

## Comparative Evaluation Of Different Concentrations Of Povidone Iodine As Subgingival Irrigant In The Management Of Chronic Periodontitis

Research Article

Karthik V<sup>1</sup>, Arvina Rajasekar<sup>2\*</sup>

<sup>1</sup> Graduate Student, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai- 77, India.

<sup>2</sup> Senior Lecturer, Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences [SIMATS], Saveetha University, Chennai- 77, India.

### Abstract

**Background:** Mechanical plaque control is the first line of management of chronic periodontitis. In recent years, a variety of adjuncts including irrigants, chemical plaque controlling agents, vitamin supplements, systemic and local antibiotics, local drug delivery, herbal extracts, probiotics are gaining importance. Povidone iodine is one of the most broad spectrum and potent antiseptics available at various concentrations.

**Aim:** The aim of the study was to assess and compare the efficacy of various concentrations of povidone iodine as sub gingival irrigant in the management of chronic periodontitis.

**Materials And Methods:** The present double blinded, parallel designed, randomized clinical trial was carried out in the Department of Periodontics, Saveetha Dental College and Hospitals, Chennai, India. A total of 66 patients with generalised chronic periodontitis (22 participants in each group [Group 1 (povidone iodine 2%), Group 2 (povidone iodine 10%) and Group 3 (povidone iodine 0.1%)]) were enrolled. Scaling and root planing was done for all the participants and then the pocket was irrigated with respective irrigant. The clinical parameters including Loe and Silness Gingival Index (GI) and Probing Pocket Depth (PPD) were recorded at baseline and after 1 month. The data was analyzed using Statistical Package for Social Sciences (SPSS Software, Version 23.0). One-way ANOVA was used to compare the mean values of GI and PPD between the groups. Tukey's HSD post hoc test was done to find means that are significantly different from each other. Also, student's paired t-test was used to compare the mean values of GI and PPD within the groups.

**Results:** One-way ANOVA showed that there was no statistically significant difference between the baseline GI and PPD values as compared to the three mouthwash groups ( $p=0.865$ ), but there was a statistically significant difference ( $p=0.000$ ) observed between the three concentrations when compared after 1 month. Student's paired t-test showed that the difference between the baseline and post GI and baseline and the post PPD was statistically significant in both Group 1 and Group 2 with the  $p$  value of 0.000.

**Conclusion:** Significant improvement in gingival index and pocket depth suggests that subgingival povidone iodine irrigation could be an effective adjunct to scaling and root planing in the management of chronic periodontitis. Also, as the concentration of povidone iodine increases, the improvement in clinical parameters also increases.

**Keywords:** Povidone Iodine; Pocket Depth; Innovative; Gingivitis; Periodontitis; Subgingival Irrigation.

### Introduction

Periodontitis is a chronic inflammatory disease of the oral cavity which affects both the soft and hard tissues. If it is left untreated, it leads to increased pocket depth, clinical attachment loss, recession, mobility, bone loss, pathologic migration of the teeth and

tooth loss [1-5]. It is a multifactorial disease. Even though plaque is the primary etiology, the disease is aggravated by a variety of risk factors including age, systemic diseases, gender, genetic factors, smoking, stress, hormones [6-15].

Scaling and root planing (SRP) therapy is considered as the gold

#### \*Corresponding Author:

Dr. Arvina Rajasekar,

Senior Lecturer, Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences [SIMATS], Saveetha University, Chennai- 77, India.

Tel: +91 9486442309

E-mail: arvinar.sdc@saveetha.com

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standard for periodontal disease [16]. However, SRP is subjected to certain restrictions, such as the failure to insert deeper periodontal pockets, bifurcations and the failure to eliminate microorganisms because of their tissue invading nature [17, 19]. To overcome this, variety of adjuncts including irrigants, chemical plaque controlling agents, vitamin supplements, systemic and local antibiotics, local drug delivery, herbal extracts, probiotics and LASER are gaining importance.

Irrigants are effective at flushing out plaque, bacteria and their toxins that become trapped in the small spaces between teeth and under the gumline, preventing the buildup of harmful bacteria. The most widely studied subgingival irrigants are chlorhexidine and various concentrations of povidone iodine solution [20]. Chlorhexidine (CHX) is considered a “gold standard” antibacterial solution and is extensively used as a mouthwash and irrigating solution [21]. However, it has certain side effects on long term usage such as loss of taste sensation, staining of the teeth and in some cases, parotid swelling. Povidone iodine is the most broad-spectrum and potent antiseptic available [22].

