

Effects of Povidone-Iodine as an Adjunct to SRP in Chronic Periodontitis

Shruti Vyas^{1*} Rupal Mehta² Sujay Shah³ Tanvi Hirani⁴ Rakesh Anand⁵ Viraj Amin⁶

¹PG Student, Department of Periodontology and Implantology, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.

²Professor and Head, Department of Periodontology and Implantology, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.

³Assistant Professor, Department of Periodontology and Implantology, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.

⁴Assistant Professor, Department of Periodontology and Implantology, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.

⁵Senior Lecturer, Department of Oral Medicine and Radiology, Sarjug Dental College, Darbhanga, Bihar, India.

⁶Assistant Professor, Department of Periodontology and Implantology, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.

ABSTRACT

Background: The aim of this randomized split mouth study is to evaluate the clinical results of a unique subgingival irrigation of 10% povidone iodine solution in addition to a full mouth scaling & root planing for the treatment of chronic periodontitis.

Materials & Method: 10 patients with chronic periodontitis will take part in this study. In each patient, four initially untreated pockets ≥ 4 mm will be randomly selected for subgingival irrigation. After a one session of full mouth treatment with scaling & root planing (SRP) two pockets in one side of mouth will receive irrigation with 10 ml 0.9% NaCl solution. Two pockets on the other side will receive irrigation with 10 ml of betadine 10% solution. Full mouth plaque score(FMPS), full mouth bleeding score(FMBS), plaque index(PI), gingival index(GI), probing pocket depth(PPD), and clinical attachment level(CAL) parameters will be assessed at baseline and after 1 and 3 months.

Result: PI, GI, PPD and CAL were significantly improved in both groups after 3 months. But no significant difference was observed between the groups.

Conclusion: One single irrigation with 10% povidone-iodine after full mouth SRP would bring a small additional benefit in chronic periodontitis.

Keywords: Povidone-Iodine, SRP, periodontal disease.

INTRODUCTION

Periodontitis is a common oral disease caused by the colonization of microorganism in the periodontal crevice that are organized in a biofilm. Oral biofilms are organized polymicrobial communities that are embedded on mucosal and dental surface in an extracellular matrix of exopolymers.^{1,2} In periodontal disease not only bacteria, but also viruses, enteric rods and yeast have been associated.³⁻⁶ According to Roslin et al⁷ good plaque control adjunct to scaling and root planing(SRP) can induce reduction in pocket

depth(PPD), decrease bacterial counts, and bring a gain in clinical attachment level(CAL).

Aim of nonsurgical periodontal therapy is to eliminate pathogenic bacterial present in the biofilm. However complete elimination of such pathogenic microorganism is still an enigma. For that more research has been directed at developing methods for enhancing plaque removal efforts. Scaling and root planing is consider as 'gold standard' nonsurgical therapy for periodontal disease.^{8,9} But it has some limitation which include the inability to instrument the deeper periodontal pockets, bifurcations, and inability to remove the

Received: Oct. 17, 2018; Accepted: Jan. 10, 2019

*Correspondence Dr. Shruti Vyas.

Department of Periodontology and Implantology, Karnavati School of Dentistry, Gandhinagar, Gujarat, India.

Email: shrutivas9793@gmail.com

microorganisms within the tissue lining of the periodontal pockets. Hence antimicrobial agents such as antiseptics were proposed to improve SRP outcomes.¹⁰

Betadine among antiseptics is bactericidal for Gram-positive and Gram-negative bacteria, fungi, mycobacteria, viruses, and protozoans.¹¹ Activity of betadine is not completely diminished in the presence of pus and/or blood.¹² Another property of betadine is that it has a rapid microbial killing capacity, and is a cost-limited product.¹³ von Ohle et al compared the microbiologic effects of 0.2% chlorhexidine and 0.05% betadine with subgingival irrigations on undisturbed dental plaque biofilms which resulted that betadine would produce the long lasting antimicrobial effect, up to 31 days, versus 7 days for chlorhexidine. Different formulations and application regimes of betadine have been used in periodontal treatment. However, some authors note that betadine seems to be a promising antimicrobial agent, especially in high concentration, such as 10% concentration, which corresponds to 1% free iodine.¹³ The aim of the present study was to evaluate the effect of one-stage full-mouth SRP treatment in association with 10% betadine subgingival irrigation in the treatment of chronic periodontitis.

