



Determination of fixed orthodontic patients awareness about oral hygiene base on orthodontists educations

Mashallah Khanemasjedi¹, Leila Basir², Mino Alavi^{3}, Armin Erfani⁴*

¹ Department of Orthodontics, School of Dentistry, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

² Department of Pediatrics, School of Dentistry, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

³ Department of Orthodontics, School of Dentistry, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

⁴ Student of General Dentistry, Faculty of Dentistry, Jundishapur University of Medical Sciences, Ahvaz, Iran.

Abstract

Dental caries is an active process; This transmissible infectious disease requires a host (tooth), food substrate (fermentable carbohydrates) and aciduric bacteria. Biofilm (plaque), which is a combination of substrate and bacteria, accumulation around teeth over the time, the bacteria feed on the substrate and produce acids that cause the dissolution of the mineral structure of the tooth enamel (demineralization), and eventually lead to dental caries. In patients undergoing orthodontic treatment with fixed appliances, due to the difficulty in maintaining proper oral hygiene, the amount of plaque accumulation around the teeth is higher, so, the chance of enamel demineralization around the orthodontic brackets that called white spot lesions, and dental caries increases. The purpose of this study is to investigate the awareness of patients undergoing fixed orthodontic treatment regarding health care during orthodontic treatment based on orthodontist education. The present study was a cross-sectional study with the code IR.AJUMS.REC.1399.517 which was done by presenting a questionnaire to 213 healthy men and women undergoing fixed orthodontic treatment between the ages of 15 and 28 in Ahvaz city, who have been at least 6 months since the start of fixed orthodontic treatment, the patients had consent to participate the questionnaire. The designed questionnaire included of 3 parts as follows: 1- demographic characteristics of the patient, 2- Patients' awareness of oral healthcare, 3- Oral healthcare education by an orthodontist. All results were analyzed with SPSS software version 24 ($p < 0.05$). The average score of the total amount of education and health care provided to patients by the orthodontist in the studied sample was 9.40; The average total score of patients' awareness of health care and its implementation during orthodontic treatment was 9.96, there was a statistically significant relationship between the both score ($p < 0.05$). Education oral and dental healthcare methods to patients undergoing fixed orthodontic treatment can be effective in increasing their awareness and attitude about performing health care instructions during orthodontic treatment to prevent dental caries.

Keywords: Questionnaire, fixed orthodontics, oral hygiene, caries, awareness

Full length article *Corresponding Author, e-mail: Minoalavi116@gmail.com

1. Introduction

Dental caries is an active process; This transmissible infectious disease requires a host (tooth), food substrate (fermentable carbohydrates) and aciduric bacteria [1]. The soft non-mineral adhesive layer that accumulates on the surface of the teeth is called dental plaque [2]. Poor oral and dental hygiene, inappropriate dietary habits lead to the accumulation of plaque around teeth and increase the risk of dental caries [3], as well as, plaque remaining on the teeth for a long time, increases its pathogenic power [4]. In patients undergoing orthodontic treatment with fixed appliances, due to the difficulty in maintaining proper oral hygiene, the amount of plaque accumulation around the teeth is higher, and as a result, the chance of enamel demineralization around the

orthodontic brackets that called white spot lesions, and dental caries increases [5,6]. To overcome this problem, it is emphasized on following health instructions and using supplemental devices such as special orthodontic toothbrushes and interdental toothbrushes to remove plaque; Antimicrobial and fluoride mouthwashes to prevent the accumulation of plaque and increase the mechanical efficiency of brushing. Meanwhile, the patient's awareness of the importance of health cares is very important, as well as, the role of the orthodontist in informing and educating them. The motivation of patients during orthodontic treatment affects oral health, but this decreases in the middle of the treatment period and causes a decrease in oral health [7]. Studies on the importance of motivation of orthodontic

patients about oral hygiene, show that appropriate motivational methods have been effective in reducing plaque and dental caries [8,9,10].

2. Objectives

This study aimed to determine the relationship between awareness of patients undergoing fixed orthodontic treatment and education of healthcare provided to patients by the orthodontist. If found, such correlation, reveal importance appropriate education to oral healthcare during orthodontic course.