It has a bactericidal effect against most bacteria including putative periodontal pathogens, fungi, mycobacteria, viruses, and protozoa. Povidone-iodine remains an effective antibacterial agent when used directly into the periodontal pocket even at low concentrations [23].

Elemental iodine or its derivatives polyvinylpyrrolidone-iodine complex (Povidone-I) is the most broad-spectrum and potent antiseptics available. This Povidone-I has a bactericidal effect against most bacteria including putative periodontal pathogens, fungi, mycobacteria, viruses, and protozoa [24, 25]. Povidone-iodine remains an effective antibacterial agent when used directly into the periodontal pocket even at low concentrations [26, 16]. Recent studies had used 0.1% Povidone iodine as sub gingival irrigant and compared the antimicrobial efficacy and also it had shown that, when 2% concentration of povidone iodine is used as a subgingival irrigant there is a increased antimicrobial activity with reduced gingival inflammation [17].

Our team has extensive knowledge and research experience that has translated into high quality publications [27-46]. Through extensive literature search, it was revealed that there is a lack of adequate studies comparing various concentrations of povidone iodine as sub gingival irrigant in the management of chronic periodontitis. In this context, the aim of the study was to assess and compare the efficacy of various concentrations of povidone iodine as sub gingival irrigant in the management of chronic periodontitis.

## Materials and Methods

### Study Population:

The present double blinded, parallel designed, randomized clinical trial was carried out in the Department of Periodontics, Saveetha Dental College and Hospitals, Chennai, India. A total of 66 patients with generalised chronic periodontitis were enrolled. The ethical clearance was obtained from the Institutional Ethical Committee and a written informed consent was obtained from all the study participants.

### Inclusion Criteria:

Participants within the age group of 20-25 were systematically healthy, presence of at least 20 teeth, probing depth of 4-5 mm, presence of bleeding on probing (BOP) in at least 30% of the sites were included in the study.

### Exclusion Criteria:

Participants who were under orthodontic treatment, smokers, pregnant or lactating mothers, patients under long term medications, systemically compromised patients were excluded from the study.

### Test group:

- Group 1: Povidone iodine 2 %
- Group 2: Povidone iodine 10 %
- Group 3: Povidone iodine 0.1%

### Study Design:

The sample size was 66 with 22 participants in each group [Group 1 (povidone iodine 2%), Group 2 (povidone iodine 10%) and Group 3 (povidone iodine 0.1%)]. Participants were assigned to the groups by a person not involved in the study. Scaling and root planing was done for all the participants using Gracey curettes and then the pocket was irrigated with respective irrigant using a syringe. The syringe was gently inserted into the depth of periodontal pockets to assure delivery of irrigant solution. Repeated irrigation ensured that irrigant solution filled up pockets for a period of 5 min and oral hygiene instructions were reinforced. The clinical parameters including Loe and Silness Gingival Index (GI) and Probing Pocket Depth (PPD) were recorded (baseline). All the subjects were recalled after 1 month and the same parameters were recorded.

### Statistical Analysis:

The data was analyzed using Statistical Package for Social Sciences (SPSS Software, Version 23.0). Descriptive and inferential statistics were done for data summarization and presentation. One-way ANOVA was used to compare the mean values of GI and PPD between the groups. Tukey's HSD post hoc test was done to find means that are significantly different from each other. Also, student's paired t-test was used to compare the mean values of GI and PPD within the groups.

## Results

A total of 66 study participants were enrolled in this study and were divided into three groups each of 22 participants. Group 1 - 2% povidone iodine, Group 2 - 10% povidone iodine and Group 3 - 0.1% povidone iodine.

One-way ANOVA showed there was no statistically significant difference between the baseline GI and PPD values as compared to the three mouthwash groups ( $p=0.865$ ), but there was a statistically significant difference ( $p=0.000$ ) observed between the three concentrations when compared after 1 month. The baseline

values between the three groups were statistically not significant ( $p=0.865$ ), whereas after 1 month, there was a statistically significant difference ( $p=0.000$ ). (Table 1).

Tukey's HSD post hoc test was done to find means that are significantly different from each other. A statistically significant difference between Group 1 and Group 3 was observed in terms of post GI ( $p=0.000$ ) and post PPD ( $p=0.000$ ) but statistically no significant difference was observed between Group 1 and Group 2 in terms of post GI ( $p=0.171$ ) and post PPD ( $p=0.338$ ). (Table 2).

Student's paired t-test was done to compare the mean values of GI and PPD within the groups. The mean difference between the baseline and post GI and baseline and the post PPD was statistically significant in both Group 1 and Group 2 with the p value of 0.000. Whereas, no statistically significant difference was observed between the baseline and post GI (0.24) and baseline and post PPD (0.27) in Group 3. (Table 3).

