Original Article

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Effect of Topical Gel Chlorhexidine 0.2% on Non-Surgical Treatment of Chronic Periodontitis

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ABSTRACT

BACKGROUND AND OBJECTIVE: Pathogenic bacteria cause degeneration of periodontal tissues, which is essential for the reduction of gingival bacteria in order to reduce scaling and leveling. But there is no perfect treatment in pockets with a depth of more than 4 mm. Therefore, this study was conducted to investigate the effect of chlorhexidine gel as a topical supplementation after scaling and leveling the root surface in the treatment of moderate to advanced periodontitis.

METHODS: This tripartite clinical trial was performed on 31 patients with chronic periodontitis, each with at least four pockets of depth of 4 to 6 mm. 62 areas as controls and 62 regions of the experimental group were selected randomly. In all patients, scaling and leveling of the root surface were done. In the experimental group, in addition to the scaling and leveling, the chlorhexidine gel surface was injected into the pockets. In four steps, before treatment, 2, 3 and 6 months after treatment, the clinical parameters of gingival index, bleeding index, plaque index, adhesion index and probe index depth index were measured and recorded. (IRCT:1R1N2013081314350).

FINDINGS: The plaque index, bleeding index, gingival index and pocket probe depth in the group receiving the topical gel of chlorhexidine showed a significant difference in all levels of measurement compared to the control group (PI: control group was 2.75±0.44 and case group was 1.94±0.38, p=0.000, BI: The control group was 1.0±0.5, the case group was 0.05±0.44, p=0.000, PPD: the control group was 4.62±0.73, the case group was 3.88±0.83, p=0.000, GI: The control group was 1.77±0.42, case group was 1.18±0.18, p=0.000).

CONCLUSION: The results showed that injection of chlorhexidine gel with scaling and leveling of the root surface resulted in a greater improvement in periodontal clinical indices than SRP alone.

KEY WORDS: Chronic periodontitis, treatment, Chlorhexidine.

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Introduction

The contradiction between pathogenic bacteria and the inflammatory response of the susceptible host causes the destruction of periodontal tissues. Health education, scaling and root planning are essential for reducing gingival bacteria. On the other hand, it is possible that non-surgical treatments do not completely eliminate all pathogens present in the gingival environment, which is truer for deep-pockets. Because in pockets with a depth of more than 4 mm, 66% of the rooted surface has plaque and residual mass.

Deep pockets, therefore, significantly impede the effectiveness of non-surgical procedures (1, 2). So far, antibiotics and antiseptics, either in the form of systemic or topical administration, have been used in the treatment of moderate to advanced periodontitis (3). Priya et al., in their study of the effect of chlorhexidine chip with bis-collagen piscean in the treatment of chronic periodontitis, observed the positive effects of this treatment with SRP compared with SRP alone in reducing probe depth and clinical attachment levels (4). The effect of simultaneous use of chlorhexidine chip and laser diode in the treatment of chronic periodontitis was investigated by Kachapilly et al. It was observed that the use of chlorhexidine chip alone or with a diode laser in reducing the depth of the pockets and improving the level of clinical connections when combined with SRP in the treatment phase in non-surgical treatment is effective (5).

Systemic administration of antibiotics due to the potential for side effects should be limited to patients who are poorly responsive to mechanical treatments (6). Today, topical antibiotic and antiseptic methods have expanded with local drug delivery systems. Local antibiotic and antiseptic methods have been tested alone or in combination with SRP. The results of the topical application of these drugs indicate an improvement in the results obtained from mechanical treatments (7). Chlorhexidine is an antiseptic that has a broad spectrum of antimicrobial activity and is safe and not toxic (8). Gingival rinsing is not effective in treating periodontitis using chlorhexidine, because this method cannot maintain an effective concentration of the substance for a sufficient period of time in a periodontal pockets. To overcome this problem, devices were developed to slowly release chlorhexidine (9).

Based on these views, the aim of this study was to investigate the effects of using 0.2% chlorhexidine gel with SRP in the treatment of patients with moderate to advanced chronic periodontitis

Methods

This clinical trial study with the registration number IRCT:1R1N2013081314350 Approved by the Ethics Committee No. 53.1394IR.Gums.Rec. Between November 2013 and July 2014, 31 patients referring to the periodontics department of the special clinic of the Faculty of Dentistry of Guilan, were studied. People with moderate to severe chronic periodontitis with at least 4 pockets with a depth of 4-6 mm, lack of any systemic illness, lack of effective drugs usage such as antibiotics, contraceptives, etc.

