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Awareness of orthodontists regarding oral hygiene performance during active orthodontic treatment

ABSTRACT

Aim *The aim of the present study was orthodontist's awareness for maintenance of several home and professional prevention measures during active orthodontic treatment according to patients' report.*

Methods *A structured questionnaire was distributed to 122 patients undergoing active orthodontic treatment with fixed appliances. Patients were treated by 38 different orthodontists. The questionnaire accessed information regarding instructions patients received from their orthodontist concerning maintenance of their oral hygiene during orthodontic treatment.*

Results *Most of the patients (94%) reported that their orthodontists informed them at least once about the importance of tooth-brushing, and 74.5% received instructions for correct performance of tooth brushing or alternatively were referred to dental hygienist. However, only 24.5% of the patients reported that their orthodontist instructed them to use the correct fluoride concentration in their toothpaste, to use daily fluoride mouthwash (31.5%) and to brush their teeth once a week with high concentration of fluoride gel (Elmex gel; 10.2%). Only 13.8% received application of high concentration of fluoride gel or varnish at the dental office, and 52% of the patients reported that their orthodontist verified that they attend regular check-ups by their dentist. A significant positive correlation was found between explaining the patients the importance of tooth brushing and the following variables: instructing them on how to brush their teeth correctly ($p<0.0001$), explaining them which type of toothbrush is recommended for orthodontic patients ($p=0.002$), recommending to perform daily fluoride oral rinse ($p=0.036$) and referring them to periodic check-ups ($p=0.024$).*

Conclusion *Orthodontists should increase their awareness and commitment for instructing their patient on how to maintain good oral hygiene in order to prevent caries and periodontal disease during orthodontic treatment.*

Keywords *Gingivitis; Plaque control; Tooth-brushing.*

Introduction

Patients undergoing orthodontic treatment with fixed appliances face invariably objective obstacles in performing adequate oral hygiene measures and as a result, have increase susceptibility to carious and gingival diseases [Levin et al. 2008, Lovrov et al. 2007]. The oral hygiene difficulties are related to the fact that the orthodontic brackets and wires are tenacious trappers of food and other oral debris [Lovrov et al. 2007]. In addition, Lovrov et al. [2007] have shown an increase of 24.9% in the prevalence of white spot lesions in patients with fixed orthodontic appliances. Orthodontic treatment and fixed retainers were also associated with an increased incidence of gingival recession, increased plaque retention, and increased bleeding on probing [Levin et al. 2008].

One way to improve the oral hygiene of these patients is to use specially-designed toothbrushes. Several types of toothbrushes were suggested to assist orthodontic patients in brushing their teeth including electrical toothbrush, manual orthodontic toothbrush, triple headed toothbrush, interproximal toothbrush, brush with two sets of bristles [Ousehal et al., 2011; Rafe et al., 2006; Silvestrini Biavati et al., 2010; Zimmer et al., 1999]. Obviously, the role of the orthodontist is to inform patients about these toothbrushes and instruct them on when and how to use them. Indeed, frequent tooth brushing, repeated oral hygiene instructions and supervision contributed to the reduction of dental plaque and gingivitis in these patients [Levin et al., 2008; Lovrov et al., 2007].

To decrease further the caries risk during the

orthodontic treatment, patients are recommended to use several fluoride supplements. Twetman et al. [2004] concluded that daily (230-250 ppm, 0.05% NaF) or weekly (900 ppm, 0.2% NaF) use of sodium fluoride mouth rinses, decrease the development of new carious lesions by 29% in adults and children without additional exposure to fluoride. However, weekly usage of high-concentration fluoride gel is even more efficient then fluoride mouth rinse in caries reduction [Denes and Gabris 1991]. Unfortunately, compliance with dental home prevention measures is usually found to be rather low [Ashkenazi et al., 2007; Hobson and Clark, 1998; Geiger et al., 1992].

In addition to home dental preventive measures, it is also recommended to apply high-concentration fluoride gel or varnish (such as Durafat 22.600 ppm) at the dental office. Demito et al. [2004] found that application of high-concentration fluoride varnish 3-4 times a year, decreased caries lesions by 38% as compared to control.

Orthodontic patients tend to perceive that their orthodontist is the main dental care giver during orthodontic therapy and thus fail to visit their general dentist during this high-risk time for caries development. Nevertheless, only a limited number of clinical studies have examined whether orthodontists implement the above mentioned recommendations in their routine daily practice. In one survey among 178 orthodontists in the Netherlands, the authors concluded that orthodontists do not implement all the science based knowledge available today in order to prevent enamel demineralisation during orthodontic treatment with fixed appliances [Derks et al., 2007].

The aim of the present study was therefore orthodontist's awareness for maintenance of several home and professional prevention measures during active orthodontic treatment according to patients' report.