3. Methods

This cross-sectional study was performed with convenience sampling on 213 health women and men who were referred to the orthodontic department of the School of Dentistry at Ahvaz Jundishapur University of Medical Sciences from September to October to December 2020. By using the following formula with a ratio of $P = 0.5$ and 95% confidence interval, the sample size was estimated at 196 patients according to the estimated $d = 0.07$, which was increased to 213 people because of the risk of sample loss.

$$n = \frac{z^2 \frac{\alpha P(1-P)}{1-\frac{\alpha}{2}}}{d^2}$$

Healthy men and women, aged 15-28 years, who had at least 6 months have passed since the start of fixed orthodontic treatment, were included in the study. Exclusion criteria were: debilitating physical diseases, the use of drugs that affect dental caries or gingival lesions. At the beginning of the study, consent of all the women for participation was obtained after the project was described. Data collection instrument was an inventory consisting of three parts (1-demographic characteristics of the patient, 2- Patients' awareness of oral healthcare, 3- Oral healthcare education by an orthodontist). (Table 1 and 2) shows the design of the questionnaire. Each item has 4 options scored from 0 to 3, and the score obtained was from the patient's awareness of oral healthcare questionnaire (0-17) and was from oral healthcare education questionnaire by an orthodontist (0-16). Then the obtained scores were categorized into three groups: low, moderate and high. In patient's awareness questions of oral healthcare considered the total score of 0 - 5 as low, 6 - 11 as moderate, 12 - 17 as high. In oral healthcare education questions by an orthodontist considered the total score of 0 - 5 as low, 6 - 11 as moderate, 12 - 16 as high.

3.1. Reliability

Cronbach's alpha method was used to determine the scientific reliability of the device. In a pilot study, the questionnaire was given to 30 people from the samples who were similar to the research samples but were not included in the final study.

3.2. Statistics

SPSS 24.0 software was used for analyzing data. The data obtained were analyzed by using descriptive statistics, Pearson and Spearman correlation coefficients, chisquare, and ANOVA. The internal consistency of the device was confirmed by Cronbach's alpha test of 0.8.

3.3. Ethics statement

Khanehmasjedi et al., 2023

This trial was approved by the Medical Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (ethical code: IR.AJUMS.REC.1399.517). A voluntary written informed consent was obtained from participates. The collected data held confidential. There were no costs involved for the participants in this study.

4. Results

According to the findings of the study, which was performed on 213 people, the mean age of the participants in the study were 21.73 and 155 women the mean age 21.88 ± 7.37 and 58 men the mean age 21.33 ± 6.13 . (Table 3). Frequency Distribution of Patients' awareness of oral healthcare shown in (Table 4).

The average overall Patients' awareness of oral healthcare score in the study was 9.96. And based on the classification of the total score of patients' awareness of oral healthcare score, 2.3% patients in low awareness group, 70.9% in moderate awareness group and 26.8% was in high awareness group (Table 5). Frequency Distribution of oral healthcare education by an orthodontist shown in table 6. The average overall score of oral healthcare education by orthodontist score in the study was 9.40. And based on the classification of the total score of oral healthcare education by orthodontist, 7.5% in low oral healthcare education group, 67.1% in moderate oral healthcare education group and 25.4% was in high oral healthcare education group (Table 7). There is a positive and significant statistical correlation between total score of Patients' awareness of oral healthcare and total score of oral healthcare education by orthodontist ($p=0.040$) (table 8).

5. Discussion

According to the results of the present study, a significant relationship was observed between total score of Patients' awareness of oral healthcare and total score of oral healthcare education by orthodontist. The same relationship was observed in a study by Chopra et al. their data showed that the levels of knowledge, and oral hygiene practices among orthodontic patients were higher than non-orthodontic patients, they suggested that higher awareness of orthodontic patients because of are more frequently educated [11]. Nadar et al. also found similar results that were consistent with the findings of our study, their data showed that the overall oral hygiene awareness among the patients is poor. An average of 44% of the population are aware of the oral hygiene measures. Extra attention should be given in educating and motivating the patients on oral hygiene practices during orthodontic treatment in a proper manner and this could be beneficial in maintaining proper oral hygiene [12]. Also, Sawai et al. they reported education of study participants was significantly associated with awareness and practice regarding maintenance of periodontal health [13]. As well as, Mahjoub et al. they found that improvement in oral health during orthodontic treatment can be endorsed by continuous monitoring and reinforcement of the oral health instructions given by their orthodontist during the follow-up visits [14]. On the same side, in a study by Atanasova et al. their result showed that oral hygiene instructions are necessary throughout the entire orthodontic treatment and they need to be strengthened. At the very beginning of the orthodontic treatment, the therapist

should motivate patients in order for the oral hygiene to be at a high level throughout the entire treatment [15].

