

A Comparative Evaluation of the Effect of 0.25% of Sodium Hypochlorite as a Irrigant in Reduction of Inflammation among Gingivitis Patients.-A Pilot Study.

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Abstract:

Aim : The study aimed to evaluate the effect of 0.25% sodium hypochlorite twice-weekly oral irrigant in patients with gingivitis at baseline, 7th and 14th day.

Objective : This study evaluated the potential of gingival bleeding on probing to serve as a indicator of future periodontal breakdown. It also assesses the ability of 0.25% sodium hypochlorite twice-a-week oral rinse converted active sites to inactive sites.

Background: The study included 30 patients with gingivitis. 15 patients were irrigated for 30 s with 15 mL of a fresh solution of 0.25% sodium hypochlorite (test) and the other 15 patients were irrigated with distilled water. The periodontal parameters bleeding on probing and probing depth were evaluated at baseline 0, in consecutive 7th days and in consecutive 14th days.

Result: All 30 patients in the study completed the baseline, 7th and 14th day for the parameters bleeding on probing and probing depth. The test group and the control group, respectively, were undertaken on the study participants. The differences in clinical improvement between the sodium hypochlorite rinse group and the water rinse group were statistically significant. No adverse events were identified in any of the study patients.

Keywords : sodium hypochlorite, bleeding on probing, probing depth, gingivitis

INTRODUCTION:

Plaque-induced gingivitis is the most common form of periodontal disease, which is considered to be the second most common oral disease after dental caries, affecting more than 75% of the population worldwide. (1) The prevalence of gingivitis increased with age. In India, prevalence of gingivitis was 57%, 67.7%, 89.6% and 79.9% in the age groups 12, 15, 35-44 and 65-74 years, respectively. (2)

Plaque-induced gingivitis is characterized by the presence of inflammation confined to gingiva without extension into other tooth-supporting structures. The clinical features that can be used as characteristic of gingivitis could be one of the following signs: erythematous and sponginess; changes in contour; bleeding upon stimulation; and presence of calculus, or plaque without clinical attachment loss, or radiographic evidence of crestal bone loss. Prevention of dental plaque accumulation and early treatment of gingivitis reduces the risks associated with the development of a more severe, and destructive form of periodontal diseases. The prevalence of gingivitis when compared with periodontitis are higher. So effective plaque control can significantly reduce the future development of periodontitis. Thus removing the plaque are the main key to prevent the occurrence of periodontal disease and stopping the progression from further disease. (2)

Periodontal diseases associated with characteristic pathogenic bacteria located in the oral biofilms. Successful therapy of this are based on effective control of the biofilms. The ultimate goal of any periodontal therapy was disruption of biofilm. Till date the gold standard therapy for non-surgical management of periodontal diseases are scaling and root planning. With the evolution of increased antibiotic resistant biofilms, lead to the development of newer cost effective substances to eliminate infections in periodontium. The antiseptics are broad spectrum

microbicidal agents that are applied topically onto living tissue to prevent or treat clinical infections by bacteria and viruses. (3,4) Extensive research have been carried out to evolve cost effective as antiseptics to plaque control. sodium hypochlorite was used for several centuries as a root canal irrigant at concentration from 1% – 5.25%. Dakin solution (0.25%) sodium hypochlorite was effective in reduction in amount of dental plaque than compared to water rinse. Lobene et al (5). American Dental Association on dental therapeutics has designated as 0.1% sodium hypochlorite 'a mild antiseptic mouth rinse' and suggested its use for direct application to mucous membrane. (8)



Sodium hypochlorite is ionized in water to Na⁺ and the hypochlorite ion to OCl⁻, which establishes an equilibrium with hypochlorous acid, HOCl, the active moiety. sodium hypochlorite destroys microorganisms through oxidation of proteins, nucleotides and lipids, and is greatly effective against biofilm microbes and thus effective against biofilm infections. (6)

Thus, the aim of the study to evaluate the effect of 0.25% sodium hypochlorite twice-weekly oral irrigant in patients with gingivitis at baseline, 7th and 14th day.

MATERIALS AND METHOD :

The study included 30 gingivitis patients, were randomly allotted into 15 patients who received sodium hypochlorite rinse (test group) and 15 patients who received distilled water rinse (control group). The clinical examination was performed by a single blinded examiner who calibrated to accomplish more than 90% reproducibility in the repeated measurements of the clinical variables studied. Based on the inclusion criteria the study patients had a mean age of 41 years and an average of 27 teeth. Each patient exhibited at least four separate teeth with a pocket depth of ≥ 6 mm.

The patients were medically healthy and required no emergency dental care.(6)

This study included comparison of sodium hypochlorite with distilled water due to the similar colour of both the solution. The solution was taken in 5ml syringe and irrigated full mouth three times in all the surfaces . Two parameters were chosen , bleeding on probing and probing depth. Bleeding on probing was assessed within 30 s after probing to the full pocket depth, and was recorded on the facial, lingual, mesiofacial, distofacial, mesiolingual and distolingual surfaces of each tooth. These two parameters were assessed using william’s probe for every participant after irrigation of sodium hypochlorite/distilled water on baseline , 7th and 14th day and the result were evaluated based on these parameters.

RESULTS :

Individual patients served as the unit for statistical analysis. The mean value of each study variable was obtained for each patient at each visit and used in the statistical analysis. The Normality tests Kolmogorov-Smirnov and Shapiro-Wilks tests results reveal that the variables do NOT follow Normal distribution. Therefore to analyse the data Non-parametric methods are applied. To compare between test and control groups Mann Whitney test is applied. To compare between time points Friedman repeated measures ANOVA is applied followed by Bonferroni adjusted Wilcoxon Sign tests for multiple pairwise comparisons. SPSS version 22.0 is used to analyse the data. Significance level is fixed as 5% ($\alpha = 0.05$).

