Povidone Iodine-An Adjunct to Periodontal Therapy

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Abstract: Objective and Background: Povidone-iodine might constitute a valuable adjunct to current periodontal therapy because of its broad-spectrum antimicrobial activity, low potential for developing resistance and adverse reactions, wide availability, ease of use, and low financial cost.The present study was performed to assess the clinical outcome of irrigation using 10% Povidone Iodine in periodontitis patients.Material and Methods: 10 patients (age range 35-65 years) with moderate to severe periodontitis on the basis of clinical parameters were selected.4 quadrants were randomly divided according to mode of treatment- 1st quadrant- scaling and root planing + subgingival irrigation with 10% Povidone iodine, 2ndquadrant - scaling and root planing, 3rd quadrant -subgingival irrigation with 10% Povidone iodine. 4th quadrant - no treatment, The Clinical variables were determined at baseline and 4 weeks post- treatment Results: The results showed a mean reduction of pocket depth of 1.98mm, change in the plaque index and gingival index from 2.22±0.3 to 1.22 ±0.2 and 2.2 ±0.2 to 1.1±0.4 respectively in the group treated with povidone iodine along with scaling and root planing which was highly significant. Conclusion: This study demonstrates positive effect of the subgingival irrigations with 10% povidone iodine in cases of severe chronic periodontitis. However, subgingival irrigation with PVP-iodine without concomitant mechanical debridement might not vary clinical variables. [Pandya D et al NJIRM 2012; 3(3) : 148-151]

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Introduction: Gingivitis and periodontitis are infectious diseases of bacterial origin[1]. Chronic periodontitis in adult patients results from a complex interplay of the mixed polymicrobial infection and host response. The adherent microbes evoke release of a number of inflammatory mediators in the underlying soft tissue[2]. Removal of supragingival plaque is usually sufficient to prevent inflammation. However, effective treatment of all forms of periodontitis also requires the control of subgingival plaque. As pockets deepens, scaling and root planing as well as mechanical plaque control methods become less effective. This is particularly true when root surfaces are irregular or when grooves and furcation exposures are present. Retention of plaque in inaccessible sites can provide a nidus for re-infection, which may allow return of pretreatment microflora and subsequent disease. Systemic and topical chemotherapeutic agents have been used as adjunctive methods for treating periodontitis. Long-term use of systemic antibiotics is contraindicated because of adverse effects and the possible development of bacterial resistance. Topical agents used as rinses are of limited usefulness as they do not appear to penetrate pockets deeper than 3 mm and may have poor substantivity—that is, they do not bind to surfaces for extended periods[1]. Local administration of antimicrobial agents offers a "site-specific" approach to periodontal therapy that has several benefits; primarily, it can be localized to infected sites at high concentrations while avoiding the potential adverse reactions inherent in the systemic use of these medications.

Supragingival irrigation allows for the disruption and dilution of marginal bacteria and their by-products which helps to prevent or treat gingivitis. Subgingival irrigation interferes with the complex ecosystem required for the initiation and continued destruction of the compromised periodontium in the susceptible host[3]. Sub-gingival irrigation is done by different irrigating agents such as water, saline and Antiseptics/anti microbial chemicals .Water-pik irrigators have been developed to deliver these agents deeper into the periodontal pockets.

In contrast, chlorhexidine, a commonly used drug, is often employed supragingival or subgingival to

reduce the oral micro biota. Another antiseptic that has not received a great deal of attention in the dental literature, despite wide utilization in medicine, is povidone-iodine (10%)[4]. PVP iodine is also effective against herpes viruses, which show resistance to chlorhexidine, which is of interest because of the suspected significance of cytomegalovirus and Epstein–Barr virus in destructive periodontal disease[5].

Therefore, it was deemed important to evaluate data concerning the utility of povidone-iodine as an intraoral anti-infective agent and to assess its role in the management of periodontal diseases[4].