In the past six months, having an acceptable collaboration, Non-smoking and non-periodontal treatment in the last six months were included. After selecting patients and giving written consent to each patient, the patients underwent health education in order to minimize plaque and mass. They were then asked to brush their teeth in a Bass method for 10 minutes twice a day (in the morning after breakfast and at night before bedtime) (3). After two weeks, patients were evaluated and the dental plaque condition was evaluated in all patients and was titrated as index basis and subjects with 10 to 30 percent index plaque were selected. In this research, 124 pockets with the mentioned conditions were selected. This research was performed on single-root teeth. For each pockets, plaque indexes (PI or Plaque Index), Bleeding on probing, probing pocket depth (PPD), Clinical attachment loss (CAL), and gingival index index) were recorded. Scaling and Root Planning (SRP) measurements were performed using ultrasonic instruments (Mactron, carasco, GE, Italy). In areas where the pocket depth was more than 5 mm, manual crutches were also used.

In all cases, root leveling was performed and evaluated with catheter .At the end of SRP, patients were re-called one week later and, if there was mass, SRP was re-treated for the patient. Then 0.2% chlorhexidine gel (Perio.Kin) was administered to each subject in the desired areas. The method of injection is Walking and Fill Over, by inserting the gel into the depth of the periodontal pocket with the insulin syringe and inserting the gel from the bottom of the pocket upwards to allow the depth of the pocket to be filled with gel. Then it was placed in the COP-PAK injection area. Patients were told that they would not eat anything for an hour after entering the gel and do not wash their mouths and keep oral hygiene well during the treatment. Finally, the cup was removed a week after the area. Followed by 2, 3 and 6 months follow-up. Finally, 31 patients and 124 districts were evaluated, which

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included 62 cases and 62 areas as controls. Data were analyzed using SPSS 16 software, paired t-test and independent t-test. P<0.05 was considered significant.

Results

In this study 124 samples were studied and all samples completed the study process. Treatment reduced PI, GI, BI, and PPD in both control and case groups and decreased CAL in the case group compared to pre-treatment (p<0.001) (table 1). In the control group, gingival adhesion loss only in the second month after treatment showed statistically significant improvement compared with the onset of treatment. (p<0.001), but in the other two stages (3 and 6 months), CAL status did not show improvement compared to the beginning of the study. There was a significant difference in improvement of PI, GI, BI and PPD between the two control and case groups in the 2nd, 3rd and 6th months in comparison with the pre-treatment (p<0.001). Comparison of CAL index between the two case and control groups, showed a significant difference between the 3rd and 6th months in comparison with the pre-treatment conditions (p<0.001) (table 2).

Table 1. Comparison of plaque index, gingival index and gingival hemorrhage index, pocket probe depth, gingival adhesion loss index relative to the onset time in the control and case group

Indicator	Evaluation steps	Control (SRP)		Case (SRP + CHX gel)	
		Mean±SD	p-value	Mean±SD	p-value
PI	PI0 –PI2	8.1±61.0	0.000	2.2±0.6	0.000
	PI0 –PI3	64.1±58.0	0.000	14.2±0.59	0.000
	PI0 –PI6	21.1±58.1	0.000	2.03±0.6	0.000
GI	BI0 –BI2	63.1±61.0	0.000	87.1±53.0	0.000
	BI0 –BI3	21.1±59.0	0.000	66.1±54.0	0.000
	BI0 –BI6	06.1±60.0	0.000	60.1±79.0	0.000
PPD	PPD0 –PPD2	89.0±60.0	0.000	25.1±72.0	0.000
	PPD0 –PPD3	67.0±58.0	0.000	08.1±70.0	0.000
	PPD0 –PPD6	44.0±52.0	0.000	04.1±73.0	0.000
GI	GI0 –GI2	13.1±38.0	0.000	28.1±47.0	0.000
	GI0 –GI3	92.0±39.0	0.000	31.1±40.0	0.000
	GI0 –GI6	67.0±37.0	0.000	25.1±42.0	0.000
CAL	CAL0 –CAL2	31.0±59.0	0.000	64.0±59.0	0.000
	CAL0 –CAL3	09.0±64	0.277	56.0±60.0	0.000
	CAL0 –CAL6	07.0±63.0	0.365	43.0±61.0	0.000

Table 2. Comparison of plaque index mean, gingival index mean and gingival hemorrhage index mean, pocket probe depth index mean and loss of adhesion mean in the two groups (case and control) by time of measurement

Group	Variable	Start of treatment (Mean±SD)	p-value	2nd month (Mean±SD)	p-value	3rd month (Mean±SD)	p-value	6th month (Mean±SD)	p-value
PI	Control	3.96±0.71	0.919	2.16±59.0	0.000	2.32±0.57	0.000	2.75±0.44	0.000
	Case	97.3±61		1.77±58.0		83.1±50.0		1.94±0.38	
BI	Control	2.06±0.25	0.347	0.44±0.54	0.033	0.85±0.50	0.000	1.00±0.60	0.000
	Case	2.11±0.32		0.24±0.47		0.45±0.50		0.51±0.74	
PPD	Control	5.02±0.64	0.427	4.14±0.83	0.02	4.35±0.74	0.000	4.62±0.73	0.000
	Case	4.93±0.71		3.68±0.80		3.85±0.79		3.88±0.83	
GI	Control	2.46±0.43	0.712	1.33±0.41	0.016	1.54±0.4	0.000	1.77±0.42	0.000
	Case	2.43±0.41		1.15±0.4		1.12±0.33		1.18±0.38	
CAL	Control	3.83±0.90	0.883	3.52±1.05	0.81	3.47±0.99	0.012	3.90±0.99	0.007
	Case	3.81±0.93		3.17±1.15		3.25±1.15		3.37±1.17	

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Discussion

The results of the study showed a significant difference in PI, BI, GI and PPD indices in the group receiving the topical chlorhexidine gel compared to the control group. This statistically significant difference is better in the gel recipient group.