### Discussion

The present study was done to assess the different concentrations of povidone iodine as a subgingival irrigant in the management of chronic periodontitis.

The present study showed that the mean PPD at baseline was statistically not significant between the three groups ( $p=0.47$ ). However, the mean PPD after 1 month was highly significant between 2% povidone iodine and 0.1% povidone iodine ( $p=0.000$ ) and 10% povidone iodine and 0.1% povidone iodine ( $p=0.000$ ); showing that both 2% povidone iodine and 10% povidone iodine were equally effective in preventing plaque formation ( $p=0.338$ ). Selvaggi et al., studied the clinical efficacy of povidone iodine as a subgingival irrigant and observed that there was a significant reduction in pocket depth after one month of usage [47]. Hoang et al., revealed that there are three main mechanisms such as anti-inflammatory, antiseptic and bone formation through which povidone iodine is effective in reducing periodontitis [48].

Also, the present study revealed that the mean GI after 1 month was highly significant between 2% povidone iodine and 0.1%

**Table 1. One-way ANOVA comparison of mean GI and PPD between the study groups.**

Variable	Group 1 (2% povidone iodine)	Group 2 (10% povidone iodine)	Group 3 (0.1% povidone iodine)	p value
Pre GI	2.681±1.037	3.409±1.543	3.5±1.144	0.865
Post GI	1.409±1.225	1.476±1.081	2.343±1.1154	0
Pre PPD	4.54±1.33	4.8±1.012	4.36±1.000	0.47
Post PPD	0.76±0.36	1.05±1.65	2.30±1.479	0

**Table 2. Tukey's HSD post Hoc pairwise comparison of mean GI and PPD.**

Groups		Post GI		Post PPD	
		Mean difference	p value	Mean difference	p value
Group 1 (2% povidone iodine)	Group 2 (10% povidone iodine)	-0.067	0.171	-0.29	0.338
	Group 3 (0.1% povidone iodine)	-0.934	0	-1.54	0
Group 2 (10% povidone iodine)	Group 1 (2% povidone iodine)	0.067	0.171	0.29	0.338
	Group 3 (0.1% povidone iodine)	-0.867	0	-1.25	0

**Table 3. Mean comparison of GI and PPD within the study groups using student's paired t-test.**

Groups	Mean GI		p value	Mean PPD		p value
	Pre	Post		Pre	Post	
Group 1 (2% povidone iodine)	2.681±1.037	1.409±1.225	0	4.54±1.33	0.76±0.36	0
Group 2 (10% povidone iodine)	3.409±1.543	1.476±1.081	0	4.8±1.012	1.05±1.65	0
Group 3 (0.1% povidone iodine)	3.5±1.144	2.343±1.1154	0.24	4.36±1.000	2.30±1.479	0.27

povidone iodine ( $p=0.000$ ) and 10% povidone iodine and 0.1% povidone iodine ( $p=0.000$ ); showing that both 2% povidone iodine and 10% povidone iodine were equally effective in reducing inflammation ( $p=0.171$ ). This might be due to the substantivity of 2% povidone iodine and 10% povidone iodine, which adhere to the tissues such as oral mucosa and teeth. This helps to maintain a potent sustained release, which, in turn, reduces the bacterial count and prevents the accumulation of dental plaque and so the gingivitis.

Berkelmen *et al.*, studied the clinical efficacy of povidone iodine towards periodontitis and revealed that there was a reduction in pocket depth after one month of usage [49]. Sindhura H *et al.*, studied the clinical efficacy of 0.1% of povidone iodine and showed significant reduction in gingival index scores after 1 month of usage [17]. Similar results were obtained in the studies of Perayil *et al.*, [50] and Eid Alroudhan *et al.*, [51]. Our findings are in accordance with the previous studies.

From the study results, it can be stated that 10% povidone iodine showed significant improvement in gingival index and pocket depth and hence it could be an effective adjunct to scaling and root planing in the management of chronic periodontitis. Also, as the concentration of povidone iodine increases, the improvement in clinical parameters also increases. However, further long term follow-up studies are needed to substantiate the present finding and hence can be used as an adjunct to scaling and root planning in the management of periodontal diseases.

## Conclusion

Significant improvement in gingival index and pocket depth suggests that subgingival povidone iodine irrigation could be an effective adjunct to scaling and root planing in the management of chronic periodontitis. Also, as the concentration of povidone iodine increases, the improvement in clinical parameters also increases.

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