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RESEARCH ARTICLE

AWARENESS OF ORTHODONTIC PATIENTS ABOUT THE MAINTENANCE OF HOME AND PROFESSIONAL PREVENTION MEASURES DURING ACTIVE ORTHODONTIC TREATMENT

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ABSTRACT

Aim: To assess awareness of orthodontic patients regarding oral hygiene measures during active orthodontic treatment in Riyadh region, Saudi Arabia.
Methods: A descriptive cross-sectional study was carried out among 202 subjects aged between 15-25 years undergoing orthodontic treatment in various orthodontic centers. A structured, self-administered, and close-ended online questionnaire was provided to the orthodontic patients and their attitudes and actions regarding performance of several home and professional preventive measures during active orthodontic treatment were assessed. Descriptive and inferential statistics were applied to the data. All data were analyzed by using SPSS version 21software.
Results: Most of patient 85.1% reported that their orthodontist never recommended them to brush their teeth once weekly with high concentrated fluoride gel (Elmex gel). 69.3% were not referred for routine dental examination, 76.2% of patient reported they didn't receive any recommendation about the fluoride concentration in their toothpaste.
Conclusion: The study showed patient's awareness is inadequate for maintenance of several home and professional preventive measures during active orthodontic treatment in Riyadh Region.

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INTRODUCTION

Comprehensive and adjunctive orthodontic treatment is accessible for all ages. Correction of malocclusion improves quality of periodontal and restorative outcomes and psychological benefits (Buttke and Proffit, 1999).Orthodontic treatment has the potential to damage hard and soft tissue if used inadvertently. It is essential to have high standard of oral hygiene before and during orthodontic treatment. It is also important that any carious lesions should be treated before the start of the treatment (Travess *et al*., 2004). Fixed orthodontic appliance has been associated with the side effect of development and retention of plaque leading to demineralization of enamel, caries and gingival disease due to plaque accumulation on wires and surrounding the brackets (Lovrov *et al*., 2007; Levin *et al*., 2008). Damage to biological structure may lead to poor esthetic and plaque accumulation.

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There are changes oral environment with associated difficulties in keeping good oral hygiene. In the absence of preventive methods, gingival inflammation and enamel demineralization around fixed appliance will have adverse effects (Migliorati *et al*., 2015). Dental decay mostly occurs on smooth surfaces in fixed orthodontic patients affecting 2% to 96% of all orthodontic patients (Chang *et al*., 1997). An Increased risk of dental decay during treatment is due to the several factors, including: the carious lesions are difficult to locate; the resting pH is lowered there is increased volume of dental plaque; and there is a rapid shift in bacterial flora (Yun-Wah Lau and Wing-KIt Wong, 2006). It has been reported that demineralization can occur rapidly, within the first month of fixed appliance treatment.Oral hygiene instruction is essential in all cases especially in fixed orthodontic treatment .The quality, frequency and quantity of prevention methods should be implemented and adopted to prevent damage to supporting structures (O'Reilly and Featherstone, 1987). Hence it is important that an orthodontist is required to educate their patient about the importance of oral hygiene and instruct them

when and how to use tooth brush during orthodontic treatment continuously. It requires experience and effort from orthodontist to change habits and behavior of patients (Bardal *et al*., 2011). To decrease damage preventive measures include patient selection, vigorous oral hygiene measures and dietary awareness. Reinforcement of oral hygiene and dietary awareness should be implemented at each visit. Positive reinforcement even in good oral hygiene will motivate the patient further mechanical and chemical methods to prevent plaque accumulation can maintain gingival and repair enamel damage (Travess *et al*., 2004). To improve oral hygiene several types of tooth brushes, such as special design toothbrush, electrical toothbrush, manual brush orthodontic toothbrush, triple headed toothbrush, interproximal toothbrush brush with two set of a bristle (Zimmer *et al*., 1999; Rafe *et al*., 2006; Silvestrini Biavati *et al*., 2010; Ousehal *et al*., 2011). To decrease caries risk it is recommended to use several fluoride supplements including fluoridated mouthwash, fluoridated toothpaste, application of fluoride gel (Elmex gel) weekly and perform fluoridation at dental office by gel or varnish 2-3 times yearly found that it will decrease caries lesions by 38% as compared to control (Demito *et al*., 2004).Incidence of white spot lesions in patients treated with fixed orthodontics was significantly high and the preventive therapy provided appeared to be ineffective (Richter *et al*., 2011). Orthodontics appliances increases the plaque accumulation thus, changes the composition of the oral flora, and complicates the oral hygiene for the patient gingival inflammation and enamel decalcification present when the prevention measures not carry out correctly. Adequate repeating of prophylaxis and reinforcement of oral hygiene measures on monthly basis had a significant effect in reducing the gingivitis routinely associated with fixed orthodontic appliances (Ay *et al*., 2007).

