontal Parameter |          | Mean | SD   | P-value |
|-----------------------|----------|------|------|---------|
| GBI                   | Baseline | 29.0 | 2.49 | -       |
|                       | 3 Weeks  | 7.2  | 1.48 | <0.001* |
|                       | 5 Weeks  | 6.8  | 1.23 | <0.001* |
| PD                    | Baseline | 3.3  | 0.82 | -       |
|                       | 3 Weeks  | 2.4  | 0.69 | 0.002*  |
|                       | 5 Weeks  | 2.2  | 0.42 | <0.001* |
| RAL                   | Baseline | 9.9  | 0.99 | -       |
|                       | 3 Weeks  | 10.6 | 1.27 | 0.009*  |
|                       | 5 Weeks  | 10.8 | 1.03 | <0.001* |

**Table - 3:** Intra-group comparison of various periodontal parameters at 3 and 5 weeks in Group 2.

|     |          | Mean | SD   | P-value |
|-----|----------|------|------|---------|
| GBI | Baseline | 29.3 | 2.50 | -       |
|     | 3 Week   | 18.5 | 2.84 | <0.001* |
|     | 5 Weeks  | 27.2 | 2.01 | 0.064   |
| PD  | Baseline | 3.7  | 0.82 | -       |
|     | 3 Week   | 3.2  | 0.79 | 0.183   |
|     | 5 Weeks  | 3.0  | 0.67 | 0.051   |
| RAL | Baseline | 10.3 | 1.25 | -       |
|     | 3 Week   | 10.5 | 1.35 | 0.736   |
|     | 5 Weeks  | 10.6 | 1.35 | 0.613   |

In Hydrogen peroxide group; Group A, Comparison of mean gingival bleeding, mean probing depths and mean relative attachment level before and after treatment (at baseline (0), 3

weeks and 5 weeks after treatment), shows a statistically significant difference (P<0.05) (**Table - 2**).

In Normal saline group; Group B, a significant decrease in mean gingival bleeding from baseline to 3<sup>rd</sup> week after which it increased giving a statistically insignificant value when comparing baseline and 5<sup>th</sup> week values (**Table - 3**).

A statistically insignificant difference was observed in values of mean probing depths and mean relative attachment levels in Group B when comparing baseline values with values at 3<sup>rd</sup> and 5<sup>th</sup> week (**Table - 3**).

## Discussion

This study was conducted to evaluate the clinical effect of sub gingival irrigation with 20 mL of 3% H<sub>2</sub>O<sub>2</sub> compared to normal saline. According to the results, there was a significant reduction in gingival bleeding from baseline to 3<sup>rd</sup> and 5<sup>th</sup> week in Hydrogen peroxide group; Group A when compared to Normal saline group; Group B reaching from 29.0±2.49 to 6.8 ±1.23 in the H<sub>2</sub>O<sub>2</sub> group but from 29.3±2.50 to 27.2±2.01 in normal saline group which is consistent with the results of the study carried out by Morad, et al. [9] according to which, 3% H<sub>2</sub>O<sub>2</sub> had a significant effect on probing depth compared to the normal saline group.

In the H<sub>2</sub>O<sub>2</sub> group, mean probing depth changed from 3.3±0.82 to 2.4 ±0.69 mm at 3<sup>rd</sup> week to 2.2 ±0.42 at 5<sup>th</sup> week and in the normal saline group it decreased from 3.7±0.82 mm to 3.2 ±0.79 mm at 3<sup>rd</sup> week to 3.0 ±0.67 at 5<sup>th</sup> week. The results of our study are in accordance with Wolff's study [10] where 3% H<sub>2</sub>O<sub>2</sub> had a positive effect on pocket depth reduction. According to Wolff, et al. [11] an oxidizing agent containing H<sub>2</sub>O<sub>2</sub> had a positive effect on probing depth. The oxidising nature of H<sub>2</sub>O<sub>2</sub> results in destruction of anaerobic periodontal pathogens which account for the majority of inflammatory process of periodontium. The reduction in inflammatory exudates and attachment gain might be responsible for gain in probing depth.

In 3% H<sub>2</sub>O<sub>2</sub> group, the mean relative attachment levels showed a statistically significant gain from

baseline to 3<sup>rd</sup> week and 5<sup>th</sup> week. Gain in attachment level, reached from 9.9±0.99 at baseline to 10.6±1.27 at 3<sup>rd</sup> week to 10.8±1.03 mm at 5<sup>th</sup> week. In the normal saline group mean relative attachment levels increased from 10.3±1.25 at baseline to 10.5±1.35 at 3<sup>rd</sup> week to 10.6±1.35 mm at 5<sup>th</sup> week. Although there was a gain in mean relative attachment levels the values were statistically insignificant. The results of our study is in accordance with the studies conducted by Wolff, et al. [10] and Moradi, et al. [9] which also showed that H<sub>2</sub>O<sub>2</sub> was more effective in attachment gain. Attachment gain in the H<sub>2</sub>O<sub>2</sub> group was faster and more than normal saline group. Changes in attachment level are a result of building an attachment, which corresponds to the amount of periodontal destruction.

Hence to conclude, sub gingival irrigation with 3% H<sub>2</sub>O<sub>2</sub> is effective in reducing gingival bleeding and inflammation and also results in attachment gain thus showing a positive clinical effect compared to sub gingival irrigation with normal saline.

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