Spectrum and Mechanism of Microbial Destruction
PVP-I is microbicidal for Gram-positive and Gram negative bacteria, fungi, mycobacterium, viruses, and protozoan. Its bacterial activity is due to oxidation of amino (NH−), thiol (SH−), and phenolic hydroxyl (OH−) groups in amino acids and nucleotides. PVP-I also reacts strongly with double bonds of unsaturated fatty acids in cell walls and organelle membranes. Schreier et al. reported that electron microscopic and biochemical assessments supported the contention that PVP-I interacted with cell walls, causing a transient or permanent pore formation. This resulted in loss of cytoplasmic material and deactivation of enzymes due to direct contact with iodine. PVP-I also was found to cause coagulation of nuclear material without rupturing cell walls[4].

Material And Methods-Sample: Ten patients (age range 35-65 years) with moderate to severe periodontitis on the basis of clinical and radiographic parameters with the permission of ethical committee and consent of patient were selected from a larger group of subjects referred to the Department of Periodontology, Pacific dental college, Udaipur. Subjects who were invited to participate were otherwise healthy and met the following inclusion criteria: (i) had a minimum of 8 non-molar teeth, (ii) exhibited periodontal lesions characterized by probing pocket depth depth more than or equal to 5 mm in all quadrants.

Exclusion criteria included: (i) Patient with systemic disease (ii) Patient on drug therapy (iii) Any form of Tobacco user (iv) Pregnant\lactating mothers.

Determination of clinical parameters: Plaque presence/absence was determined (modified SILNESS and LOE 1967), Bleeding on Probing (LOE and SILNESS 1963), Probing pocket depth (PPD) was measured at 6 sites per tooth to the nearest 1 mm using a standardized periodontal probe, William's probe.

Relative attachment level (RAL) was assessed with the same probe by measuring the distance between fixed landmarks on individually fabricated stents and the bottom of the pocket. The reading of RAL was performed in connection with the PPD measurement and without changing the location of the probe-tip. Measurements at buccal and lingual surfaces were performed at the midpoint between the line angles. At interproximal surfaces, the measurements were performed immediately outside the contact point between two teeth with the probe angulated towards the midpoint of the interproximal surface.

The PPD and RAL measurements were performed at 6 sites (disto-buccal, buccal, mesio-buccal, disto-lingual, lingual, mesio-lingual) per tooth. Bleeding on probing (BOP) was assessed at 4 sites per tooth (mesial, distal, buccal and lingual) in conjunction with the PPD measurements[6].

Periodontal treatment: Patients initially received thorough oral hygiene instruction. In each subject, four test sites, each of them located in a different quadrant of the dentition, were selected based on having probing pocket depth of 5 mm or greater. All 4 quadrants randomly divided according to mode of treatment-

1st quadrant- scaling and root planing + subgingival irrigation with 10% Povidone iodine.
2nd quadrant - scaling and root planing
3rd quadrant - only subgingival irrigation with 10% Povidone iodine.
4th quadrant - no treatment

Subgingival irrigation was performed using a water-pik irrigator with a pik-pocket irrigating tip. Irrigation was performed at a pressure of 400 psi (Figure 1). All patients were, on an individual basis, informed about the nature of the proposed treatment and informed consent forms were signed.

Figure 1 Water pik irrigator

Result: In the regions treated with subgingival irrigation with 10% povidone-iodine solution superior reduction of the probing depth, more attachment gain and better reduction of the gingival inflammation were recorded in comparison with other groups.

At 4 weeks post treatment reduction in mean pocket depth was 1.43 mm for the PVP-iodine along with scaling and root planing group (group 1), 0.98 mm for the scaling and root planing group(group 2), while there was no difference noted for the PVP-iodine monotherapy and the control group(Table 3). The results were significant for the povidone iodine along with scaling and root planing group (P=0.0) as well as for the scaling and root planing group (P=0.0).

Reduction in visible dental plaque was 2.22±0.3 to 1.22 ±0.2 for group 1 and 2.12±0.4 to 1.26±0.2 for group 2, both of which were highly significant. (P=0.0)(Table 1).

Discussion: The present clinical study was designed to evaluate the clinical effects of the adjunctive use of povidone–iodine with/without, scaling and root planing in the treatment of slight to moderate chronic periodontitis. In each subject, the mouth was split into four quadrants.