Therefore, patients with fixed orthodontic appliances need to maximize oral hygiene care since it is a challenging task to maintain acceptable oral hygiene, to minimize complications during the treatment (Zimmer *et al*., 1999; Rafe *et al*., 2006; Silvestrini Biavati *et al*., 2010; Ousehal *et al*., 2011). Patients usually fail to visit their general dentist assuming that their orthodontist is the main oral health provider during orthodontic treatment. Hence the patients should be made aware of visiting their dentist for regular checkups and preventive care. Therefore, purpose of the study is to assess the educational and oral hygiene method of prevention provided to orthodontic patients by utilizing specially designed questionnaire among orthodontic patients.

MATERIALS AND METHODS

Ethical approval

Study proposal submitted to research center of Riyadh Colleges of Dentistry and Pharmacy and approval was obtained. Informed consent was obtained from the study participants.

Study setting and sample

List of government and private dental centers providing orthodontic treatment was prepared, and by employing convenient sampling methodology few orthodontic centers were included in to the study. Then, a total of 202 patients (age: 15-25 years) undergoing fixed orthodontic treatment and those agreed to participated in the study were considered. Patient's duration of fixed orthodontic treatment ranged between 3 months to 12 months. An online questionnaire was designed to assess the attitudes and actions of orthodontic patients regarding performance of several home and professional preventive measures during active orthodontic treatment. A structured close ended questionnaire consisting of 16 questions were prepared by subscribing survey monkey online system. Patients were requested to fill the questionnaire in ipad provided by the researcher. Once the patient submits the filled questionnaire it was saved within the database. All the data was retrieved in the form of excel sheet and subjected to the statistical analysis. Descriptive statistics and chi-square tests were applied to evaluate the relationships between variables. All the statistical analysis is performed by using SPSS version 21 software, and the level of significance was set at 5% ($p<0.05$).

RESULTS

Characteristic of study participants

Most of participants were (82.2%) females, (90.1%) of the patient were Saudis. (75.7%) of the patient with high educational level. Most Patients treated in private clinic (81.2%). Patient reported that they are undergoing orthodontic treatment since more than twelve month (69.8%), as shown in (Table 1).

Table 1. Characteristics of study participants

Characteristics		n	%
Gender	Male	36	17.8
	Female	166	82.2
	Total	202	100.0
Nationality	Saudi	182	90.1
	Non-Saudi	20	9.9
	Total	202	100.0
Educational Level	Uneducated	0	0.0
	Primary	0	0.0
	Secondary	7	3.5
	High school	42	20.8
	University	153	75.7
	Total	202	100.0
Orthodontic Clinic	Govt	38	18.8
	Private	164	81.2
	Total	202	100.0
Age (Yrs): Mean ± SD	21.45±2.90		
How Long Orthodontic Treatment	less than 3 months	15	7.4
	4 to 6 months	14	6.9
	7 to 9 months	19	9.4
	10- 12 months	13	6.4
	more than 12 months	141	69.8
	Total	202	100.0

Awareness of orthodontic patients regarding tooth brushing and regular dental examination during the treatment. Most of the patients (64.4%) reported that they were informed every visit about the importance of tooth brushing during their orthodontic treatment and (76.2%) were instructed on when to brush their teeth. Similarly, most of the patients (54.5%) reported that they had received information on how to brush or alternatively were referred to a dental hygienist for instructions. Only (66.3%) of the patients reported that their orthodontist instructed them on the type of tooth brush to use. (69.3%) reported that their orthodontist never refer them to their dentist for routine dental examination (Table 2).

