

BACTERICIDAL ASSESSMENT OF TWO SUBGINGIVAL IRRIGATION SOLUTIONS USED IN PERIODONTAL DISEASE

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ABSTRACT

Introduction Based on microbial etiology of chronic periodontitis, local microbial agents impact and systemic chemotherapy have been used to improve the effectiveness of scaling and root planing. Povidone-iodine (polyvinylpyrrolidone-iodine) is one of the most widely used antiseptic agents in the medical field. It is used as a disinfectant for the skin, hands and mucous membranes. It can also be used for the treatment of wounds rinsing body cavities, joints and ophthalmic applications. It is comprised of a combination of water-soluble polymer, povidone and iodine. **Aim of the study** This study aimed to evaluate the composition of the microbial flora in patients with various forms of periodontal disease and to study the bactericidal effect of the two antiseptic: chlorhexidine solution of povidone-iodine solution, evaluating the minimum inhibitory concentration and the effect of various microbial strains. **Material and methods** Our study included a group of 36 patients with 20 boys and 16 girls aged 16-20 years. The research consisted in laboratory and clinical investigations. At these patients we performed complete clinical examination, periodontal probing, radiographic examination, and microbial test for responsible flora. **Results** Our results showed that the reduction in the depth of the pockets and clinical attachment gain occurred, when the teeth have been treated with povidone - iodine in addition of hydrogen peroxide mixture, or with povidone -iodine and saline solution only as a coolant during the scaling ultrasound.

Keywords: chronic periodontitis, local microbial agents impact, laboratory and clinical investigations

INTRODUCTION

Primary etiologic factor in any form of periodontal disease, regardless of age is the plaque, with a dynamic interrelation between microbial challenge and the response of the host organism. Various systemic risk factors can modify the effect of plaque on the host. A risk factor for periodontal disease represents a particular aspect of behaviour or response to the environment that may be associated with

periodontal disease: the combination may or may not be causal. Some risk factors are variable, while others are not [1,2].

Cases with chronic periodontitis can be successfully managed by professional scaling, root planing and additional asset plaque control[3]. Ultrasound devices have been shown to be effective in root planing, even deep pockets. However, the complete elimination of plaque and tartar is hard to

achieve. Insufficient elimination of bacteria and its products could lead to the growth of microorganisms remaining [4].

This allows the re-colonization of the root surface of putative pathogenic bacteria. Based on microbial etiology of chronic periodontitis, agents local impact and systemic chemotherapy have been used to improve the effectiveness of scaling and root planning [5,6]. Povidone-iodine (polyvinylpyrrolidone-iodine) is one of the most widely used antiseptic agents in the medical field. It is used as a disinfectant for the skin, hands and mucous membranes. It can also be used for the treatment of wounds rinsing body cavities, joints and ophthalmic applications. It is comprised of a combination of water-soluble polymer, povidone and iodine.

AIM OF THE STUDY

This study aimed to evaluate the composition of the microbial flora in patients with various forms of periodontal disease and to study the bactericidal effect of the two antiseptic: chlorhexidine solution of povidone-iodine solution, evaluating the

minimum inhibitory concentration and the effect of various microbial strains.

MATERIAL AND METHODS

Our study included a group of 36 patients with 20 boys and 16 girls aged 16-20 years.

Our research consisted of laboratory and clinical investigations. At these patients we performed complete clinical examination, periodontal probing, radiographic examination, and microbial test for responsible flora.

We collected samples of the microbial composition from the periodontal pockets from 36 patients. Microbial determinations were performed in a microbiological laboratory.

Sampling was made after isolation with cotton rolls after gentle rinsing the mouth with water and drying with easy jet air. Sterile paper points was placed in a bag and kept up to saturation (10 seconds). A sterile paper cone was introduced and placed so as to arrive as close to the base periodontal pocket.

The test mode differ depending on the type of microbial flora.

Table 1. The type of microbial flora

<i>Polymorphic flora of periodontal pockets</i>	<i>Candida albicans</i> ATCC 10231
Broth R.C. (HiMedia Laboratories Pvt. Limited, India) Agar Wilkins-Chalgren (Oxoid, U.K)	Agar Sabouraud (Biotech, U.K)

Exam preparations was assessed by direct microscopic technique and was related to the number of bacteria seen under a microscope in special lighting conditions.

Subsequently, the specimens were cultured in the culture medium for evaluation of the effectiveness of various solutions used in the medicinal treatment of periodontal disease

Products tested were:

- chlorhexidine gluconate (concentration of the solution: 2%, 1%, 0.5%, 0.05% and 1%)

- povidone-iodine (solution concentration: 3%, 2%, 1%, 0.5% and 0.1%)

Bacterial strains isolated from periodontal pockets at which was evaluated antimicrobial activity against a polymorphic microbial flora, was evidenced by direct microscopic examination.

The methods used are, respectively on 3 study groups:

- subgingival irrigation ultrasonic scaler with a mixture of povidone-iodine and chlorhexidine gluconate,

- ultrasonic scaling subgingival irrigation with povidone-iodine only
- ultrasonic scaling subgingival irrigation with normal saline solution.

periodontal disease were as follows (table 2).

This clinical trial was designed to evaluate the clinical effects of povidone-iodine use as an adjuvant with or without hydrogen peroxide during ultrasonic scaling and disinfectants and root planing in the treatment of chronic periodontitis - mild to moderate.