Mann-Whitney Test to compare between test and control groups for bleeding on probing.(TABLE 1)

Bleeding on probing	Group	N	Mean Rank	P-Value
Baseline	Control	15	14.13	0.383
	Test	15	16.87	
7th Day	Control	15	21.23	<0.001
	Test	15	9.77	
14th Day	Control	15	22.30	<0.001
	Test	15	8.70	

Table 1 represents Mann Whitney test which compares test and control groups for bleeding on probing. While comparing the test and control group at baseline ,the p value is not statistically significant .At 7th day and 14th the p value is statistically significant (<0.001).(7)

Mann-Whitney Test to compare between test and control groups for probing depth.(TABLE 2)

Pocket Depth	Group	N	Mean Rank	P-Value
Baseline	Control	15	15.10	0.806
	Test	15	15.90	
7th Day	Control	15	18.53	0.058
	Test	15	12.47	
14th Day	Control	15	19.47	0.013
	Test	15	11.53	

Table 2 represents Mann Whitney test which compares test and control groups for pocket depth. While comparing the test and control group at baseline and the 7th day , the p value is not statistically significant . **At 14th day the p value is statistically significant(<0.001).**

Friedman Test to compare between time points (TABLE 3)

Group	Bleeding on probing	N	Mean Rank	P-Value
Control	Baseline	15	2.10	0.051
	7th Day	15	2.10	
	14th Day	15	1.80	
Test	Baseline	15	2.97	<0.001
	7th Day	15	2.03	
	14th Day	15	1.00	

Table 3 represents Friedman test to compare between the time points that is baseline, 7th day and 14th day for test and control groups(bleeding on probing). P value for control group is not significant and for **test group it is significant(< 0.001) .**

Friedman Test to compare between time points (TABLE 4)

Group	Pocket Depth	N	Mean Rank	P-Value
Control	Baseline	15	2.03	0.368
	7th Day	15	2.03	
	14th Day	15	1.93	
Test	Baseline	15	2.87	<0.001
	7th Day	15	2.13	
	14th Day	15	1.00	

Table 4 represents Friedman test to compare between the time points that is baseline, 7th day and 14th day for test and control groups(probing depth). P value for control group is not significant and for **test group it is significant(< 0.001).**

Bonferroni adjusted Wilcoxon Sign Test for pairwise comparisons (TABLE 5)

Group	Bleeding on probing	P-Value
Test	Baseline vs 7th Day	0.032
	Baseline vs 14th Day	<0.001
	7th Day vs 14th Day	0.014

Bonferroni adjusted Wilcoxon Sign Test for pairwise comparisons (TABLE 6)

Group	Probing Depth	P-Value
Test	Baseline vs 7th Day	0.134
	Baseline vs 14th Day	<0.001
	7th Day vs 14th Day	0.006

Table 4 and 6 represents Bonferroni adjusted Wilcoxon Sign Test for pairwise comparisons for test group sodium

hypochlorite as it is statistically significant. The sodium hypochlorite oral rinse group showed marked improvement from baseline to 14th day for bleeding on probing ($p < 0.001$) and probing depth ($p < 0.001$). The clinical changes in the control group were statistically non-significant.

DISCUSSION :

Dental plaque is a yellowish biofilm that builds up on the teeth. Biofilms contain communities of disease-causing bacteria and their uncontrolled accumulation has (both gingivitis and periodontitis). Successful periodontal therapy is based on the effective disruption of the microbial biofilm. There are several commercially available self-care techniques which are used in prevention in the treatment of periodontal diseases. Gold standard available is chlorhexidine as a chemical plaque control. Mechanical plaque control (brushing) which is unable to remove supra gingival and inter dental plaques. With the great population in India, and low economy there is a need to develop cost effective and highly safe and efficient method in reduction of plaque control. 3% of Sodium hypochlorite is the most used irrigating solution in endodontics, because its mechanism of action causes biosynthetic alterations in cellular metabolism and phospholipid destruction, formation of chloramines that interfere in cellular metabolism, oxidative action with irreversible enzymatic inactivation in bacteria, and lipid and fatty acid degradation. Sodium hypochlorite is diluted to 0.25% due to its reaction with intra oral tissues. A highly diluted sodium hypochlorite solution (0.25%), used as an oral irrigant in an experimental gingivitis design study, was able to reduce dental plaque index scores. (8)

Sodium hypochlorite and distilled water is used because of the similar colour of both the solutions, study methodology is similar to Galvan et al. The sodium hypochlorite is irrigated on baseline 7th day and 14th by the examiner which

was compared with distilled water. There were limitations in this study, short period that is 2 weeks and less no. of samples were chosen and hence microbial counts/markers were unable to be evaluated. (6)

The sodium hypochlorite test group showed clinical improvements up to the end point of the study, suggesting that the difference between sodium hypochlorite test group and the water control group would widen even further with a longer study period. 0.25% of sodium hypochlorite is highly safe, invasive, extremely inexpensive and may be efficacious to reduce the presence of plaque and bleeding on probing, and therefore possibly prevent the risk of future attachment loss. (10)

In conclusion, sodium hypochlorite was effective as a irrigant. The bleeding on probing and pocket depth reduction was statistically significant.

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