ORIGINAL RESEARCH PAPER
VOLUME-6 | ISSUE-5 | MAY - 2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

"A Comparative Evaluation Of The Efficacy Of Subgingivally Delivered Xanthan Based Chlorhexidine Gel In The Treatment Of Chronic Periodontitis"

Dental Science

Dr. Niraj Chaudhari M.D.S. (Reader, CSMSS Dental College & Hospital, Aurangabad M.S.)
Dr. Saurabh Patil M.D.S. (Reader, SMBT Dental College & Hospital, Sangamner M.S.)
Dr. P.S.Rakhewar M.D.S. (Professor, SMBT Dental College & Hospital, Sangamner M.S.)
Dr. S.S.Doiphode M.D.S. (Ex-Prof, CSMSS Dental College & Hospital, Aurangabad M.S.)

ABSTRACT

The traditional therapy consisting of mechanical debridement may fail to eliminate the pathogenic bacteria because of their location within the gingival tissues or in other area inaccessible to periodontal instruments. This may lead to recurrence of periodontal inflammation. Systemic treatment with broad spectrum antibiotics has often been used as an adjunct to conventional treatment. To obtain an effective concentration of the antimicrobial drug in the periodontal pocket after systemic administration, repeated intakes over a prolonged period of time are required. Hence an attempt is made to study the effect of local delivery of these agents in periodontal pockets.

KEYWORDS:

Periodontitis, Local Drug delivery, Chlorhexidine, Xanthan.

Introduction:

Periodontitis is an inflammatory disease caused by specific micro-organisms or groups of specific micro-organisms. It is characterized by loss of connective tissue attachment to the tooth and migration of junctional epithelium apically which leads to pocket formation or recession, tooth mobility and finally tooth loss. The traditional cause-related therapy consisting of mechanical debridement may fail to eliminate the pathogenic bacteria because of their location within the gingival tissues or in other area inaccessible to periodontal instruments.2 This may lead to recurrence of periodontal inflammation. Systemic treatment with broad spectrum antibiotics has often been used as an adjunct to conventional treatment. To obtain an effective concentration of the antimicrobial drug in the periodontal pocket after systemic administration, repeated intakes over a prolonged period of time are required. With respect to these aspects, local delivery of these agents can be used in periodontal pockets. Goodson et al. (1979)3 first proposed the concept of controlled drug delivery in the treatment of periodontitis Based on these considerations, the present study is being conducted to clinically evaluate the efficacy of subgingivally delivered chlor hexidine gel when used as an adjunct to scaling and root planing in the treatment of chronic periodontitis.

Material & Method:

The present study was undertaken to clinically evaluate and compare the efficacy of subgingivally delivered xanthan based chlorhexidine gel along with scaling and root planing and scaling and root planing alone.

A total of 60 sites in 30 patients comprising of both the sexes and diagnosed as suffering from chronic periodontitis were selected from the department of periodontics and included in the study.

CRITERIA FOR PATIENT SELECTION

Inclusion Criteria:

1) Subjects in the age range of 20-60 years.
2) Subjects diagnosed as having chronic periodontitis with probing pocket depth of ≥5 mm and bleeding on probing present in atleast 2 non-adjacent sites.
3) Subjects who had not received any surgical or non-surgical periodontal therapy in the past 6 months.

Exclusion Criteria:

1) Subjects with history of any antibiotic therapy or antibacterial mouthwash in past 3 months.
2) Subjects with history of any systemic disease.
3) Any allergic reaction to chlorhexidine.
4) Pregnant women.
5) Subjects who are habitual smokers or use tobacco in any other form.
6) Subjects with periodontal pockets in which the depth of pocket corresponded to the apex of the tooth as in probable endodontic-periodontic condition.

STUDY PROTOCOL

- A special case history proforma was designed so as to have systematic and methodical recording of all the observations and information required for the study. The proforma included relevant data including indices and clinical examination.
- Treatment procedure was fully explained to all the patients before the study. Informed consent was obtained from all the patients and protocol was approved by institutional ethical committee.
- The following indices and clinical parameters were assessed and recorded for determination of periodontal status of the study patients, at baseline and subsequently on 30th and 45th day4 following the placement of chlorhexidine gel when used as an adjunct to phase I periodontal therapy (scaling and root planing) in treatment of chronic periodontitis.

