PILOT STUDY

A new management strategy for the treatment of streptococcal gingivitis: A pilot study

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Abstract

Objective: To demonstrate a supportive treatment option based on microorganism's growth characteristics.

Methods: This study was conducted at Ordu University, Faculty of Dentistry, Turkey, between January and April, 2017, comprising patients whose periodontal parameters and saliva pH scores were measured before and after the treatments.

The patients were divided into two equal groups. Group I underwent routine periodontal treatment methods for streptococcal gingivitis, while a supportive treatment that involved an antacid chewing tablet two times a day for a week based on the microorganism's growth characteristics was used on patients in Group II. SPSS 11.5 was used for data analysis.

Results: There were 16 patients in the study with an average age of 27.90±5.54 years. The periodontal index values progressively decreased for all patients post-treatment. However, the decrease of gingival index values in Group I was significantly higher than Group II ($p<0.05$). The decrease in the oral pH was statistically significant after the periodontal treatment procedures with supportive method ($p<0.001$).

Conclusion: The use of antacids in addition to conventional periodontal treatment may be effective in the treatment of oral streptococcal infections.

Keywords: Acute streptococcal gingivitis, Oral pH, Antacid, Oral hygiene. (JPMA 68: 235; 2018)

Introduction

Acute streptococcal gingivitis is a rare condition characterised by a diffuse erythema of the gingiva and the pathogenesis and prognosis of this oral disease is different from routine plaque-associated gingivitis.[1,2] Bacterial smears show a preponderance of streptococcal forms, which were identified as streptococcus viridians, but recently group A β-haemolytic streptococcus is reported.[3-5] Streptococcal gingivitis is usually seen with throat infections caused by streptoccus.[6] This disease is characterised by swollen bright-red gingiva associated with pain, fever, malaise, and submandibular lymphadenitis. However, there is a consensus about the treatment and a comprehensive periodontal treatment must be planned.[1] Numerous antimicrobials and antibiotics including penicillin, amoxicillin and chlorhexidine have been used for against streptococcus.[2,5] However, antibiotics that are taken for a bacterial infection have the potential to cause side effects such as vomiting, diarrhoea and teeth staining. Also, the development of antimicrobial-resistant bacteria is an increasing concern. These drawbacks justify further research and development of natural antimicrobial agents targeting specific oral pathogens while being safe for the host. The current study was planned to present a supportive treatment modality which was based on the microorganism's growth characteristics and could be very effective in this condition by not using antibiotic medication.

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Patients and Methods

This randomised prospective controlled clinical trial was conducted at Ordu University, Faculty of Dentistry, Turkey, between January and April, 2017, and comprised patients with periodontal problems because gingival bleeding, oedema and inflammation who presented to the periodontology clinic. Permission was obtained from the institutional ethics committee and informed consent was taken from all the participants. They were assured that if the supportive method was not successful within two days, the conventional periodontal treatment would be applied. The subjects were required to fill out a medical history questionnaire.

Periodontal parameters and saliva pH scores of all subjects were measured before and after the treatment.

Because of the clinical characteristics of the patients, acute streptococcal infection was suspected, and

bacterial specimens were obtained with sterile paper strips (Periopaper, ProFlow, Inc, Amityville, NY, USA) by inserting into the gingival crevice until mild resistance was felt, and left in place for 30 seconds. The samples were tested with Rapid Strep test. Then, the patients whose cultures of the gingival samples grew streptococcus pyogenes were included.

Subjects having received antibiotic treatments within the last three months or showing evidence of systemic disease that may influence oral condition were excluded. The final study population was divided into two equal groups. Patients in Group I were treated with routine periodontal procedures for streptococcal gingivitis, while Group II patients were given the supportive treatment. For randomised treatment allocation, the treatment methods were randomly assigned in a consecutive manner. First patient was treated with the conventional method, second patient with supportive method and this consecutive assignment of the treatments was then repeated for all subsequent participating patients.

Clinical examinations and measurements were done before and after treatment, using the plaque index (PI),[7] the gingival index (GI),[8] periodontal probing depths (PPD) of the teeth. The PI was scored on a scale of 0 to 3, where 0 = no plaque in the gingival area; 1 = a film of adherent plaque was present on the free gingival margin and the adjacent area of the tooth; 2 = moderate accumulation of soft deposits within the gingival pocket and on the gingival margin and/ or adjacent tooth surface which could be seen by the naked eye; 3 = an abundance of soft matter within the gingival pocket and/or on the gingival margin and adjacent tooth surface. The GI was scored on a scale of 0 to 3, where 0 = normal gingivae; 1 = the presence of mild inflammation, a slight change in gingival color, negligible edema, and no bleeding on palpation; 2 = moderate inflammation, gingival redness, oedema and glazing, and bleeding on probing; 3 = severe inflammation, marked gingival redness and oedema, ulceration, and a tendency to spontaneous bleeding. PPD from the gingival margin to the base of the crevice/pocket was measured using a manual probe (Hu-Friedy Manufacturing Inc., Chicago, IL, USA).