RESULTS

The predominant bacteria deposits from gum pockets in patients with chronic forms of

Table 2. The antimicrobial effect of chlorhexidine gluconate on periodontal flora

Tested concentration	Sample 1	Sample 2	Sample 3
2%	+	+	+
1%	+	+	+
0,5%	+	+	+
0,1%	+	+	+
0,05%	+	+	+

Table 3. The antimicrobial effect of iodine-povidone on periodontal flora

Tested concentration	Sample 1	Sample 2	Sample 3
3%	+	+	+
2%	+	+	+
1%	+	+	+
0,5%	±	±	±
0,1%	-	-	-

Table 4. The antimicrobial effect of chlorhexidine gluconate on strain ATCC 10231 of Candida albicans

Tested concentration	The observed effect
2%	+
1%	+
0,5%	+
0,1%	±
0,05%	±

Table 5. The antimicrobial effect of iodine-povidone on strain ATCC 10231 of Candida albicans

Tested concentration	The observed effect
3%	+
2%	+
1%	+
0,5%	±
0,1%	-

In each subject, the oral cavity was divided into four quadrants. Using randomization table, selected quadrant was chosen to receive one of three treatment modalities, while four quadrant served as a blank control.

Table 6. Index plaque and media (\pm SD)

	Group 1	Group 2	Group 3
Initial	1.22 \pm 0.78	1.00 \pm 0.75	1.18 \pm 0.88
6 weeks	0.61 \pm 0.68 *	0.64 \pm 0.71 *	0.75 \pm 0.72*
3 months	0.61 \pm 0.67 *	0.58 \pm 0.62 *	0.63 \pm 0.64 *

There is no statistically significant difference between groups.

* (P <0.05) statistically significant change from visit base (intra-group).

Table 7. The percentage of site bleeding on probing

	Group 1 (%)	Group 2 (%)	Group 3(%)
Initial	68,5	65,8	72,6
6 weeks	* 34.5	27.9 _ *	34_*
3 months	29.5*\$_	31.5 *	32.6*_

* (P <0.05) statistically significant change from visit base (intra-group).

\$ (P <0.05) statistically significant change from visit 6 weeks (intra-group).

_ (P <0.05) statistically significant difference from the control group (inter-group).

Table 8. The level of clinical attachment and media(\pm SD)

	Group 1 (%)	Group 2 (%)	Group 3(%)
Initial	6.74 \pm 1.56	6.70 \pm 1.57	7.04 \pm 1.62
6 weeks	6.23 \pm 1.40 *	6.33 \pm 1.46_*	6.32 \pm 1.34 _*
3 months	6.15 \pm 1.35 *	6.22 \pm 1.41_*	6.17 \pm 1.36 _*

* (P <0.05) statistically significant change from visit base (intra-group).

\$ (P <0.05) statistically significant change from visit 6 weeks (intra-group).

_ (P <0.05) statistically significant difference from the control group (inter-group).

The addition of hydrogen peroxide was carried out in order to increase the effectiveness of povidone - iodine as an antimicrobial agent .

In this study, there was a reduction of about 1 mm deep pockets in group 1, group 2 and group 3 and the end of the study.

Untreated quadrants in this study showed statistically significant reduction in the depth from 2.82 mm to 2.55 mm at baseline and at 3 months. Reducing the depth of penetration could be a good solutions in untreated sites or for improving of oral hygiene .

It was a gain of clinical attachment level only 0.2 mm in untreated sites. Therefore, it is more likely that the reduction of inflamed

gingiva, because of the efficiency of the control treatment, was responsible for the reduction in the depth of the pockets.

Our results showed that the reduction in the depth of the pockets and clinical attachment gain occurred, when the teeth have been treated with povidone - iodine in addition of hydrogen peroxide mixture, or with povidone -iodine and saline solution only as a coolant during the scaling ultrasound.

DISCUSSIONS

Iodine-povidone showed the highest bactericid effect and the greatest reduction in the counting rate of oral bacteria.

Mechanical subgingival curettage with or without surgery, is basic means to destroy subgingival biofilm and pathogen control [3,7].

Antimicrobial agents that can be administered systematically (antibiotics) or local (iodine-povidone) can enhance pathogen eradication or mark abolition of scaling .

Microbiological testing can assist the clinician in selecting the most effective antimicrobial agent or combination of agents. Understanding the benefits and limitations of antibiotics and antiseptics will optimize their use in therapy of periodontal infections [6,8,9].

Current periodontal therapy involves measures ranging from simple removal of plaque by mechanical or scaling and root planing, to surgical procedures and may include antibiotics and antiseptics[10].

As microbiota associated with gingivitis parodontitis is different, different forms of

periodontitis pathogens that colonize show variations in periodontal pockets.

Following therapy sequence illustrated here can be made efficient and practical scientific approach to periodontal treatment[11,12].

CONCLUSIONS

1. Our study tested the effect of chlorhexidine and iodine-povidone recommended as subgingival irrigation solutions.
2. As can be seen, the minimum concentration of chlorhexidine for all active microbial strains tested is the same -0.05%
3. Regarding povidone-iodine, active trough inhibited microbial growth was 1%, representing 1/10 dilution compared to the concentration used in general medicine.

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