

Clinical Study on the Effect of Sodium Fluoride Mouthrinse /Gel and Toothpaste in Combination with Chlorohexidine Mouth Wash on Plaque and Gingivitis in Orthodontic Patients .

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Key words

Orthodontic ,fluoride ,chlorohexidine, gingivitis

Abstract

This study is to examine which one is most effective the use of NaF mouthrinse and toothpaste with chlorohexidine mouthwash or the use of NaF gel with NaF toothpaste and chlorohexidine mouth wash on the plaque and gingivitis of maxillary anterior teeth that occurs in orthodontic patients during the treatment of fixed appliance. A prospective, randomized, double-blind study with 60 orthodontic patients (16 males and 44 females, average age from 15 to 25) was designed . All the patients were instruct to brush with NaF tooth past three times in the day and to use chlorohexidine mouth wash at night . Visible plaque index (VPI) and gingival bleeding index (GBI) were recorded on the six maxillary anterior teeth at bonding and after one, two and three months and evaluated with t tests .Then the patients that began to have plaque and gingivitis were divided into two groups A and B , In group A they were instruct to use NaF gel (1500 ppm) in addition to NaF(1450ppm) toothpaste and 2% chlorohexidine mouth wash while group B used Naf (250 ppm) mouth rinse in addition to NaF toothpaste and chlorohexidine . There was a significant differences($P<0.05$) between bonding and debonding after 3 months recorded for VPI and there was also a significant difference between group A and B for the VPI and for the GBI after six weeks of the treatment . It was concluded that the combined use of an NaF toothpaste/gel and chlorohexidine mouthwash had a slightly more inhibitory effect on the development of , plaque and gingivitis on maxillary anterior teeth during fixed orthodontic treatment compared with NaF mouth rinse / toothpaste with chlorohexidine mouthwash .

Introduction

Orthodontic treatment is widely recognized for its results .Through the use of fixed appliances ,clinicians have been able to offer patients great improvements in their appearance and oral health . Depending upon the specific type and

severity , malocclusion is known to be associated with inadequate oral hygiene ,periodontal issues ,TMJ disease, speech problems , mouth breathing ,and where appearance is an issue ,poor self –esteem ⁽¹⁾ .Clinicians and patients alike have struggled with plaque buildup ,gingival irritation ,and the ensuing decalcifications around orthodontic brackets and

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bands, with approximately 80% of orthodontic patients falling into the preadolescent age groups, oral hygiene is especially difficult based on their emotional –development stage. This age group is known for rejecting authority, being influenced by peer pressure, and believing that because of their uniqueness they will be exempt from compromised health, this includes decalcification and the long – term adverse effects of poor oral hygiene⁽²⁾. Gingivitis is the most common inflammatory reaction of the gingiva and is caused by bacterial plaque colonization on tooth surfaces and subsequent invasion of the micro-organisms into the gingival sulcus⁽³⁾. Typically, patients experience gingival inflammation after a fixed appliance is placed. An increased number of microbes is present and the composition of the microbial load changes. One study of motivated patients undergoing fixed orthodontic therapy who were healthy after their first six months of treatment revealed they had significant microbiological changes, including a substantial increase in supragingival motile rods and subgingival spirochetes. Control of the microbial load would reduce the risk for future periodontal diseases^(4,5). The benefits of fluoride are well known: its lethal to bacteria; it aids in the remineralization of enamel; it forms fluorapatite, which is more acid-resistant than hydroxyapatite; and it has long term desensitizing effects. Fluorides desensitizing effects come from its ability to block the tubules and slow the flow of fluid that causes sensitivity⁽⁶⁾. A Toothpaste containing both amine fluoride (AmF) sodium fluoride (NaF) and stannous fluoride (SnF₂) was introduced in 1985 and the cariostatic potential has been documented in several studies^(7,8). Stannous fluoride also has a well-known plaque inhibiting effect and may inhibit bacterial metabolism⁽⁸⁾. It has been shown that a combination of AmF and SnF₂ reduced both plaque and retarded gingivitis. Sodium fluoride varnish is used to prevent caries development, arrest early enamel and even soft dentine caries through promotion of remineralization of carious tooth substance. It is also used to