The split-mouth design has the advantage of eliminating inter- subject variables. The selection of the povidone–iodine as an adjunctive treatment to scaling and root planing was based on the microbial etiology of the periodontal diseases. Povidone–iodine is probably, the most commonly used antiseptic agent in medical practice, possessing an unblemished safety track record, broad spectrum antiseptic action and low cost (Reimer et al., 2002)[7]. The results of the present study supported the reports of Rosling et al.(2001)[6] who evaluated the periodontal scaling and root planing with an ultrasonic device ‘‘Odontoson’’ plus 0.1% povidone–iodine irrigation and compared it to scaling and root planing with the same device, but with tap water irrigation. In the third month, they demonstrated that the reduction in probing depth for the povidone–iodine group was 1.1 mm compared to 0.8 mm for the tap water group and this difference was statistically significant. The difference in the gain of clinical attachment was 0.2 mm in favor of the povidone–iodine group.

Table 1 : Plaque Index

Plaque Index				
Quadrant	Day	Mean	SD	P
1	0 day	2.22	0.3	0.0 (SS)
	30th day	1.22	0.2	
2	0 day	2.12	0.4	0.0 (SS)
	30th day	1.26	0.2	
3	0 day	2	0.4	0.3 (NS)
	30th day	2	0.4	
4	0 day	2.1	0.3	0.1 (NS)
	30th day	2	0.4	

Table 2 : Gingival Index

Gingival Index				
Quadrant	Day	Mean	SD	P
1	0 day	2.2	0.2	0.0 ss
	30th day	1.1	0.4	
2	0 day	2.2	0.4	0.004 ss
	30th day	1.4	0.6	
3	0 day	2.3	0.4	0.18
	30th day	2.2	0.4	
4	0 day	2.3	0.3	0.042
	30th day	2.2	0.4	

Similarly the gingival index, showed a reduction from 2.2 ±0.2 to 1.1±0.4 for group 1 and from 2.2 ±0.4 to 1.4±0.6 which was highly significant (P=0.004) (Table 2).

According to the study done by Hoang T, Jorgensen MG, reduction in mean pocket depth was 1.8 mm for the PVP-iodine/ scaling and root planing group, 1.6 mm for the scaling and root planing group, and

0.9 mm for the PVP-iodine and the saline monotherapy groups, with statistical significance reached for the scaling and root planing group vs. the PVP-iodine group (P = 0.04) and for the scaling and root planing group vs. the saline group (P = 0.02). Reduction in visible dental plaque, which ranged from 38% to 62%, showed no significant differences among treatment groups[8]. These results were comparable to the results obtained in the present study where reduction in mean pocket depth in the SRP along with povidone iodine irrigation group was 1.42 mm, whereas in the SRP group it was 0.98mm which was statistically significant.

Table 3: Pocket Depth

Pocket depth				
Quadrant	Day	Mean	SD	P
1	0 day	5.17	0.7	0.0 ss
	30th day	4.18	0.6	
2	0 day	5.18	0.5	0.0 ss
	30th day	4.2	0.3	
3	0 day	5.12	0.6	0.2
	30th day	5.12	0.6	
4	0 day	4.9	0.7	0.3
	30th day	4.8	0.7	

The significant results obtained may be attributed to the fact that the pulsating nature of the water-pik irrigator which delivered povidone- iodine deeper into the periodontal pocket.

On the other hand, the results of this study contradicted those reported by Al-Saeed M Y et al.[7] and Hoang et al.[8].They evaluated that there was no significant difference between the treatment groups in terms of probing depth reduction, clinical attachment gain, gingival recession increase, reduction in the bleeding upon probing or plaque score reduction (P > 0.05).

The split mouth design carries the risk of transferring povidone–iodine from the assigned quadrants to the others. To minimize the risk, a high volume evacuation and saliva ejector was used to remove the excess solution and its aerosol.

Another disadvantage of this design was the presence of untreated sites which might act as a reservoir for periodontal pathogens. This may cause underestimation of the results, but not affect the comparison between treatment groups in as much as they will be affected equally.

Conclusion: Within the limitations of the present study, it might be concluded that: scaling and root planing along with subgingival irrigation using 10 % povidone iodine delivered with water-pik irrigator resulted in a marked resolution of the clinical signs of periodontal disease. These results are rationale for future studies on the effectiveness of the iodophore solutions in the treatment of the disease and on the clinical significance of the investigated treatment.

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