1. Plaque Index (PI) (Turesky-Gilmore-Glickman modification of the Quigley-Hein 1970)9
2. Gingival Index (GI) (Loe and Silness 1963)10
3. Gingival bleeding index (Ainamo and Bay)11
4. Probing Pocket Depth (PPD) using William's graduated probe and acrylic stent.
5. Relative Attachment Level (RAL) using William's graduated probe and acrylic stent.

PROCEDURE

After recording the above parameters, thorough subgingival scaling and root planing (SRP) was done for all the sites using hand instruments and ultrasonic scaler under local anesthesia. The experimental site and the control site were randomly assigned by the flip of a coin. Along with phase I periodontal therapy (scaling and root planing), experimental sites received chlorhexidine gel. The gel was inserted into periodontal pocket subgingivally after drying the area using a dedicated syringe until the gel flowed out from the gingival

margin and no periodontal dressing was used.4 Subjects were given careful instructions in self performed oral hygiene measures; twice daily brushing using the modified Bass brushing technique.1 Subjects were instructed not to perform mechanical oral hygiene procedures (i.e., tooth brushing, flossing) on any study sites for 7 days.1 The level of oral hygiene was checked at each recall visit and further instructions were given when indicated.

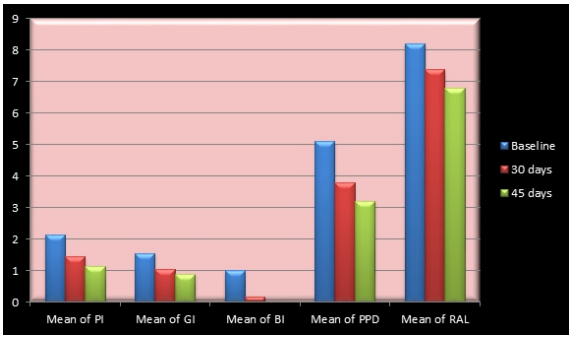
Patients were reevaluated on 30th and 45th day.4 The use of antimicrobial mouthrinses was not allowed during the study period.

Material used for the study:
Xanthan-based chlorhexidine gel Chlosite® (GHIMAS, Italy).

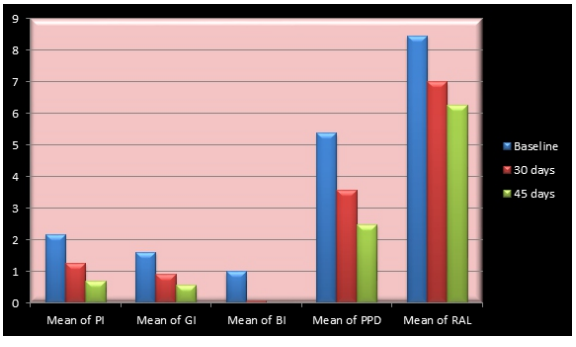
The gel is a combination of two chlorhexidine formulations: 0.5% chlorhexidine digluconate and 1% chlorhexidine dihydrochloride incorporated in a saccharidic polymer, xanthan. Cross linking structure of xanthan controls the release of drugs and it exhibits a near zero order drug release. When in contact with water, it forms a three dimensional pseudoplastic reticulum capable of holding and maintaining various substances in suspension.[4] The chlorhexidine xanthan based gel (CHX) undergoes a progressive process of imbibition and is physically removed in 10-30 days.[1] Chlorhexidine digluconate is liberated in the first day and achieves a concentration >100 µg/ml which is maintained for an average of 6-9 days which is greater than the minimum inhibitory concentration (MIC) for chlorhexidine (0.10µg/ml). Chlorhexidine dihydrochloride is released in the following days and maintains the bacteriostatic and bactericidal concentrations for at least 2 weeks and prevents recolonization.