treat tooth hypersensitivity⁽⁹⁾. Some use it as a provisional luting agent by itself or combined with other provisional luting agents for cementing provisional crowns⁽¹⁰⁾. Fluoride varnish has recently gained much attention in dentistry because it is quick and easy to apply. It sets rapidly on teeth, and gagging and swallowing is unusual. Side-effects or complications of its use are rare. Studies show that fluoride varnish is safe for young children and the risk of dental fluorosis is minimal. The simplicity of its application makes it very suitable and practical for use in dental clinics and outreach dental services, especially in young children and in other special needs groups⁽¹¹⁾. Chlorhexidine mouthwashes, as an adjunct to tooth brushing have been found effective in the control of gingival inflammation because chlorhexidine is the most potent documented antimicrobial agent against mutans streptococci, although prolonged use may cause problems with staining⁽¹²⁾. More recently, pre-brushing rinses have been introduced, though these show no difference in effect on plaque accumulation or gingival health⁽¹³⁾. Fluoride mouth rinses significantly reduce the extent of enamel decalcification and gingival inflammation during orthodontic treatment⁽¹⁴⁾. So the aim of this study is to evaluate which one is most effective in treatment of plaque and gingivitis that occurs during orthodontic treatment, the use of chlorhexidine mouthwash with sodium fluoride NaF tooth paste and mouth rinse or chlorhexidine mouth wash and fluoride toothpaste with sodium

Materials and Method

Study population. -The study group consisted of 60 adolescent patients scheduled to have fixed orthodontic treatment in the Orthodontic Department at the College of Dentistry university of Tikrit. Patients with a history of rheumatic fever, congenital heart disease, blood dyscrasias, or diabetes mellitus were not included. Patients were also excluded if they were diagnosed as having juvenile periodontitis. The study population age of the patients was between (15 -25) years, at the start of

treatment . Preventive treatment. -Shortly before appliances were placed , all study patients received instructions in tooth brushing with an approved sodium fluoride dentifrice 1450 PPM (Crest toothpaste) and to rinse at night with mouth wash containing 2% chlorohexidine (Corsodyl) . One week before the baseline examination, all patients underwent a session of supra – and subgingival ultrasonic scaling. Then Roth brackets with a 0.22 inch bracket slot of (dentarum) were bonded according to standard procedures using a nonfluoride adhesive . Excess adhesive around the brackets was removed with a scalar before curing, or with a tungsten carbide bur after curing. Bands were used routinely on the first molars and cemented with a glass ionomer cement.

Clinical Data Collection

The following clinical data was collected according to a previously described protocol⁽¹⁰⁾:

Plaque: VPI was recorded as 1 for visible plaque, and 0 for non-visible plaque on the mesio-buccal surface of every bonded tooth after rinsing and drying of the tooth surface.

Gingivitis: GBI was assessed using a 0.5 mm diameter periodontal probe (LM Dental LM 550B Si WHO probe, LM-Instruments Oy, Parainen, Finland). The gingiva was lightly air-dried and the probe lightly inserted into the gingival crevice parallel to the long axis of the tooth until slight pressure was felt. Only the gingival margin at the mesio-labial surfaces was evaluated. Bleeding was recorded as 1, and no bleeding as 0. The number of elicited bleeding points was totalled and divided by the number of units probed.

Then the patients that began to have increase in PI and GBI after 3 months were divided in to two groups A and B the both groups were still instructed to brush with the fluoride NaF 1450 PPM (crest) tooth paste and 2% chlorohexidine mouthwash (corsodyl) so the subjects in group A ($n = 13$, 3 males and 10 females) were requested to use the NaF gel in the evening after the tooth brushing during

the entire treatment period while the subjects in group B ($n = 12$, 3 males and 9 females) were requested to rinse in the morning and in the evening with NaF (250 ppm neutral sodium fluoride, pH 6.7) mouth wash. and the both groups were diagnosed at 3 , 6 , and 9 weeks and GBI ,VPI were measured after the 9 weeks of treatment .

Results

The results showed that 25 of 60 patients began to have increase in PI and GBI which means about 42% of the patients began to have plaque index and gingival index at 3 months of the treatment as shown in Table 1 .The clinical periodontal indices of the subjects recorded at baseline were expressed as Mean (SD) as follows: 0.12(0.200), 0.30(0.233) for the VPI, and GBI ,respectively. After 3 months the indices were measured as 0.62(0.630), 0.80(0.263) for the PI and GBI respectively. The values of VPI increased significantly when comparing the values at baseline with those after 3 months ($P < 0.05$). The gingival index also increased significantly from (0.31) at baseline to (0.54), (0.75) and (0.80) after 1 month, 2 months and 3 months respectively ($P < 0.05$). as shown in Table 2. The VPI and GBI of Group A using the NaF gel began to decrease at the 6 weeks of treatment faster than group B which used the NaF mouth rinse and there was a slight difference between group A and B (Table 3).

