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The Efficacy of Chlorhexidine Gel as an Adjunctive Treatment for Patient with Chronic Periodontitis

Ban Zuhair Ahmad

Department of Periodontics, College of Dentistry, AL-Essra University College, Iraq

Abstract

Background: chronic Periodontitis is considered to be an inflammatory disease and is characterized by the damaging the connective tissue and supporting bone due to secondary infection by periodontal bacteria. Chlorhexidine has been used in the dental practice as an excellent antiplaque agent. Chlorhexidine not only exhibits special property of substantivity, it also possesses a broad antimicrobial spectrum which makes its use in wide variety of oral disorders. Virtually all disciplines of dentistry make use of this material in different formulations like mouth wash, gel, spray, varnish, and restorative material.

Aims of study: The aim of this study was to evaluate the clinical effectiveness of locally delivered Chlorhexidine gel as an adjunctive therapy to scaling and root planing in treatment of chronic periodontitis.

Material and methods: five patients with chronic periodontitis were selected. Pocket depth between 4 and 6 mm was selected and the patient had two sites on his mouth (splitting mouth). A total of 17 control sites were scaled and root planed and 17 test sites were scaled and root planed and Chlorhexidine gel was added. The clinical parameters, probing depth (PD), clinical attachment level (CAL), plaque index (PI) and bleeding on probing (BOP), gingival index were recorded at baseline, 1 week, 2 weeks and 4 weeks.

Results: From baseline to a period of 4 weeks, significant difference was found between test and control group for PD, CAL, PI and BOP.

Conclusions: Subgingival injection of Chlorhexidine gel adjunct with scaling and root planing appeared to cause significant improvement compared with scaling and root planing alone in persons with chronic periodontitis.

Keywords: *Chlorhexidine gel , chronic periodontitis.*

Introduction

Periodontal disease is an inflammatory condition initiated by a bacterial infection which affects the supporting structures of the teeth. The first stage of the disease is plaque-associated gingivitis (inflammation of the gingivae), which is a reversible inflammatory condition characterized by redness and swelling of the gingivae and a tendency for the gingivae to bleed easily. It is caused by the accumulation and persistence of microbial biofilms (dental plaque) on the teeth.[1] In susceptible individuals, gingivitis may lead to the second stage of periodontal disease which is periodontitis. Periodontitis is an irreversible condition where inflammation of the gingivae is accompanied by connective tissue destruction and loss of the periodontal ligament and alveolar bone supporting the tooth. If untreated, periodontitis may ultimately lead to tooth loss.[(2)] Chronic periodontitis, formerly known as adult periodontitis or chronic adult periodontitis, is the most prevalent form of periodontitis. It is generally considered to be a slowly progressing disease. However, in the presence of systemic or environmental factors that may modify the host response to plaque accumulation, such as diabetes, smoking, or stress, disease progression may become more aggressive. [(3)] The use of adjuvant chemical antibacterial agents is considered an important complement to mechanical oral hygiene techniques, both those performed at home, as well as those performed in a professional setting, especially in cases where the patient is unable to maintain an acceptable standard of

oral hygiene, or when surgical procedures represent a contraindication. [4]

Chlorhexidine

It is a bisbiguanide base, is a cationic antiseptic with broad-spectrum antibacterial activity (against Gram-positive and Gramnegative bacteria and certain mycetes). Consequently, it has been extensively studied in medical settings as an antiseptic compound. [5] The bactericidal action is more effective against Gram-positive cocci and weaker in case of Gram-negative ones. There is also a moderate activity against some mycetes, but not against viruses and alcohol-resistant bacilli. [6] The efficacy of CHX is not limited to its antiplaque effect, but extends also to its substantivity, which allows the molecule to remain attached to tissues and have an antibacterial action lasting for 8-12 hours making it possible to reach the minimum effective dose required to inhibit plaque formation, even with very few daily administrations [7]. This property comes from CHX's ability to bind mucins, proteins forming the salivary film covering teeth and oral mucosa surfaces: the CHX cationic portions can bind to the mucin carboxylic segment, which is negatively charged. [7] CHX inhibits bacterial colonization and is slowly released as it is displaced by the calcium ions secreted by the salivary glands. [8]