Table 1. Questions and scoring Patients' awareness of oral healthcare

Question	Mood	Score
Tooth brushing frequency per day	Once	1
	Twice	2
	After each meal	3
	No brushing	0
Type of toothbrush	Regular	1
	Orthodontic	2
	Interdental	2
	Regular+orthodontic	3
	Regular+interdental	3
Using of mouthwash	Orthodontic+interdental	3
	Yes	2
	No	0
Tooth flossing	Yes	2
	No	0
Professional application fluoride in dental office	2-3 time in year	2
	1time in year	1
	No	0
Gingival bleeding after brushing	Always	0
	Occasional	0
	No	2
Recent visit a general dentist for dental examinations	Yes	1
	No	0
Type of toothpaste	With fluoride	1
	Without fluoride	0

Table 2. Questions and scoring oral healthcare education by an orthodontist

Question	Mood	Score
Explanation of importance of tooth brushing	Every meeting	2
	Some meeting	2
	Just at first meeting	1
	Never	0
Advice of frequency of brushing per day	Twice per day	2
	After each meal	2
	Never pointed	0
Tooth brushing education	education without evaluation	1
	education with evaluation in every meeting	2
	Sometimes evaluation	2
	evaluation just at first time	1
	never education	0
type of toothbrush	Yes	2
	No	0
Referring patients to general dentist for examinations	just at first time	1
	occasionally	2
	never	0
Recommendation of fluoride level in toothpaste	just at first time	1
	occasionally	2
	never	0
Recommendation of use mouthwash containing fluoride	just at first time	1
	occasionally	2
	never	0
Recommendation of schedule fluoride therapy	4 times in year	2
	2 times in year	2
	occasionally	1
	never	0

Table 3. Demographic characteristics of participants

Parameters	Number	Per cent (%)	
		M±SD	
Gender	women	155	72.8
	men	58	27.2
	total	213	100
Age (year)	women	155	21.88±7.37
	men	58	21.33±6.13
	total	213	21.73±7.05

Table 4. Frequency Distribution of Patients' awareness of oral healthcare

Parameters	Mood	Number (n=213)	Percent
Tooth brushing frequency per day	Once	20	14.1
	Twice	77	36.2
	After each meal	105	49.3
	No brushing	1	0.5
Type of toothbrush	Regular	35	16.4
	Orthodontic	97	45.5
	Interdental	5	2.3
	Regular+orthodontic	10	4.7
	Regular+interdental	17	8
Using of mouthwash	Orthodontic+interdental	49	23
	Yes	120	56.3
Tooth flossing	No	93	43.7
	Yes	110	51.6
Professional application fluoride in dental office	No	103	48.4
	2-3 time in year	10	4.7
	1time in year	15	7
Gingival bleeding after brushing	No	188	88.3
	Always	12	5.6
	Occasional	74	34.7
Recent visit a general dentist for dental examinations	No	127	59.6
	Yes	60	28.2
Type of toothpaste	No	153	71.8
	With fluoride	196	92
	Without fluoride	17	8

Table 5. Descriptive indicators of the total score of Patients' awareness of oral healthcare

Parameter	Number	M±SD	Group	Number	Percentage
total score of Patients' awareness of oral healthcare	213	9.96±2.42	Low (0-5)	5	2.3
			Moderate (6-11)	151	70.9
			High (12-17)	57	26.8
			total	213	100

Table 6. Frequency Distribution of oral healthcare education by an orthodontist

Parameter	Mood	Number (n=213)	Percentage
Explanation of importance of tooth brushing	Every meeting	98	46
	Some meeting	32	15
	Just at first meeting	78	36.6
	Never	5	2.4
Advice of frequency of brushing per day	Twice per day	24	11.3
	After each meal	170	79.8
	Never pointed	19	8.9
Tooth brushing education	education without evaluation	49	23
	education with evaluation in every meeting	55	25.8
	Sometimes evaluation	35	16.4
	evaluation just at first time	63	29.6
	never education	11	5.2
type of toothbrush	Yes	191	89.7
	No	22	10.3
Referring patients to general dentist for examinations	just at first time	60	28.2
	occasionally	53	24.9
	never	100	46.9
Recommendation of fluoride level in toothpaste	just at first time	50	23.5
	occasionally	22	10.3
	never	141	66.2
Recommendation of use mouthwash containing fluoride	just at first time	125	58.7
	occasionally	40	18.8
	never	48	22.5
Recommendation of schedule fluoride therapy	4 times in year	16	7.5
	2 times in year	7	3.3
	occasionally	45	21.1
	never	145	68.1

Table 7. Descriptive indicators of the total score of oral healthcare education by an orthodontist

Parameter	Number	M±SD	Group	Number	Percentage
total score of oral healthcare education by orthodontist	213	9.40±2.91	Low (0-5)	16	7.5
			Moderate (6-11)	143	67.1
			High (12-16)	54	25.4
			total	213	100

Table 8. The results of Peterson's correlation coefficient to determine the relationship between two scores

parameter	total score of Patients' awareness of oral healthcare	
	Peterson's correlation coefficient results	
	r	P.value
total score of oral healthcare education by orthodontist	0/134*	0/040

* p<0.05

Limitations

Limiting the statistical population to a public center due to the start of the Corona pandemic and the closure of private centers.