Discussion

It is well recognized that the patients who undergo orthodontic treatment are more likely to suffer gingivitis and different levels of periodontal breakdown during the orthodontic treatment phases. In most cases, the patients do not know exactly how they can maintain 'orthodontic treatment results. It is the orthodontist's responsibility to teach his/her patients the right way to perform the different methods needed for oral hygiene maintenance⁽¹⁵⁾. The results of the present study showed that only 42% of the patients began to

have gingivitis during orthodontic treatment with the use of chlorhexidine mouth wash and fluoride toothpaste this agrees with Gehlen *et al* 2000 who found in a prospective plaque regrowth study focusing on oral hygiene during fixed appliance therapy that the effect. 0.2% chlorhexidine (Corsodyl) may be employed as an adjunct to other preventive measures such as professional care and patient-oriented instruction on an intermittent basis in order to reduce the plaque-induced iatrogenic side effects and to enhance the efficacy of oral hygiene measures in connection with orthodontic therapy with fixed appliance ⁽¹⁶⁾ . The use of dentifrices with 1100PPm NaF and lower concentration of chlorhexidine can reduce the risk of tooth staining without compromising its effectiveness in controlling gingivitis and bleeding in orthodontic patients , although the intense motivating contact that the volunteers had with the researchers may have also played a role ^(17 , 18) . The results of the present study showed that the gingival index and bleeding tendency scores were significantly lower for the treatment group(A) using fluoride toothpaste and fluoride gel with chlorhexidine greater than the scores of group (B) which used a mouth wash containing NaF and chlorhexedine with fluoride toothpaste, this agrees with a study presented by Mozghan in 2009 , who found that the use of 5000 ppm NaFgel was more effective in preventing mineral loss , gingivitis and lesion depth than 250 ppm ASF. The higher concentration of fluoride (NaF) was more efficient in terms of lesion depth and mineral loss reduction when compared to ASF and to water⁽¹⁹⁾. Boyd and Chin in 1994, concluded that the use of a 0.4% SnF₂ gel containing more than 90% available Sn²⁺ is an effective adjunct to mechanical tooth cleaning in preventing gingivitis in adolescents⁽²⁰⁾ . The results of the study agrees with Jayaprakash and Hiremath in 2007 who assessed the effects of a mouthrinse containing chlorhexidine and sodium fluoride on plaque accumulation and gingivitis in comparison with a chlorhexidine mouth rinse alone in a group of school children aged 13-16 years in

Bangalore city. This combination along with the well established effect of fluoride in the prevention of caries presents an important contribution to dental public health. They suggested that the chlorhexidine-sodium fluoride mouth rinse potentially possesses a significant effect on inhibition of plaque accumulation and gingivitis. This combination along with the well-established effect of fluoride in the prevention of caries, presents an important contribution to dental public health⁽²¹⁾. Recently, it was suggested that individuals undergoing orthodontic treatment should brush twice daily with a 5000ppm fluoride dentifrice. This regime was reported to provide much greater prevention than the daily use of 1000ppm fluoride toothpaste in combination with the daily use of a 500ppm sodium fluoride rinse ⁽²²⁾ . We hypothesize that in this study the lack of increase in these scores in the NaF gel group occurred because the high NaF gel was preventing gingival inflammation that would have occurred if this gel had not been used. Also in plaque associated with fixed orthodontic appliances, the pH may drop below 4. At this low pH plaque fluid will be under saturated with respect to fluorapatite and no remineralization will occur. However, a calcium fluoride material with less internal phosphate is less soluble than fluorapatite and may protect the enamel as such against dissolution ⁽²³⁾ . This may be a significant factor since plaque pH is generally lower and hence clearance of fluoride can occur faster in the plaque on the upper anterior teeth than in other areas in orthodontic patients ⁽²⁴⁾ .

The results of this study showed that the combined use of NaF tooth paste / gel and chlorhexidine mouth wash had slightly more inhibiting effect on visible plaque index and gingival bleeding index on the upper anterior teeth compared with NaF tooth paste /mouth rinse and chlorhexidine mouth wash .However , a prophylactic regimen based on daily use of an NaF gel / toothpaste and chlorhexidine mouth wash will be effective in the treatment of VPI and GBI that occurs during orthodontic treatment and may be recommended during treatment with fixed orthodontic appliances .

Table (1):- illustrates the ages of the patients at the starting time of treatment and the number of males and females .

Age of the Patients	Number of the Females	Number of the Males	Total Numbers
15	8	2	10
16	7	2	9
17	7	0	7
18	6	3	9
19	3	2	5
20	4	3	7
21	0	3	3
22	2	0	2
23	1	0	1
24	2	0	2
25	4	1	5

Table (2):- illustrates the records of the clinical indices during different time points of the study.

Time Index	Baseline	1 Month	2Months	3 Months	P value
VPI	0.12±0.200	0.35±0.374	0.37±0.340	0.62±0.630	(P<0.05)
GBI	0.30±0.233	0.54±0.310	0.75±0.381	0.80±0.263	(P<0.05)

Table (3):- Mean visible plaque index and standard deviation for the maxillary anterior teeth and gingival bleeding index and standard deviation for group A and B .

Group	PI	GBI	P value
Group A	0.06 ± 0.13	0.12 ± 0.21	0.02
Group B	0.10 ± 0.21	0.13 ± 0.25	0.01

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