The antibacterial action of CHX is, therefore, most likely the result of an immediate bactericidal action, followed by a prolonged bacteriostatic action, due to its ability to attach itself to the enamel surfaces . [7]

Materials and Method

A total of 34 sits diagnosed as suffering from chronic generalized periodontitis attending the clinic at the Department of periodontics in College of Dentistry / AL-Issra University. All five patients were informed about the purpose of the study and their consents were provided prior to their enrollment in to the study. The Exclusion criteria included: any chronic systemic disease, pregnancy, and smoking, use of antibiotics and/ or anti-inflammatory drugs within the last 3 months, the Presence of periodontal pocket depth (PPD) sites located on the same side PD between 4 to 6 mm.

Clinical procedure

A special preform (stent) was designed for the present study so as to have a systemic and methodical recording of all the observation and information. The sites were divided into two half, one half of the mouth is control sites and the other half is test sites Fig. (1).

Figure 1: examination kit.

Control sites: 17 sites were treated by scaling and root planing alone.

Test sites: 17 sites were treated with scaling and root planing followed by the placement of the 30ml CHX gel (PRIOKIN) in the periodontal pocket.

The following parameters were recorded at baseline (day 0), 1 week, 2 weeks and 4weeks using a Michigan "o" probe with marking of 1,2,3,5 by a single examiner:

- Gingival index (GI)
- Sulcus bleeding index
- Plaque index (PI)

The following parameters were recorded at baseline (day 0), and 4 weeks using a Michigan "o" probe with marking of 1,2,3,5 by a single examiner:

- Probing pocket depth - measurement to the nearest millimeter of the distance from the gingival margin to the depth of the pocket
- Relative clinical attachment level (CAL).

After recording all the parameters at the baseline, full mouth scaling and root planing was performed using ultrasonic instruments followed by hand instruments until all supra and subgingival root surfaces felt hard and smooth.

Following debridement, target sites were irrigated gently with cold saline to achieve hemostasis prior to placement of CHX gel (PERIOKIN) and it was applied into the deepest portion of periodontal pocket by means of a thin rounded tip needle .

Results

Probing pocket depth (P.I)

In control sits (table 1), the P.I mean showed a gradual decrease from 1.047± 0.212 at baseline to 0.993±0.595 at 1 week, 0.899±0.899 at 2 weeks and 0.793±0.489 at 4 weeks but however, there was no significant difference (p>0.05) between the baseline and the 1, 2 weeks but significant difference between the baseline and the 4 weeks. The overall mean total of P.I in control sits was 0.933±0.112.

In CHX sits, the P.I mean showed a gradual decrease from 1.262± 0.439 at baseline to 0.918±0.552 at 1 week, 0.393± 0.552 at 2 weeks and 0.311±0.463 at 4 weeks and there was significant difference between the baseline and 1week, 2weeks and 4 weeks. Moreover, there were significant difference between the 1 week with 2 and 4 weeks but not between the 2 and 4 weeks. The overall mean total of P.I in CHX sits was 0.721±0.450. The mean of P.I in CHX treated sits was significant difference (P ≤0.05) when compared to the mean of P.I in control sits fig (1).

Table 1: Clinical parameters assessments (PI, GI and BOP%; Means ±SD) of patient control / treated with Chlorhexidine gel (CHX) examined on 1, 2 and 4 weeks.

Treatment	Non-CHX (Control)					CHX				
Clinical parameter	Baseline	1-w	2-w	4-w	Total	Baseline	1-w	2-w	4-w	Total
P.I (M±S.D)	1.047 (±0.212)	0.993 (±0.595)	0.899 (±0.485)	0.793 (±0.489)	0.933 (±0.112)	1.262 (±0.439)	0.918 (±0.552)	0.393 (±0.488)	0.311 (±0.463)	0.721 (±0.450)
G.I (M±S.D)	1.158 (±0.365)	1.109 (±0.772)	0.523 (±0.499)	0.095 (±0.293)	0.821 (±0.507)	1.081 (±0.274)	0.868 (±0.664)	0.180 (±0.384)	0.098 (±0.297)	0.557 (±0.491)
B.O.P (%)	(6/63) 10	(5/63) 8	0%	0%		(15/61) 25	(10/61) 16	0%	0%	