MATERIAL AND METHOD

Systemically healthy controls presenting to the Department of Periodontics, fulfilling the criteria were selected and recruited for the study. Ten patients with an age range of 20–60 years who were diagnosed with chronic periodontitis, mild to moderate type⁸ were recruited. In each patient, four initially untreated pockets ≥ 4 mm will be randomly selected for subgingival irrigation.

Inclusion criteria

Subjects selected were healthy nonsmokers with a minimum of 20 teeth and exhibiting at least one pocket in each quadrant with PPD ≥ 4 mm, with positive bleeding on probing.

Exclusion criteria

Exclusion criteria included pregnant or lactating females, allergy to iodine, thyroid dysfunction, and patients with systemic disorders. Patients who had already received periodontal treatment and those

who had taken antibiotics or antiseptics within 3 months prior to the study were also excluded, as well for those who would need antibiotic prophylaxis to be treated.

Clinical parameters

Full mouth plaque score, full mouth bleeding score, plaque index, gingival index, probing pocket depth, and clinical attachment level parameters of selected teeth will be assessed at baseline and after 1, 3, and 6 months.

Dental impressions of the maxilla and mandible were taken to make customized removable thermoformed splints. These devices were realized to ensure reliable measures of CAL at baseline and at 3 and 6 months of follow-up. CAL measurements corresponded to the distance between fixed splint landmarks and the bottom of the pocket. The probe was inserted with a constant pressure, as for PPD measurements.

Treatment

One phase of nonsurgical fullmouth SRP and 6 months of supportive periodontal treatment were included in the treatment. The nonsurgical therapy was performed under local anesthesia. SRP was performed with an ultrasonic system with water and hand instruments scalers. The supra- and subgingival instrumentation was carried out by the same clinician (ED) over at least 1½ hours for the whole mouth.

Pocket irrigation

After scaling and root planing, periodontal pockets were randomly assigned in a split-mouth design in two groups according to a list of randomization previously produced with Microsoft Excel Software. On one side of the mouth (right or left), pockets were irrigated with 10% povidone-iodine, and on the other side with 0.9% NaCl.

- The test group corresponded to the pockets treated with 10% povidone-iodine subgingival irrigation (PIG)
- The control group (CG) corresponded to the other part of the mouth that received 0.9% physiologic serum for subgingival irrigation.

For selected pockets (n = 4 for each patient, PPD $\geq$ 4 mm), a longer subgingival irrigation with 10% PVI or 0.9% NaCl was performed with 10 mL sterile plastic syringes (10 mL syringe Luer-Lok Tip; BD) and a blunt needle (0.6 mm diameter) placed tangentially to the axis of the root and about 1 mm coronally to the bottom of the pocket previously measured. The irrigation was performed with slow constant pressure during 60 seconds (Fig 1 & 2). A high-speed evacuation system was placed near the irrigated pocket to absorb the irrigant progressively.

For the rest of the mouth, test group pockets received a unique subgingival irrigation of 10% povidone iodine and control group pockets received 0.9% NaCl in the same way for selected pockets, but during only 10 seconds per pocket. Use of antiseptic mouthwashes were not advised to the patients.

The measurements of PPD, and CAL were taken for selected pockets as at the baseline. For the others pockets, FMPS, FMBS were registered in the same way. And oral instructions were reinforced during each visit.

RESULT

Table 1: plaque index

		Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	P Value
	Baseline	1.95	10	.24	.075	-.27	<0.001
	1 month	1.68	10	.19	.059		
	Baseline	1.95	10	.24	.075	-.45	<0.001
	3 month	1.50	10	.17	.055		
	1 month	1.68	10	.19	.059	-.18	.048
	3 month	1.50	10	.17	.055		

Table 2: gingival index.

		Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	P Value
	Baseline	2.40	10	.28	.089	-.68	<0.001
	1 month	1.72	10	.20	.063		
	Baseline	2.40	10	.28	.089	-.90	<0.001
	3 month	1.50	10	.12	.039		
	1 month	1.72	10	.20	.063	-.22	.004
	3 month	1.50	10	.12	.039		



Fig 1: Irrigation with 0.9% NaCl.



Fig 2: Irrigation with 10% PVI.

Table 3: full mouth plaque score.

		Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	P Value
	Baseline	53.87	10	6.07	1.920	-9.36	<0.001
	1 month	44.51	10	6.71	2.120		
	Baseline	53.87	10	6.07	1.920	-17.84	<0.001
	3 month	36.03	10	6.40	2.023		
	1 month	44.51	10	6.71	2.120	-8.48	<0.001
	3 month	36.03	10	6.40	2.023		

Table 4: full mouth bleeding score

		Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	P Value
	Baseline	52.75	10	4.98	1.575	-8.26	<0.001
	1 month	44.48	10	5.11	1.614		
	Baseline	52.75	10	4.98	1.575	-17.17	<0.001
	3 month	35.58	10	5.35	1.693		
	1 month	44.48	10	5.11	1.614	-8.90	<0.001
	3 month	35.58	10	5.35	1.693		

Whole mouth result

Table 3 and 4 shows the results for FMPS and FMBS. All patients showed a significant improvement in oral hygiene. At baseline the mean FMPS was $53.87 \pm 6.07\%$. Significant results were noted for the reexaminations at M1 and M3 ($P < .001$). There were consecutive reductions of $44.51 \pm 6.71\%$ in the first month, $36.03 \pm 6.7\%$ in the third month. FMBS at baseline corresponded to $52.75 \pm 4.98\%$. Significant results were noted for the reexaminations at M1 and M3 ($P < .001$). There was a reduction of $44.48 \pm 5.1\%$ at one month and a consecutive reduction of $35.58 \pm 5.35\%$ at 3 months.

Table 5: Intergroup comparison of PPD.

GROUP		N	Mean	Std. Deviation	Std. Error Mean	Mean Difference	P Value
Baseline	PPD of selected pockets(CG)	10	5.00	.82	.258	-.10	.786
	PPD of selected pockets(PIG)	10	5.10	.81	.256		
1 month	PPD of selected pockets(CG)	10	4.80	.75	.238	.40	.246
	PPD of selected pockets(PIG)	10	4.40	.74	.233		

Selected pocket result

For selected pockets PPD and CAL parameters were registered in Table 5 and 6. The difference between Control Group and Test Group (BG) was not statistically significant for all parameters at each time point ($P > .001$). Regarding CAL, the highest CAL gain was obtained between baseline and 3 months. The principal reduction for PPD also corresponded to the period between baseline and 3 months.

	pockets(PIG)						
3 month	PPD of selected pockets(CG)	10	4.25	.86	.271		
	PPD of selected pockets(PIG)	10	3.65	.58	.183		
						.60	.083

Table 6: intergroup comparison of CAL

GROUP		N	Mean	Std. Deviation	Std. Error	Mean Difference	P Value
Baseline	CAL of selected pockets(CG)	10	6.45	1.07	.337		
	CAL of selected pockets(PIG)	10	6.15	1.00	.317		
						.30	.525
1 month	CAL of selected pockets(CG)	10	6.15	1.16	.366		
	CAL of selected pockets(PIG)	10	5.50	.94	.298		
						.65	.185
3 month	CAL of selected pockets(CG)	10	5.65	1.11	.350		
	CAL of selected pockets(PIG)	10	4.60	.81	.256		
						1.05	.026

DISCUSSION

The present study was designed to evaluate the clinical effects of adjunctive use of 10% povidone-iodine with SRP in the treatment of slight to moderate chronic periodontitis. In each participant, the mouth was split into 2 arches to eliminate inter subject variables. However, split-mouth design employed in the present study might carry the risk of transferring povidone-iodine through saliva and affecting the microbiota in control sites.¹⁴

PVI could be of interest in the periodontal treatment because of its broad spectrum and its low potential of inducing resistant bacteria. Moreover, as proposed by some authors, it is easy to use and cost effective.¹⁰ Nakagawa et al,¹⁵ who highlighted that only undiluted PVI solution could decrease the bacterial load in pockets in vivo, and by the fact that the solution will be diluted by the crevicular fluid and blood and reach a concentration of 0.1%, which is bactericidal.