Results:

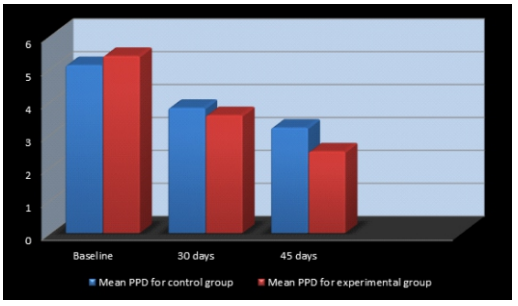
Graph-1 Mean and SD of PI, GI, BI, PPD & RAL at baseline, 30 days post-operative and 45 days post operative in Control group



Graph- 2 Mean and SD of PI, GI, BI, PPD & RAL at baseline, 30 days post-operative and 45 days post operative in Experimental group



Graph- 3 COMPARISON BETWEEN POCKET DEPTHS IN CONTROL & EXPERIMENTAL GROUP AT BASE LINE, 30 DAYS & 45 DAYS



Discussion:

The primary etiologic factor in periodontitis is bacterial plaque, which results in inflammatory lesion in the adjacent tissue leading to progressive destruction of the supporting periodontal tissues.[12]

Scaling and root planing has been shown to be an effective treatment for periodontitis. However, as the depth increases to ≥ 5 mm, scaling and root planing becomes progressively less effective. For periodontal pocket ≥ 5 mm, the adjunctive use of an antimicrobial may be necessary to enhance the therapeutic effect.**13,7** Hence, in the present study probing pocket depth of ≥ 5 mm was selected.

Local delivery of antibacterial agents into periodontal pockets has been extensively developed and investigated since the late 1970s. These systems allow the therapeutic agents to be targeted to the diseased site with minimal systemic effects, and also unnecessarily exposing the patient to large amounts of systemic antibiotics which can result in bacterial resistance.

Various local drug delivery systems to deliver antibacterial agents such as tetracycline, minocycline, doxycycline, chlorhexidine and metronidazole have been studied and resulted in better clinical changes in the test group.[3,8,14,15,16]

Chlorhexidine is one of the most investigated compounds in dentistry17 with numerous studies carried out on different formulations of chlorhexidine (mouth wash, topical gel, spray, varnish, chip, dentifrice etc). But very few studies have been conducted on formulation containing Xanthan- based chlorhexidine gel. Hence, the present study was carried out to evaluate the efficacy of subgingivally delivered Xanthan- based chlorhexidine gel as an adjunct to phase I periodontal therapy in the treatment of chronic periodontitis.

It could be explained that chlorhexidine gel attains additional antibacterial effects during the healing process of tissues which enhances the effect of scaling and root planing. CHX has bactericidal effect due to its cationic molecule binding to extra microbial complexes and negatively charged microbial cell walls thereby altering the osmotic equilibrium of cells. It also binds to salivary bacteria thus interfering with their adsorption to teeth.

In the present study, more reduction in PPD and RAL was obtained in the SRP + CHX gel group as compared to the SRP group. ***Unsal et al.***[5] found less CAL gain in periodontal sites treated with SRP and subgingival administration of 1% CHX gel compared to those treated with SRP alone. This observation was explained by the mechanical interference of the CHX gel with the early healing process. Similar results were stated by ***Quirynen et al.***[6] and ***Vinholis et al.***[18]. Taken together, these findings suggest that the high viscosity of a CHX gel formulation cannot reduce the clearance of CHX within the periodontal pocket, thus failing to increase the antibacterial effects of such devices, despite the well-known beneficial effects provided by CHX.[19] Furthermore, the lack of adherence of CHX to root surfaces20 and its high affinity for blood and serum proteins[21] were also hypothesized to be among the causes of its low subgingival substantivity.

The results of the present study have shown that both SRP and xanthan- based chlorhexidine (Xan-CHX) gel are effective for treating chronic periodontitis. However SRP in combination with Xan-CHX gel shows a better treatment option when compared to SRP alone. Hence this combination therapy can be extended to multiple sites as well as compromised patients in future.

The need for detailed microbiological study persists to co relate it with the clinical findings observed. Hence in future, it may be suggested that microbiological studies should include the aerobic and anaerobic culturing of the microorganisms and the methods to identify the individual strains of bacteria.