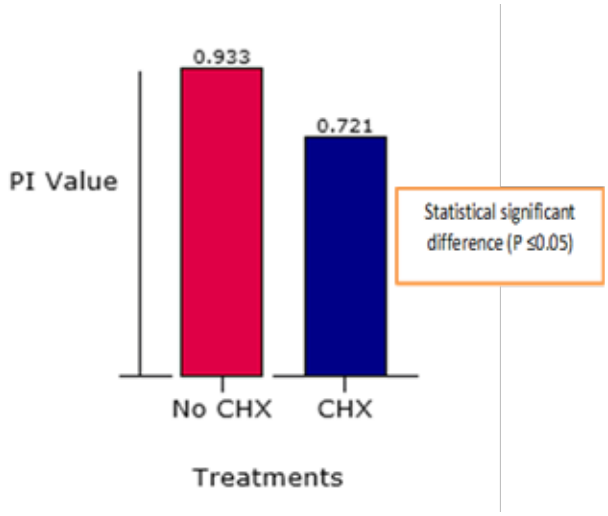

Figure 2: Overall PI values (mean ±SD) of patient control and treated sits with Chlorhexidine gel (CHX) during the study

Gingival index (G.I)

The G.I mean (table 1) of the control sits decreased from 1.158±0.365 at the baseline to 1.109±0.772 at the 1 week and to 0.523±0.499 at the 2 weeks and to 0.095±0.293 at the 4 weeks , however there was no significant difference between baseline and the 1 week but a significant difference between baseline and 2,4 weeks. The results also showed that there were significant difference between the 1 week with 2 and 4 weeks and between the 2 weeks with 4 weeks. The overall mean total of G.I in control sits was 0.821±0.507.

The G.I mean (table 1) of the CHX treated sits decreased from 1.081±0.274 at the baseline to 0.868±0.664 at 1 week and to 0.180±0.384 at 2 weeks and 0.098±0.297 at 4 weeks . This decrease was significant difference when the baseline compered to 1week, 2 and 4 weeks .However there was no significant difference between 2 and 4 weeks. The overall mean total of G.I in CHX sits was 0.557±0.491.

The mean of G.I in CHX treated sits was significant difference (P ≤0.05) when compared to the mean of P.I in control sits .

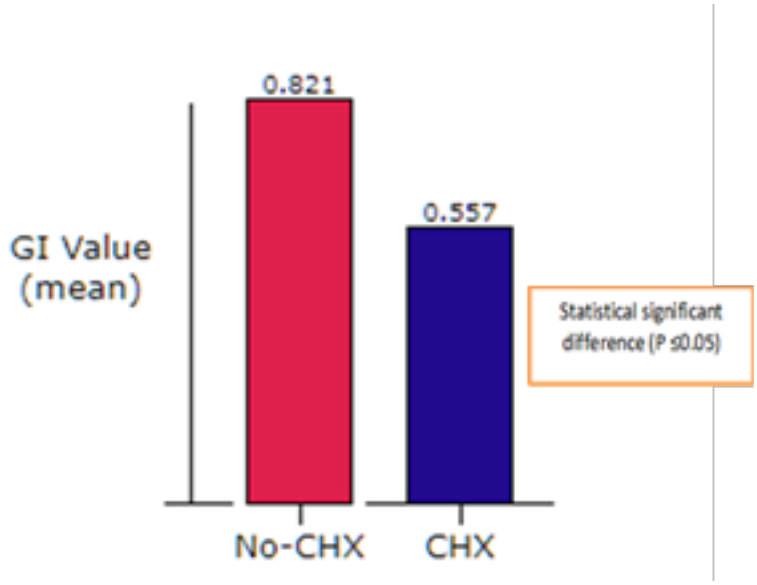

Figure 3: Overall G.I values (mean ±SD) of patient control and treated sits with Chlorhexidine gel (CHX) during the study

Bleeding index (B.O.P)

The results of the control sits (table 1) in this study showed that B.O.P was 10 % and decreased to 8% at 1 week while at 2 and 4 weeks the values ware 0%, no significant difference was observed between baseline and 1 week but a significant difference between the baseline and 2,4 weeks .