There was no significant difference in gingival adhesion index in the second month between the two groups but in the third and sixth months, the difference between the two groups was statistically significant. Because in the case group of the third and sixth months, the index of adhesion loss increased and reached the initial and higher status.

However, in the gel recipient group, despite a slight improvement, the condition was still maintained. Pietruska et al in evaluating the effect of chlorhexidine on the improvement of periodontal parameters in chronic periodontitis patients, found it useful to use chlorhexidinethe, either topically or as a mouthwash. But the best result was in a group that received not only the chlorhexidine gel in the topical position, but also the areas covered with surgical dressing (10). Archana et al, in evaluating the efficacy of Subterranean use of chlorhexidine, indicated the use of Chlorhexidine Chip, along with massaging and leveling the root, is very useful and effective for the treatment of periodontitis patients (11). Verma and colleagues found it useful to use topical drug delivery along with routine SRP therapy to improve clinical parameters, in particular to achieve a significant reduction in pocket depth and higher adhesion levels (12).

Oosterwaal et al. In their study examined the effects of 2% chlorhexidine gel as a topical application along with performing SRP and obtained similar results in comparison with SRP alone. Meanwhile, they compared the 2% chlorhexidine gel with placebo gel with performing SRP and showed more beneficial effects of chlorhexidine gel (13), which according to the use of 0.2% chlorhexidine gel in this study, this difference in concentration can justify.

This research indicates the beneficial effects of topical chlorhexidine as an adjunct to the treatment of periodontal disease. In the present study, plaque index and gingival index (GI and PI) in both control and case groups showed a significant decrease in the two, three, and six-month retrospective examinations compared to the beginning of treatment. However, there were significant differences between the two case and control groups in reducing the GI and PI indices, indicating a higher improvement in the gel recipient group. The higher recovery of these two indicators in the gel recipient group could be attributed to the anti-plaque and antimicrobial activity of the chlorhexidine gel (10).

The decrease of PPD index in both groups was significantly different from the start of treatment in two, three, and six months reassessment. However, the difference in the recovery of this indicator in both case and control groups was statistically significant, and in the recipient group the recovery gel was better and the maintaining results were higher. Since the GI index is an inflammatory index and is well controlled due to the effects of chlorhexidine, the reduction of inflammation can be effective in reducing PPD.

According to study of Jeffcoat et al., reducing the depth of the pocket may significantly alter the patient's treatment plan (14). According to results and statistical analysis of CAL, only the gel recipient group showed significant improvement until the end of two, three, and six months reassessment, and the difference between the two case and control groups from the second and third months was statistically significant. The absence of a significant difference in the improvement of adhesion index between the two case and control groups in the second month after the onset of treatment can be considered as the mechanical interference of the chlorhexidine gel with the initial repair and delay (15). In both groups, improvement in bleeding index was significant in all retests compared to the beginning of treatment, and there were significant differences between the control and control groups in the re-examinations. As other studies have indicated, bleeding index as an analogue of the plaque index is improved by decreasing PI significantly (16-18).

In the case group, despite a significant improvement in periodontal indices compared with the onset of treatment and control group, in most of the indicators, the third and sixth months were slightly increased in the indices compared to the second month. In explaining this, we can point to the lack of compliance with health education by the end of six months. This means that the relationship between health indicators and increased indicators is meaningful.

On the other hand, the high concentration of chlorhexidine prevents it from being washed out of the pocket, and if it is washed, it will not increase the antibacterial properties. The GCF, which is 20 µl per hour, justifies the 1 minute half-life of the chlorhexidine gel in the periodontal pocket. In addition, the lack of adhesion of chlorhexidine to the levels of the root and its high prevalence of blood and serum proteins can

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justify its lower durability by gingival (19-22). Therefore, methods for preserving and further effect of chlorhexidine gel in the area under the gum are suggested. xanthan gum has adhesion properties to the tissue (23). Needlman et al. Have mentioned that the addition of xanthan to chlorhexidine increases the adhesion property and the cationic load of chlorhexidine reacts with the anionic charge of xanthan, which increases the gel structure and stability (24). It seems that the use of PerioKin topical chlorhexidine gel as a substitute for routine SRP therapy results in better improvement of BI, PI, PPD and GI indices in patients. Regarding the CAL index, although there is not a lot of recovery, it prevents the process from worsening to a great extent and maintains the same level of recovery. Due to the different concentrations of chlorhexidine, it is suggested that more extensive studies be carried out on different types of these concentrations.

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