

# Role of Hydrogen Peroxide as a Sub Gingival Irrigant in Periodontal Therapy

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## ABSTRACT

**Objective:** 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:** 35 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:** 3% H<sub>2</sub>O<sub>2</sub> sub gingival irrigation produced a significant reduction in gingival bleeding, pocket depths and a significant gain in clinical attachment level compared to the normal saline which served as a control.

**Conclusion:** 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:** Hydrogen peroxide, Normal saline, periodontitis, sub gingival irrigation.

## INTRODUCTION

Chronic periodontitis is one of the most prevalent diseases throughout the world. <sup>[1]</sup> Chronic periodontitis cases can be successfully managed by professional scaling and root planning. In addition to an appropriate plaque control, <sup>[2]</sup> the complete removal of plaque and calculus is difficult to achieve. Insufficient removal of bacteria and its products leads to the growth of the remaining microorganisms which allows the re-colonization of the root surface by putative pathogenic bacteria. The efficacy of locally applied antimicrobial agents in periodontal therapy depends on obtaining adequate sub gingival delivery of the agent.

It has been shown that there is a total lack of penetration of oral rinses below the gingival margin, mean 0.2 mm <sup>[3]</sup>

Ram & Slots Classification for sub gingival delivery systems. <sup>[4]</sup>

I) 1. Personally applied (in patient home self-care)

A. No sustained sub gingival drug delivery i.e. home oral irrigation

B. Sustained sub gingival drug delivery

2. Professionally applied (in dental office)

A. No sustained sub gingival drug delivery i.e. professional pocket irrigation

B. Sustained sub gingival drug delivery

Delivery systems use direct irrigation using a hand-held syringe or

mechanical irrigation. Sub gingival irrigation using a pulsed jet irrigator with either a standard tip or a cannula on an oral irrigator penetrates into both medium (3.5 to 6.0 mm) and deep ( $\geq 6$  mm) pockets. [5] Various irrigating solutions include; Water: It is utilized as a placebo agent. [6,7] Normal saline can also be used. [8,9] Chlorhexidine: Chlorhexidine (CHX) has been shown to possess a broad spectrum of topical antimicrobial activity. It is used in a concentration of 0.12%, [10] 2%, [11] 0.06%, [12] 0.2%. [13]

Peroxides: professionally performed periodic subgingival irrigation with hydrogen peroxide used alone, or in combination with thorough mechanical debridement, has a significant therapeutic effect on clinical or microbial parameters. [14] Other agents include Fluorides, iodine, phenolics, sodium bicarbonate etc. Chlorhexidine although most potent and most commonly used agent has unfavourable side effects, which calls for alternative agents. [15]

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. [16] Hydrogen peroxide is known to exhibit antimicrobial effects through release of oxygen, and pathogenic effects are seen both in Gram positive as well as Gram-negative organisms. [17] Thus 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

Thirty five patients were enrolled in this study. The inclusion and exclusion criteria of the study were;

### Inclusion criteria;

- Periodontitis with pocket depths of 3-5 mm

### Exclusion criteria;

- Systemic diseases such as diabetes, blood pressure, and hematologic, cardiovascular or renal disorders.

- Any antibiotics or any kind of mouth rinses used by the patient in the previous 3 months.

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

Relative attachment level  
Pocket depth and gingival bleeding.

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 magnetostriuctive 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. Data was expressed as Mean $\pm$ 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

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

In Normal saline group; Group I as shown in Table 2, a significant decrease in mean gingival bleeding from baseline to 3<sup>rd</sup> week is seen after which it increased giving a statistically insignificant value when comparing baseline and 5<sup>th</sup> week values.

In Hydrogen peroxide group; Group II, as shown in Table 3, comparison of mean gingival bleeding, mean probing depths and mean relative attachment level before and

after treatment that is at baseline (0), 3 weeks and 5 weeks after treatment, shows a statistically significant difference ( $P < 0.05$ ).

Table 2 also shows a statistically insignificant difference was in values of mean probing depths and mean relative attachment levels in Group I when comparing baseline values with values at 3<sup>rd</sup> and 5<sup>th</sup>.

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

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

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

		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

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

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*

## DISCUSSION

The clinical effect of sub gingival irrigation with 20 mL of 3% H<sub>2</sub>O<sub>2</sub> compared to normal saline was compared in this study. 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 Group II; hydrogen peroxide group compared to Normal saline group; Group I reaching from 29.0±2.49 to 7.2 ± 1.48 to 6.8 ± 1.23 in the H<sub>2</sub>O<sub>2</sub> group and 29.3±2.50 to 18.5±2.84 to 27.2±2.01 in normal saline group. The results of the study are consistent with study done by Moradi et al [18] according to which, 3% H<sub>2</sub>O<sub>2</sub> had a significant effect on

reduction of gingival bleeding compared to the normal saline 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 in the H<sub>2</sub>O<sub>2</sub> group, 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 are similar to Wolff's study, [19] where 3% H<sub>2</sub>O<sub>2</sub> had a positive effect on pocket depth reduction.

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 Moradi et al [18] and Wolff et al [19] 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. According to Wolff et al [20] the majority of inflammatory processes of periodontium are caused by anaerobic periodontal pathogens. The oxidising nature of H<sub>2</sub>O<sub>2</sub> results in destruction of anaerobic periodontal pathogens and decreases the inflammatory exudate. The reduction in inflammatory exudates and attachment gain might be responsible for gain in probing depth. Changes in attachment level are a result of building an attachment, which corresponds to the amount of periodontal destruction.

In conclusion,, sub gingival irrigation with 3% H<sub>2</sub>O<sub>2</sub> is effective in reducing gingival bacterial counts thus bleeding and inflammation are controlled and gain in attachment results..

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