Von Ohle et al,¹⁶ showed significant improvement in microbiologic results with unique irrigation of 10% PVI without SRP.¹⁷ The present study based on

these preliminary findings modified the original protocol in adding a 10% PVI to SRP. Whole mouth clinical results in this study are in accordance with other studies using SRP and demonstrating significant improvements of all clinical parameters (FMBS, FMPS, CAL, and PPD).^{18,19}

A decrease of FMPS would be linked to the fact that patients were instructed to improve their brushing and to maintain proper oral hygiene over the 3-month follow-up period. Regarding all selected pockets, results showed an improvement of all parameters with a significant decrease and higher results for the change between baseline and 3 months. No significant results were recorded between the groups.

Rosling et al's study²⁰ used an irrigation of 0.1% PVI via an Odontoson ultrasonic scaler at baseline and at each recall visit (3, 6, and 12 months) for pockets > 6 mm. The results for all selected pockets showed a significant decrease of PPD and higher CAL gain for the test group as compared to the control group. Various reasons could explain these results. The investigation period was 12 months compared to 3 months for the present study. The selected pockets

were strictly ≥ 6 mm. Hence, only severe periodontitis was considered. It was further observed that the action of antiseptics was more efficient on deep pockets than on shallow pockets.²¹

On the other hand, Zanatta et al²² and Koshy et al²³ argued that PVI would be useless because any significant differences were not found in the clinical and bio-chemical outcomes between the PVI group and the control group. Furthermore, the study by Zanatta et al²² was conducted only for 3 months, which might be insufficient to show between group differences.

Del Peloso et al²⁴ did a study to treat furcation which showed no significant improvement for the PVI group compared to the control group was reported by in 6-month study. The authors did not include only deep pockets. Furthermore, it is known that the treatment of furcation and the action of antiseptics in this area is relatively limited.²⁵

The studies treatment modalities vary; hence, a consensus cannot be reached. Similar design studies with the selection of only deep pockets or multiple irrigations and/or multiple SRP are needed to determine the precise treatment protocol that would be beneficial for the use of PVI as an additional antimicrobial agent for the treatment of periodontal disease.

CONCLUSION

One unique irrigation of 10% PVI or 0.9% NaCl combined with one-stage full-mouth SRP showed a reduction of all clinical parameters until 3 months. No statistical difference between control and test groups was recorded. One single irrigation of 10% PVI would bring a small additional benefit to full-mouth SRP for deep pockets. The clinical benefits of iodine in deep pockets should be taken into consideration. However, more research is needed.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Marsh PD. Dental Plaque: biological significance of a biofilm and community lifestyle. *J Clin Periodontol* 2005;32:7-15.
2. Do T, Devine D, Marsh P. Oral Biofilms: molecular analysis, challenges, and future prospects in dental diagnostics. *Clin Cosmet Investig Dent* 2013;5:11-19.
3. Conteras A, Slots J. Herpes Viruses in human periodontal disease. *J Periodontal Res* 2000;35:3-16.
4. Teles RP, Haffajee AD, Socransky SS. Microbiological goals of periodontal therapy. *Periodontol* 2000 2006;42:180-218.
5. Griffen AL, Beall CJ, Campbell JH, et al. Distinct and complex bacterial profiles in human periodontitis and health revealed by 16S pyrosequencing. *ISME J* 2012;6:1176-1185.
6. Teles R, Teles F, Frias-Lopez J, Paster B, Haffajee A. Lessons learned and unlearned in periodontal microbiology. *Periodontol* 2000 2013;62:95-162.
7. Rosling B, Slots J, Webber R, Christersson L, Genco R. Microbiological and clinical effects of topical subgingival antimicrobial treatment on human periodontal disease. *J Clin Periodontol* 1983;10:487-514.
8. Cobb CM. Clinical significance of non-surgical periodontal therapy: An evidence-based perspective of scaling and root planing. *J Clin Periodontol* 2002;29 Suppl 2:6-16.
9. Cobb CM. Microbes, inflammation, scaling and root planing, and the periodontal condition. *J Dent Hyg* 2008;82 Suppl 3:4-9.
10. Finkelman RD. Role of controlled drug delivery for periodontitis (position paper). American Academy of Periodontology. *J Periodontol* 2000;71:125-140.
11. Schreier H, Erdos G, Reimer K, Konig B, Konig W, Fliesher W. Molecular effects of povidone-iodine on relevant microorganisms: an electron-microscopic and biochemical study. *Dermatology* 1992;2:111-116.
12. Gottardi W. Iodine and disinfection: theoretical study on mode of action, efficacy, stability and analytical aspects in the aqueous system. *Arch Pharm Med Chem* 1999;332:151-157.