Materials and methods

Study population

The study population included 122 patients (mean age 16.3 ± 5 years), 44% boys and 66% girls, with fixed orthodontic appliances for at least 6 months, who agreed to fill in the questionnaire. The children were treated by 38 different orthodontists in private or public clinics located in the same large city. The study was approved by the Ethics Committee of Tel-Aviv University.

Questionnaire

A structured questionnaire was designed to assess the attitudes and actions of orthodontists regarding performance of several home and professional prevention measures during active orthodontic treatment. The questionnaire assessed demographic characteristics of patients (age, gender) and information regarding instructions patients received from their orthodontists concerning tooth brushing habits, tooth paste selection, usage of several fluoride supplements etc.

For analysis, the responses were scored on a 0-2 point scale. 0= low level, 2= optimal answer. In some questions, two multiple choice answers received the same score (Table 1-2).

Statistical analysis

Descriptive analysis was performed regarding patient responses to the questionnaire. The chi-square test was used to evaluate relationships between variables. The level of significance was set at 5%.

Results

Study population

The response rate for filling in the questionnaire was 100%. However, response rates for particular questions ranged from 92.6-97.5%.

Awareness of orthodontists regarding their patients' tooth brushing habits (Table 1)

Most of the patients (75%) reported that they were informed more than once about the importance of tooth brushing during their orthodontic treatment and 85% were instructed on when to brush their teeth.

Similarly, most of the patients (74%) reported that they had received information on how to brush or alternatively were referred to a dental hygienist for instructions. Only 60% of the patients reported that their orthodontist instructed them on the type of tooth brush to use.

Awareness of orthodontists regarding their patients' usage of fluoride supplementations (Table 2)

Most patients (75%) reported that they were not informed by their orthodontist about the recommended fluoride concentration in the toothpaste and only 33% of them reported that their orthodontist recommended them to use daily fluoridated mouth rinses. Ten percent were recommended to use high-concentration of fluoride gel once a week (Elmex gel). Only 14% of the patients reported that their orthodontist performed application of high concentration fluoride gel or varnish in office or at least recommended to receive this treatment.

Orthodontist referral to general/paediatric dentist (Table 1)

About half of the patients reported that their orthodontist never referred them for any dental

RESPONSES						QUESTION
RATE %	E	D	C	B	A	
97.5		5.9%	17.6%	38.7%	38.7%	Did your orthodontists explained to you the importance of tooth brushings during the orthodontic treatment? A. Yes, every visit (2) B. Only occasionally (2) C. Yes, only once (1) D. Never (0)
92.6			15%	39.8%	45.1%	In what frequency your orthodontist recommended to brush your teeth? A. Twice a day (2) B. After every meal (2) C. Did not mention (0)
95.9	25.6%	27.4%	15.4%	18.8%	12.8%	Did your orthodontist instruct you on how to brush correctly your teeth or refer you to a hygienist for this purpose? A. Yes, but did not evaluate the performance (1) B. Yes, and evaluate the performance every visit (2) C. Yes, and evaluate performance occasionally (2) D. Yes, only once (1) E. No (0)
95.9				41%	58.9%	Did your orthodontist informed you on which toothbrushes is recommended to use during orthodontic treatment? A. Yes (2) B. No (0)
95.1			48.3%	24.1%	27.6%	Did your orthodontist refer you to your dentist for routine dental examination? A. Yes, once (1) B. Yes, and reminded me occasionally (2) C. He never mentioned it (0)

TABLE 1 Patients' responses to the questions regarding tooth brushing and regular attending to recall dental examination during orthodontic treatment. The score for each of the answers, and used for correlation analysis, is given in parenthesis.

examination and never made sure they receive routine dental treatment or check-up. Only 25% of the patients reported that their orthodontist referred them to periodic dental examinations several times during the orthodontic treatment and 27.9% reported that they were referred only once.

Correlation analysis

A significant positive correlation was found between explaining the patients the importance of tooth brushing and the following variables: instructing them on how to brush their teeth correctly ($p<0.0001$), explaining them which type of toothbrush is recommended for orthodontic patients ($p=0.002$), recommending to perform daily fluoride oral rinse ($p=0.036$) and referring them to periodic check-ups ($p=0.024$).

Discussion

Patients with an orthodontic appliance are more susceptible to gingival inflammation and enamel decalcification [Levin et al., 2008; Lovrov et al., 2007]. Efficient mechanical removal of plaque has been shown to be the best mean of plaque control [Matic et al., 2011]. Additional effective preventive measures include use of several fluoride supplements and referral of the patients to regular follow-up appointments. Nevertheless, many patients undergoing orthodontic treatment still fail to maintain an adequate standard of plaque control and suffer from gingival inflammation and enamel decalcification.