Table 2. Patients' responses to the questions regarding tooth brushing and regular attending to recall dental examination during orthodontic treatment

Questions	Responses	n	%
Did your orthodontist explained to you the importance of tooth brushing during the orthodontic treatment?	Yes, every visit (2)	66	32.7
	Yes , occasionally (2)	64	31.7
	Yes, only once (1)	55	27.2
	No (0)	17	8.4
In what frequency your orthodontist recommended to brush your teeth?	Twice a day (2)	41	20.3
	After every meal (2)	113	55.9
	Did not mention (0)	48	23.8
Did your orthodontist instruct you on how to correctly brush your teeth or refer you to a hygienist for this purpose?	Yes, but did not evaluate the performance (1)	42	20.8
	Yes, and evaluate the performance every visit (2)	20	9.9
	Yes, and evaluate performance occasionally (2)	27	13.4
	Yes, only once (1)	21	10.4
	No (0)	92	45.5
Did your orthodontist informed you on which toothbrush is recommended to use during orthodontic treatment?	Yes (2)	134	66.3
	No (0)	68	33.7
Did your orthodontist refer you to your dentist for routine dental examination?	Yes, once (1)	35	17.3
	Yes, and reminded me occasionally (2)	27	13.4
	He never mentioned it (0)	140	69.3

The score for each of the answers, and used for correlation analysis, is given in parenthesis.

Table 3. Patients' responses to the questions regarding use of fluoride supplementation during orthodontic treatment

Questions	Responses	n	%
Did your orthodontist instruct you on what is the recommended fluoride concentration in the toothpaste to use?	Yes, once (1)	29	14.4
	Yes, and reminded me from time to time (2)	19	9.4
	Did not mention (0)	154	76.2
Did your orthodontist recommend you to performed fluoride oral rinses?	Yes, once (1)	48	23.8
	Yes, and reminded me occasionally (2)	29	14.4
	He never mentioned it (0)	125	61.9
Did your orthodontist recommend you to brush your teeth once a week with high concentrated fluoride gel (Elmex gel)?	Yes, once (1)	15	7.4
	Yes, and reminded me occasionally (2)	15	7.4
	He never mentioned it (0)	172	85.1
Did your orthodontist recommend you to performed fluoridation at the dental office by a gel or varnish?	Yes, once in three months (2)	15	7.4
	Yes, and reminded me occasionally (2)	15	7.4
	He never mentioned it (0)	172	85.1
Did your orthodontist recommend you to use special orthodontic Floss?	Yes, once (1)	57	28.2
	Yes, and reminded me occasionally (2)	59	29.2
	He never mentioned it (0)	86	42.6

The score for each of the answers, and used for correlation analysis, is given in parentheses

Table 4. Relationship between different variables

		Did your orthodontist explained to you the importance of tooth brushing during the orthodontic treatment?				
		0.00 %	1.00 %	2.00 %	*Chi-square*	*P value*
In what frequency your orthodontist recommended to brush your teeth?	.00	88.2	34.5	10.8	54.65	<0.001*
	2.00	11.8	65.5	89.2		
Did your orthodontist instruct you on how to correctly brush your teeth or refer you to a hygienist for this purpose?	.00	94.1	69.1	29.2	48.14	<0.001*
	1.00	5.9	27.3	36.2		
	2.00	0.0	3.6	34.6		
Did your orthodontist informed you on which toothbrush is recommended to use during orthodontic treatment?	.00	76.5	38.2	26.2	17.73	<0.001*
	2.00	23.5	61.8	73.8		
Did your orthodontist refer you to your dentist for routine dental examination?	.00	88.2	76.4	63.8	14.92	0.005*
	1.00	11.8	21.8	16.2		
	2.00	0.0	1.8	20.0		
Did your orthodontist instruct you on what is the recommended fluoride concentration in the toothpaste to use?	.00	100.0	92.7	66.2	21.99	<0.001*
	1.00	0.0	7.3	19.2		
	2.00	0.0	0.0	14.6		
Did your orthodontist recommend you to performed fluoride oral rinses?	.00	88.2	81.8	50.0	25.04	<0.001*
	1.00	11.8	16.4	28.5		
	2.00	0.0	1.8	21.5		
Did your orthodontist recommend you to brush your teeth once a week with high concentrated fluoride gel (Elmex gel)?	.00	100.0	94.5	79.2	10.58	0.032*,
	1.00	0.0	3.6	10.0		
	2.00	0.0	1.8	10.8		
Did your orthodontist recommend you to performed fluoridation at the dental office by a gel or varnish?	.00	94.1	92.7	80.8	5.55	0.062
	2.00	5.9	7.3	19.2		
Did your orthodontist recommend you to use special orthodontic Floss?	.00	100.0	52.7	30.8	47.99	<0.001*
	1.00	0.0	40.0	26.9		
	2.00	0.0	7.3	42.3		