For all subjects conventional oral care procedures and initial periodontal treatment methods including oral hygiene instruction and scaling were done for streptococcal gingivitis. Since there might be localised bacteria in the toothbrush, a new soft toothbrush was referred to all patients. For Group I patients, during initial periodontal treatment including scaling, as a chemotherapeutic support amoxicillin (1000mg 2x1) and a mouth rinse including chlorhexidine digluconate (0.12%) had been given, as described in the literature.[5] For Group II patients, to inhibit antibiotic resistance, an alternative treatment which was based on the microorganism's growth characteristics was planned. For this purpose, during oral hygiene instruction and subsequent initial preparation including scaling, we offered an antacid chewing tablet, which included 680mg calcium carbonate and 80mg magnesium carbonate, three times a day (in the morning and before sleeping) for a week. When using this medication, the patients were requested to chew the antacid tablet without swallowing in for one minute and keep the saliva in oral cavity for extra two minutes and then spit. By this treatment method we tried to change the acidic oral pH required for growing of the streptococcus species and kept the optimal oral pH in normal values. To evaluate the efficacy of this method, the mean saliva pHs were measured in the first day and after the treatments. To measure the effects of the antacid treatment in oral environment, saliva samples were collected without any stimulation and pH values were recorded with pH-metre (Inolab pH-meter level 2, Wissenschafllich Technische, Germany) (Table-1). The pH measurements were done on the times (as below) of the first day (T0), after one time oral antacid administration on the first day for determining the pH change in saliva (Ta) and after all the treatments (T7 days).

1. Sample: Without any intervention (09:00 am); 2. Sample: 5 minutes later (09:05 am); 3. Sample: 30 minutes later (09:30 am); 4. Sample: 60 minutes later (10:00 am); 5. Sample: 6 hours later (3pm); and 6. Sample: 6.5 hours later (3:30 pm).

Then all patients were placed on a 1-month periodontal maintenance therapy schedule. SPSS 11.5 was used for data analysis. P-values $\leq$0.05 were accepted as statistically significant.

Results

There were 16 patients in the study with an average age of 27.90±5.54 years. Of the total, 11(68.7%) were male. At baseline there was no significant difference in the periodontal condition of all the subjects, meaning that their clinical values were similar prior to the therapy ($p>0.05$). For all patients, the periodontal index values progressively decreased after the treatments for seven days and these decrease were found to be statistically significant ($p<0.001$) (Table-2). After the different periodontal treatments, clinical index values such as

Table-1: The pH values of the subjects assessed at baseline (T_0) and after one time oral antacid administration on the first day (T_a).

Samples		Patients							
		1	2	3	4	5	6	7	8
Group I									
T_0	1	7.19	7.20	7.11	7.35	7.18	7.26	7.31	7.25
	2	7.25	7.21	7.19	7.36	7.25	7.31	7.32	7.19
	3	7.38	7.28	7.20	7.34	7.21	7.36	7.32	7.26
	4	7.34	7.30	7.28	7.38	7.25	7.36	7.37	7.30
	5	7.35	7.31	7.25	7.39	7.24	7.35	7.34	7.29
	6	7.35	7.30	7.32	7.40	7.22	7.38	7.35	7.30
Group II									
T_0	1	7.11	7.21	7.41	7.08	7.23	7.35	7.31	7.15
	2	7.15	7.20	7.40	7.15	7.21	7.33	7.28	7.18
	3	7.31	7.35	7.35	7.21	7.21	7.31	7.27	7.20
	4	7.35	7.31	7.34	7.25	7.28	7.34	7.29	7.20
	5	7.36	7.40	7.41	7.26	7.30	7.33	7.30	7.28
	6	7.31	7.38	7.40	7.21	7.30	7.32	7.30	7.29
T_a	1	7.15	7.22	7.35	7.16	7.28	7.36	7.31	7.17
	2	7.95	7.91	7.92	7.95	7.92	7.89	7.93	7.91
	3	7.61	7.70	7.65	7.70	7.68	7.71	7.71	7.75
	4	7.25	7.30	7.40	7.35	7.36	7.39	7.42	7.41
	5	7.20	7.22	7.38	7.35	7.30	7.38	7.39	7.24
	6	7.21	7.20	7.38	7.32	7.30	7.38	7.38	7.33

1. Sample: Without any intervention (09:00 am)
2. Sample: 5 minutes later (09:05 am)
3. Sample: 30 " " (09:30 am)
4. Sample: 60 " " (10:00 am)
5. Sample: 6 hours " (15:00 pm)
6. Sample: 6.30 " " (15:30 pm)

Table-2: Clinical parameters of study groups' patients assessed at baseline (T_0) and after the treatments ($T_{7\ days}$).