In the CHX treated sits the data at the baseline was 25% and decreased to 16% at 1 week and to 0% at 2, 4 weeks no significant difference was observed between baseline and 1 week but a significant difference between the baseline and 2, 4 weeks. On the other hand, both the control and treated sits showed no significant difference was observed between baseline and 1 week but a significant difference (0.05) when the baseline and 1 week compared to 2 and 4 weeks.

Clinical attachment lose CAL

The results (table 2) for the control sits showed a significant decrease from 5.240±1.068 at the baseline to 2.520±0.805 at 4 weeks, while the CHX treated sits also showed a significant decrease from 4.833±0.897 at the baseline to 2.222±0.415 at 4 weeks (table 2).

Table 2: Clinical parameters assessments (CAL and PD; Means± SD) of patient control / treated with Chlorhexidine gel (CHX) examined on baseline and 4weeks

Clinical parameter	Non-CHX (Control)		CHX	
	Baseline	4-w	Baseline	4-w
C.A.L (M±S.D)	5.240±1.068	2.520±0.805	4.833±0.897	2.222±0.415
P.D (M±S.D)	5.125±0.619	2.823±0.856	4.529±0.499	2.176±1.464

Probing pocket depth (P.D)

Table 2 showed the results of P.D values in control and treated sits, in control sits the value was significant decrease from 5.125±0.619 at the baseline to 2.823±0.856 at 4 weeks. While the P.D values in CHX treated sits showed a significant decrease from 4.529±0.499 at the baseline to 2.176±1.464 at 4 weeks .table 2 also showed that there were no significant difference between the values of control and CHX treated sits at 4 weeks of the study in both C.A.L and P.D.

Discussion

Chlorhexidine mouth rinsing is ineffective in eliminating a microbiota located beneath the gingival margin, Subgingival irrigation using chlorhexidine solution or even gels turn out to be effective in the treatment of periodontitis presumably due to its ability to retain biologically significant concentration of chlorhexidine for sufficient length of time within the confines of periodontal pocket (9,10). The studies have reported the treatment of periodontal pocket with chlorhexidine irrigation as an adjunct to scaling and root planning, provides a significant improvement in probing depth and reduces the microbial load. (11) The local delivery of CHX gel in periodontal pockets enhances the effect of scaling and root planning, thus CHX gel application shows long lasting (up to 90 days) favorable effects. (12)

In this study the CHX gel is supplied with a special needle having a blunt tip to facilitate the application of the gel without traumatizing or damaging the periodontal tissues. Periodontal probing is one of the most widely used diagnostic tools for the clinical assessment of connective tissue destruction in periodontal disease. Increased PD and loss of clinical attachment are pathognomonic for periodontitis and hence, serve as primary parameters in diagnosis of periodontal disease and evaluation the success of periodontal therapy. The significant reductions observed in plaque and gingival scores from baseline the results of this study are consistent with the results observed by Vinholis (13), when they evaluated the effect of subgingival irrigation with a 0.2% CHX collagen gel in periodontal pockets as an adjunct to scaling and root planing. Mizrak observed similar reduction of probing pocket depth with both the group that were treated either by scaling and root planing alone or scaling and root planing with controlled release CHX chip. (14)

Mechanical debridement with subgingival chlorhexidine gel application provide significantly greater improvements in periodontal parameter compared to those obtained by scaling and root planing alone in the treatment of chronic periodontitis. (15) The bleeding upon probing (B.O.P) is a periodontal parameter evaluating the probability of periodontal disease progression. The result of the study are consistent with the findings of Heasman (16) who observed mean reduction of bleeding index score from baseline to the 4 weeks in the site (scaling and root planing with CHX gel) as well as control site (scaling and root planing alone). The result is similar to the results observed in the present study.

This study is considered a non-surgical treatment of chronic periodontitis and the results are similar to those obtained in the study done by Vadiati in 2017 (17) who observed that injection with CHX gel with scaling and leveling of the root surface resulted in a greater improvement in periodontal clinical indices than SRP alone.