Acknowledgements

The current paper results from research findings in a Ph.D's Thesis in Dentistry, Ahvaz Jundishapur University of Medical Sciences. All professors, Orthodontists, as well as patients are highly appreciated. Also, orthodontic department of the School of Dentistry of Ahvaz Jundishapur, which provided useful consulting, is appreciated.

References

- [1] RE. McDonald, & J.A. Dean. (2016). Dentistry for child and adolescent: Mosby: Maryland heights.
- [2] CM. Volgenant. (2016). Comparison of red autofluorescing plaque and disclosed plaque—a cross-sectional study. *Clinical oral investigations*; 20:2551-8.
- [3] N. Chounchaisithi, B. Santiwong, S. Sutthavong, & P. Asvanit. (2014). Use of a disclosed plaque visualization technique improved the self-performed, tooth brushing ability of primary schoolchildren. *Journal of the Medical Association of Thailand= Chotmaihet thangphaet*. 1;97:S 88-95.
- [4] PD. Marsh. (2012). Contemporary perspective on plaque control. *British dental journal*. 23;212(12):601-606.
- [5] L. Levin, GR. Samorodnitzky-Naveh, & EE Machtei. (2008). The association of orthodontic treatment and fixed retainers with gingival health. *Journal of periodontology*;79(11): 87-92.
- [6] S. Lovrov, K. Hertrich, & U. Hirschfelder. (2007). Enamel Demineralization during Fixed Orthodontic Treatment-Incidence and Correlation to Various Oral-hygiene Parameters. *Journal of Orofacial Orthopedics=Fortschritte der Kieferorthopadie: Organ/official Journal Deutsche Gesellschaft fur Kieferorthopadie*.1;68(5):353-63.
- [7] LE. Anderson, A. Arruda, & MR. Inglehart. (2009). Adolescent patients' treatment motivation and satisfaction with orthodontic treatment: do possible selves' matter? *The Angle Orthodontist*. 1;79(5):821-7.
- [8] M. Lalic, E. Aleksic, M. Gajic, J. Milic, & D Malesevic. (2012). Does oral health counseling effectively improve oral hygiene of orthodontic patients? *European journal of paediatric dentistry*. 1;13(3):181-6.
- [9] S. Acharya, A. Goyal, AK. Utreja, & U. Mohanty. (2011). Effect of three different motivational techniques on oral hygiene and gingival health of patients undergoing multibracketed orthodontics. *The Angle Orthodontist*.1;81(5):884-8.
- [10] ZY. Ay, M. Sayın, Y. Özat, T. Goster, AO. Atilla, & FY. Bozkurt. (2007). Appropriate oral hygiene motivation method for patients with fixed appliances. *The Angle Orthodontist*. 1;77(6):1085-9.
- [11] K. Chopra, MD. Kathariya, R. Kathariya, IB. Mohammed, SK. Patil, & V. Kasat. (2015). Knowledge, attitude and practices regarding oral health among orthodontic and non-orthodontic patients in a dental institute. *Int J Dent Case*; 5:18-24.
- [12] S. Nadar, & SS. Dinesh. (2016). A questionnaire study about oral hygiene awareness among orthodontic patients. *International Journal of Orthodontic Rehabilitation*. 1;7(3):97-110.
- [13] DS. Sawai, P. Singh, M. Dogra, R. Sultana, & SA. Khan. (2019). Perception, awareness, and practice among patients seeking orthodontic treatment toward maintenance of periodontal health and factors affecting the same among patients visiting dental clinics in Patna. *Journal of Family Medicine and Primary Care*;8(11):3695.
- [14] DT. Mahjoub, RK. AlJabri, NE. Bifari, & RS. Najjar. (2023). Oral hygiene awareness and practice in orthodontic patients in Makkah city: A cross sectional study. *journal of orthodontic science*;12, 1-10.
- [15] S. Atanasova, S. Carceva Salja, S. Naskova, J. Zarkova-Atanasova, & L. Proseva. (2018). Oral hygiene behavior during treatment with fixed orthodontic appliances. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*. 17(11), 1-10.