*chi-square test

Patient's response to the questions regarding the use of Fluoride supplementations during orthodontic treatment

Most patients (76.2%) reported that they were not informed by their orthodontist about the recommended Fluoride concentration in the toothpaste and only (38.2%) of them reported that their orthodontist recommended them to use daily Fluoridated mouth rinses. (14.8%) were recommended to use high-concentration of Fluoride gel once a week (Elmex gel). Only (14.8%) of the patients reported that their orthodontist performed application of high concentration Fluoride gel or varnish in office or at least recommended receiving this treatment. And (57.4%) patient reported their orthodontist recommended to use special orthodontic floss, as shown in (Table 3).

Association analysis

A significant association was found between explaining the patient of the importance of tooth brushing and following variables: instructing them on how to brush their teeth correctly($p<0.001$), referring them to dentist to routine dental examination ($p=0.005$), recommending them to brush their teeth with high concentrated fluoride gel (Elmex gel) is ($p=0.032$) recommending to perform fluoridation at dental office by gel or varnish ($p=0.062$), as shown in (Table 4).

DISCUSSION

Orthodontic appliances can cause gingival inflammation and enamel decalcification (Lovrov *et al*., 2007; Levin *et al*., 2008). One of the preventive measures is to use fluoride supplements and patient referral for regular check-ups. Many Patients undergoing orthodontic treatment can't maintain adequate oral hygiene thus leading to gingival inflammation and enamel decalcification. The causes of these findings may relate to orthodontists that do not implement the oral hygiene instructions and recommendation for home prevention measures frequently as should so as a consequence patient fail or forget to fulfil the recommendation (Ashkenazi *et al*., 2012). Present study aimed to assess awareness of orthodontic patients regarding oral hygiene measures during active orthodontic treatment as it leads to more accumulation of plaque that effects oral health. Nearly 64.4% reported that their orthodontist did not explain the important of tooth brushing and 75.7% of them received instruction for tooth brushing at least once during the orthodontic treatment. Regular monthly professional oral hygiene prophylaxis and home prevention instructions can reduce gingival inflammation and plaque accumulation around the fixed appliances (Huber *et al*., 1987). In the present study 33.7% reported they didn't receive recommendation of which toothbrush to use, Despite the fact that orthodontist depend on the dental hygienist to implement these instruction (Hobson and Clark, 1998) 45% patient reported that they were not referred to a dental hygienist and 69.3% were not referred for routine dental examination. Regarding fluoride supplementations, 76.2% of patients reported that they didn't receive the recommendation about the fluoride concentration in their toothpaste. The most orthodontic patients usually young thus they may still use children's toothpaste which have lower concentration of fluoride. In the existing study, 38.2% of the patients reported that they had instruction from their orthodontist to use fluoride rinses at least once. If the orthodontist did not implement the recommendations in the following visits or mentioned it only once, the patient might not remember the recommendations. Only third of the patients reported that they been referred to a dentist for routine checkup by their orthodontist. Attention to dentist referral should be taken to those high risk caries patients increases the importance for periodic check-ups.

Conclusion

The conclusion of the present study is that patient's awareness is inadequate for maintenance of several home and professional preventive measures during active orthodontic treatment in Riyadh Region. Hence it is recommended that orthodontists should improve the awareness of patients' dental health by instructing them on the importance of tooth brushing, correct tooth brushing, and use of fluoride supplementation and by referring them regularly to routine check-ups by their dentists.

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