One reason for this finding may relate to the fact that the orthodontists do not repeat their instructions and recommendation for dental home preventive measures at the periodic appointments and as a consequence, patients cease to comply or forget the recommendations [Ashkenazi et al., 2011]. Accordingly, the aim of the present study was to evaluate the awareness of orthodontists regarding oral hygiene maintenance of their patients according to patients' perception. In the current study, although, 94% reported that they received explanation on the important of tooth brushing and 85% of them received instruction for tooth brushing at least once during the orthodontic treatment, only 38%-19% received reinforcement in several appointment. The high number of orthodontists that instructed their patient on the importance of teeth brushing at least once during the treatment is in agreement with Hobson and Clark [1998] who showed that 100 per cent of the orthodontists advised routine use of a toothbrush for oral hygiene. However, Hobson

RESPONSES						QUESTION
RATE %	E	D	C	B	A	
96.7			75.4%	5.1%	19.5%	Did your orthodontist instruct you on what is the recommended fluoride concentration in the toothpaste to use? A. Yes, once (1) B. Yes, and reminded me from time to time (2) C. Did not mention (0)
96.7			68.8%	11.9%	19.5%	Did your orthodontist recommend you to performed fluoride oral rinses? A. Yes, once (1) B. Yes, and reminded me occasionally (2) C. He never mentioned it (0)
95.9			89.7%	1.7%	8.5%	Did your orthodontist recommend you to brush your teeth once a week with high concentrated fluoride gel (Elmex gel?) A. Yes, once (1) B. Yes, and reminded me occasionally (2) C. He never mentioned it (0)
95.1			86.7%	6%	7.8%	Did your orthodontist recommend you to performed fluoridation at the dental office by a gel or varnish? A. Yes, once in three months (2) B. Yes, and reminded me occasionally (2) C. He never mentioned it (0)

TABLE 2 Patients' responses to the questions regarding use of fluoride supplementation during orthodontic treatment. The score for each of the answers, and used for correlation analysis, is given in parentheses.

and Clark did not assess how many times orthodontists repeat their instructions. The importance of repeating the instruction in order to increase the compliance was shown by Ashkenazi et al., who showed that a significant positive correlation was found between compliance with preventive measures and number and frequency of recall appointments in which patients receive reinforcement [Ashkenazi et al., 2011]. McGlynn et al. [1987] compared two oral hygiene programmes in orthodontic practice. The first programme used a self-management oral hygiene booklet and was monitored by the orthodontist. In the second programme, patients were provided with oral hygiene aids and 'lectured' repeatedly by the orthodontist on the benefits of good oral hygiene. The second group showed some improvement in oral hygiene, but there was a greater improvement in the first group, due to behavioral self-management. This result supports the likelihood that the prescription of disclosing tablets, a self-motivation tool, may improve oral hygiene.

The effect of regular professional prophylaxis and oral hygiene instruction on the periodontal health of orthodontic patients was investigated by Huber et al. [1987]. They found that regular monthly oral hygiene instruction and professional prophylaxis of the teeth significantly reduced the amount of plaque accumulation and gingival enlargement associated with fixed appliances. Obviously, dental auxiliaries or dental hygienists can perform the instruction and prophylaxis; however the dentist should verify it.

In the present study 41% of the orthodontists did not recommend which type of toothbrush to use. This result is in accordance with Hobson and Clark [1998], in which only 20% of the orthodontists recommended interspace/interdental brushes and 8% electric toothbrush. The reason may lie in the fact that orthodontists consider these instructions as the dental hygienist's work, although 25% of the patients in the present study claimed that they were not even referred to a hygienist and 48% were not referred by their orthodontist to routine dental examination.

Concerning fluoride supplementations, about 75% of the patients, in the present study, reported that their orthodontists never told them about the recommended fluoride concentration in their toothpaste. It should be remembered that orthodontic patients are usually young and therefore may still use tasty children's toothpaste with lower fluoride concentration.

In the current study, only 31% of the patients reported that they were instructed to use fluoride rinses at least once. This percentage is lower than that reported by the orthodontists in previously published studies [Derks et al., 2007; Hobson and Clark, 1998]. The difference between the results of the current study and those previously published may be due to the responders: orthodontists in the previous studies versus patients in the current one. Patients in the current study might not remember the recommendations they have received about rinses, especially if they heard it only once and if it was not checked by the orthodontist during the following visits.

Only half of the patients reported that their orthodontist referred them to a dentist or made sure they receive a regular dental check-up by their dentist. The importance of referring these high caries risk population to dental examination should be of special

attention, since many of these patients refer to their orthodontist also as a general dentist, and therefore are not aware to the fact that they require periodic check-ups.

According to the correlation analysis, it is concluded that dentists that explain their patients about the importance of tooth brushing, will probably instruct their patients also on how to brush their teeth, explain which type of toothbrush is recommended for orthodontic patients, recommend to perform daily fluoride oral rinse and will refer their patients to periodic check-ups.

Conclusion

According to the present study orthodontists should improve their awareness of patients' dental health by instructing them on the importance of tooth brushing, correct tooth brushing, use of fluoride supplementation and by referring them regularly to routine check-ups by their dentists.

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