A study done by Manthena, et al to compare the effectiveness of CHX varnish and gel and conclude that Subgingival application of highly concentrated CHX varnish and gel following SRP is beneficial in reducing microbial count in moderate to deep periodontal pockets.

Conclusion

1. Chlorhexidine gel when applied topically, significally reduces the clinical parameters (plaque, gingival and bleeding index)

2. Can be highly recommended as an adjunctive treatment for chronic periodontitis.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

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References

1. Aimetti, M., Cacciatore, S., Graziano, A., Tenori, L., 2012. Metabonomic analysis of saliva reveals generalized chronic periodontitis signature. Metabolomics 8, 465–474
2. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of severe periodontitis in 1990-2010: a systematic review and meta-regression. Journal of Dental Research 2014;93(11):1045–53.
3. Newman MG, Tahei HH, Klokkevold PR and Carranza FA.2015.Carranza's Clinical periodontology. 12th ed., London: Elsevier
4. Gunsolley JC. Clinical efficacy of antimicrobial mouthrinses. J Dent 2010;38(Suppl 1):S6-10.
5. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for prevention of surgical site infec- system after periodontal flap surgery: a cross-over,randomized, triple-blind clinical trial. J Clin Periodontol 2008;35:614-20
6. Puig Silla M, Montiel Company JM, Almerich Silla JM. Use of chlorhexidine varnishes in preventing and treating periodontal disease. A review of the literature. Med Oral Patol Oral Cir Bucal 2008;13:E257-60.
7. Segreto VA, Collins EM, Beiswanger BB, Rosa M, Isaacs RL, Lang NP et al. A comparison of mouthrinses containing two concentrations of chlorhexidine. Journal of Periodontal Research 2006;21(s16):23-32
8. Chen Y, Wong RWK, Seneviratne CJ, Hägg U, Mc- Grath C, Samaranayake LP. Comparison of the antimicrobial activity of Listerine and Corsodyl on orthodontic brackets in vitro. Am J Orthod Dentofacial Orthop 2011;140:537-42
9. Gjermo P. Hibitane in periodontal disease. Journal of Clinical Periodontology 2009. 1099; 4: 94-101.
10. Asari AM, Newman HN, Wilson M et al 0.1 % and 0.2% commercial chlorhexidine solutions as subgingival irrigants in chronic periodontitis. Journal of Clinical Periodontology. 1996; 23: 320-5.
11. Lang NP and Ramseier-Grossmann K. Optimal dosage of chlorhexidine digluconate in chemical plaque control when appliedby the oral irrigator. Journal of Clinical Periodontology. 2000; 8:189-202.
12. Perinetti G, Paolantonio M, Cordella C, D'Ercole S, Serra E, Piccolomini R. Clinical and microbiological effects of subgingival administration of two active gels on persistent pockets of chronic periodontitis patients. J Clin Periodontol. 2004;31:273–81. [PubMed]
13. Vinholis AH, Figueiredo LC, Marcantonio E, Júnior, Marcantonio RA, Salvador SL, Goissis G. Subgingival utilization of a 1% chlorhexidine collagen gel for the treatment of periodontal pockets. A clinical and microbiological study. Braz Dent J. 2001;12:209–13. [PubMed]
14. Mizrak T, Güncü GN, Caglayan F, Balci TA, Aktar GS, Ipek F. Effect of a controlled-release chlorhexidine chip on clinical and microbiological parameters and prostaglandin E2 levels in gingival crevicular fluid. J Periodontol. 2006;77:437–43. [PubMed].
15. Jan cosyn, Iris wyn, Tim De Rouck. Long term clinical effects of a chlorhexidine varnish implemented treatment strategy for chronic periodontitis. Journal of Periodontology. 2006; 77: 406-415.
16. Heasman PA, Heasman L, Stacey F, McCracken GI. Local delivery of chlorhexidine gluconate (PerioChip) in periodontal maintenance patients. J

Clin Periodontol. 2001;28:90–5. [PubMed]

17. Vadiati Saderi B, Radafsher G ,Khanjani N ,Fathi S .Effect of topical Gel Chlorhexidine 0.2% on surgical treatment of chronic periodontitis . J Babol Univ Med Sci.2017;19(5):74-80.