13. Slots J. Selection of antimicrobial agents in periodontal therapy. *J Periodontol Res* 2002;37:389-398.
14. Quirynen M, Mongardini C, de Soete M, Pauwels M, Coucke W, van Eldere J, et al. The role of chlorhexidine in the one-stage full-mouth disinfection treatment of patients with advanced adult periodontitis. Long-term clinical and microbiological observations. *J Clin Periodontol* 2000;27:578-89.
15. Nakagawa T, Saito A, Hosaka Y, et al. Bactericidal effects on subgingival bacteria of irrigation with a povidone-iodine solution (Nejodin). *Bull Tokyo Dent Coll* 1990;31:199-203.
16. Von Ohle C, Weiger R, Decker E, Schlagenhauf U, Brex M. The efficacy of a single pocket irrigation on subgingival microbial vitality. *Clin Oral Investig* 1998;2:84-90.
17. Denez EM, Blandeau G, Lasserre J, Toma S, Brex M. Povidone iodine concentration on subgingival antimicrobial activity. *IADR/PER* 2014, Absrtact 2300660.
18. Papaioannou W, Bollen CM, Quirynen M. One stage full mouth disinfection to overcome intra oral transmission of periodontopathogens. *Anaerobe* 1997;3:163-168.
19. Badersten A, Nilveus R, Egelberg J. Effect of non surgical periodontal therapy I. Moderately advanced periodontitis. *J Clin Periodontol* 1981;8:57-72.
20. Rosling B, Hellstrom M-K, Ramberg P, Socransky SS, Lindhe J. The use of PVP-iodine as an adjunct to non surgical treatment of chronic Periodontitis. *J Clin Periodontol* 2001;28:1023-1031.
21. Christersson LA, Rosling BG, Dunfor RG, Wikesjo UM, Zambon JJ, Genco RJ. Monitoring of subgingival *Bacteroides gingivalis* and *Actinobacillus actinomycetemcomitans* in the management of advanced periodontitis. *Adv Dent Res* 1988;2:382-388.
22. Zanatta G, Bittencourt S, Nociti F, Sallum E, Sallum A, Casati M. Periodontal debridement with povidone-iodine in periodontal treatment: short term clinical and biochemical observations. *J Periodontol* 2006;77:498-505.
23. Koshy G, Kawashima Y, Kiji M, et al. Effects of single-visit full-mouth ultrasonic debridement versus quadrant-wise ultrasonic debridement. *J Clin Peiodontol* 2005;32:734-743.
24. Del Peloso Ribeiro E, Bittencourt S, Ambrosano GM, et al. Povidone-iodine used as an adjunct to non-surgical treatment of furcation involvements. *J Periodontol* 2006;77:211-217.
25. Fleisher HC, Mellonig JT, Brayer WK, Gray JL, Barnett JD. Scaling and root planing efficacy in multirooted teeth. *J Periodontol* 1989;60:402-409.