		T_0 (mean±SD)	$T_{7\ days}$ (mean±SD)	p(T_0-$T_{7\ days}$)
PI				
	Group I	1.14±0.03	0.15±0.05	<0.001
	Group II	1.16±0.07	0.19±0.07	<0.001
GI				
	Group I	1.76±0.16	0.07±0.02	<0.001
	Group II	1.73±0.26	0.79±0.11	<0.001
PPD				
	Group I	1.08±0.04	1.00±0.00	<0.001
	Group II	1.11±0.06	1.05±0.02	<0.001

PI, plaque index; GI, gingival index; PPD, periodontal probing depths.
* Significant difference between groups.

Table-3: The mean pH values of the groups before (T_0) and after the different treatment procedures ($T_{7\ days}$).

	N	T_0	$T_{7\ days}$	p
Group I	8	7.30±0.05	7.46±0.08	<0.001
Group II	8	7.29±0.07	7.47±0.02	

Results are expressed as mean±SD.

plaque and gingival index values of the different study groups were also found to be statistically different ($p<0.001$). The decrease in the Group I GI values after the periodontal treatment with medication was significantly higher than the decrease in the Group II GI values ($p<0.05$)). However, it was determined that periodontal treatment procedures with both medical treatment and supportive method increased the oral pH and this was found to be statistically significant ($p<0.001$) (Table-3).

The improvement of the gingival health for the Group I patients was better than Group II ($p<0.05$). However, acceptable improvement and oral health was also obtained at the end of the controls for Group II patients.

Discussion

In this study, a supportive treatment method was demonstrated for streptococcal gingivitis and its effects were evaluated using clinical periodontal indexes, pH-metre measurements and clinical findings. There was a lack of sufficient numbers of clinical studies about

streptococcal gingivitis. And also all these studies were case reports. This study is the first study investigating a supportive treatment option to inhibit the antibiotic resistant for oral treatment procedures and also is the first study investigating the streptococcal gingivitis.

Streptococcal infections of gingiva are seen rarely and are seen usually in adolescents.[1,2] There is a consensus about the treatment for this disease. The treatment simply is divided into four phases: hygienic, corrective, medical and maintenance. As treatment progresses through the four phases, non-surgical initial periodontal therapy is done by removing bio-film created by the bacterial pathogens; because the bacterial load should be reduced as much as possible before antibiotics are used. In our study, Group I patients were also treated according to these recommendations and after the treatment, full improvement was observed in all Group I subjects.

In pathogenesis of this disease like other oral diseases, saliva plays important roles as a defence mechanism with both non-immune and immune factors. Saliva has some protective factors against many various micro-organisms and prevents the oral mucosa from acidic toxicity.[9,10] At neutral pH, it prevents the bacterial glycolysis by inhibiting the pH dependant glucose uptake of the bacteria and potentates the antibacterial defence mechanisms as a bacteriostatic agent.[11-13] It has been shown that the ratio of hypothiocyanous acid (HOSCN) to hypothiocyanite (OSCN) value had an anti-streptococcal effect and very effectively inhibits bacterial growth if it was present in saliva at 7 pH values.[14] The most important factor for the increase of the pH is the HCO3.[15] Even though saliva has all those beneficiary anti-microbial effects that were mentioned above, sometimes it may not be sufficient enough to kill some specific bacteria which can be available in oral pH values of 6-8 and for streptococcus species which can survive at a low pH and to continue producing acid. Because streptococcus species are able to produce acids (acidogenesis), grow in environments with an acidic pH (acidophilia), produce acids at low pH values (aciduric capacity) and synthesise intra and extra-cellular polysaccharides.[16] pH changes may also inhibit the growth of oral streptococcus species.[17] The pH exerts selective pressure on bacteria: micro-organisms that recover their normal rate of growth shortly after exposure to an acid pH have an ecological advantage over those that take longer to reinitiate growth. Thus, even temporary alterations of oral acidity or alkalinity may have considerable repercussions on bacterial growth.[13,18]

By this study, an alternative treatment option was demonstrated based on these data to prevent antibiotic resistance development with chemotherapeutic agents and used antacid treatment as adjunctive to the recommended treatment modalities for streptococcal gingivitis. We tried to change the acidic oral pH required for growing of the streptococcus species and keep the optimal oral pH in normal values. In our study, this supportive method increased the oral pH and GI values of Group II patients were decreased after one week. Although, this decrease was not better as Group I, this should be enough for the optimal oral health.

As a conclusion, the use of antacids in addition to conventional periodontal treatment may be effective in the treatment of oral streptococcal infections. This method may be preferred because of the decreased risk of adverse effects due to the usage of systemic antibiotics.

Conclusion

The use of antacids in addition to conventional periodontal treatment may be effective in the treatment of oral streptococcal infections.

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