References

1) Gupta R, Pandit N, Aggarwal S, Verma A. Comparative Evaluation of Subgingivally Delivered 10% Doxycycline Hyclate and Xanthan-based Chlorhexidine Gels in the Treatment of Chronic Periodontitis. J Contemp Dent Pract 2008 November; (9)7:025-032.
2) Slots and Rams. Antibiotics in periodontal therapy: advantages and disadvantages. J Clin Periodontal 1990; 17:479-495.
3) Goodson JM, Haffajee A & Socransky SS. Periodontal therapy by local delivery of tetracycline. J Clin Periodontol 1979: 6: 83-92.
4) S Stratul, D Rusu. Initial periodontal therapy using a new Xanthan-based Chlorhexidine Gel- Chlosite. Int Poster J Dent Oral Med 2005; 7: 286-291.
5) Unsal E, Akkaya M, Walsh TF. Influence of a single application of subgingival chlorhexidine gel or tetracycline paste on the clinical parameters of adult periodontitis patients. J Clin Periodont 1994; 21:351-355.
6) Marc Quirynen, Claudio Mongardini, Marc de Soete, Martine Pauwels. 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: 578–589.
7) Timmerman MF, Van Strydonck DA, van der Velden U. Plaque inhibition of two commercially available chlorhexidine mouthrinses. J Clin Periodontol. 2005 Mar; 32(3):305-9.
8) Paolantonio M, D'Angelo M. Clinical and microbiologic effects of subgingival controlled-release delivery of chlorhexidine chip in the treatment of periodontitis: a multicenter study. J Periodontol. 2008 Feb; 79(2):271-82.
9) Turesky S, Gilmore ND and Glickman I. Reduced plaque formation by the chloromethyl analogue of vitamin C. J Periodontol 1970; 41: 41 – 43.
10) Loe H and Silness J. Periodontal disease in pregnancy. Acta Odontol Scand 1963; 21: 533 – 542.
11) Ainamo J, Bay I. Problems and proposals for recording gingivitis and plaque. Int J Periodont Res Dent 1975; 25:229.
12) Listgarten H. A. Plaque and Periodontal disease, the role of dental plaque in gingivitis and periodontitis. J. Periodontal1988; 15: 485-487.
13) Heitz M, Trombelli L, Heitz F, Neeleman I, Moles D. A systemic review of the effect surgical debridement versus non-surgical debridement for the treatment of chronic periodontitis. J Clin Periodontol 2002; 29(Supp. 3) : 92-102.
Garrett S, Adams DF, Bogle G, Donly K, Drisko CH, Hallmon WW, Hancock EB, Hanes P, Hawley CE, Johnson L, Kiger R, Killoy W, Mellonig JT, Raab FJ, Ryder M, Stoller N, Polson A, Wang HL, Wolinsky LE, Yukna RA, Harrold CQ, Hill M, Johnson VB, Soouthard GL.
14) The effect of locally delivered controlled-release doxycycline or scaling and root planing on periodontal maintenance patients over 9 months. J Periodontol 2000; 71: 22-30.
Williams RC, Paquette DW, Offenbacher S, Adams DF, Armitage GC, Bray K, Caton J, Cochran DL, Drisko CH, Fiorellini JP, Giannobile WV, Grossi S, Guerrero DM, Johnson GK, Lamster IB, Magnusson I, Oringer RJ, Persson GR, Van Dyke TE, Wolff LF, Santucci EA, Rodda BE, Lessem J.
15) Treatment of periodontitis by local administration of minocycline microspheres: a controlled trial. J Periodontol 2001; 72: 1537-1544.
Ainamo J, Lie T, Ellingsen BH, Hansen BF, Johansson LA, Karring T, Kisch J, Paunio K, Stoltze K.
16) Clinical responses to subgingival application of a metronidazole 25% gel compared to the effect of subgingival scaling in adult periodontitis. J Clin Periodontol 1992; 19: 723-729.
17) Jones CG. Chlorhexidine is it still the gold standard? Proceedings of the 1st European workshop on periodontology; London Quintessence 1997; 90: 119-125.
18) Vinholis AH, Figueiredo LC, Marcantonio Junior E, 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;12:209-213.
19) Loe H, Schiott CR. The effect of mouthrinses and topical application of chlorhexidine on the development of dental plaque and gingivitis in man. J Periodontal Res 1970;5:79-83.
20) Stabholz A, Kettering J, Aprecio R, Zimmerman G, Baker PJ, Wikesjo UM. Retention of antimicrobial activity by human root surfaces after in situ subgingival irrigation with tetracycline HCl or chlorhexidine. J Periodontol 1993;64:137-141.
21) Rolla G, Lo¨e H, Schiott CR. The affinity of chlorhexidine for hydroxyapatite and salivary mucins. J Periodontal Res 1970;5:90-95.