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Oral Health Knowledge, Attitude, Practice Among a Sample of Saudi Orthodontic Patients. A Cross Sectional Survey Study

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ABSTRACT

Background: Orthodontic treatment involves realignment of teeth and dentofacial structures using orthodontics appliances. During the treatment, it is mandatory for the patient to recognize and apply oral hygiene to prevent irreversible damage to the teeth and periodontium that might occur during the orthodontic treatment course. **Aim:** To assess the knowledge, awareness, attitude, and practice of patients regarding oral hygiene maintenance of patients undergoing fixed orthodontic appliance treatment. **Methods:** Out of 450 patients selected, 317 responded with a response rate 70.5%, in the Qassim region and other Saudi regions (Al-Jawf/Aseer/Eastern/Jazan/Mecca/Northern/Riyadh/Tabuk). Inclusion criteria are patients undergoing fixed orthodontic appliance treatment, with the age group of 13–25 years, willing to participate were selected for the study. All participants were given a questionnaire containing 21 questions based on the knowledge, attitude, and practices of oral hygiene. Their responses were tabulated, and analysis was performed using IBM Statistical Package for the Social Sciences (SPSS) statistics version 20 (SPSS Inc. Chicago, IL, USA). **Results:** Participants who completed the survey, 71% were females compared to 29% males. More participants who completed the questionnaire belonged to the Qassim region (67.5%) compared to other Saudi regions (32.5%). The participants had good knowledge (Qassim region 41.6% and other Saudi regions 45.6%), Fair attitude (Qassim region 50% and other Saudi regions 46.8%), and poor practice of oral hygiene (Qassim region 43.9% and other Saudi regions 53.4%) during orthodontic treatment. A statistically significant correlation was found between patients' knowledge and practice ($P < 0.05$). The knowledge and attitude of females toward oral hygiene during orthodontic treatment was higher than males with no statistically significant differences ($P = 0.246$). Females' oral hygiene practice during orthodontic treatment was found to be better than males and the difference was statistically significant ($P = 0.021$). **Conclusion:** Most of the participants (male/female) had the awareness about the importance of oral hygiene maintenance during orthodontic treatment; however, very few of them had a positive attitude toward oral hygiene maintenance and only few of them practiced it.

Keywords: Attitude, Knowledge, Oral hygiene, Orthodontic patients, Practice

Introduction

Orthodontics and maxillo-facial orthopedics are two divisions of dentistry which chiefly deal with malocclusion. Malocclusion is defined as an appreciable deviation from ideal occlusion' and is the third-most common oral health disease after dental caries and periodontal diseases.[1] It is a multifactorial disease which influences the well-being of an individual due to difficulty in eating, talking, and unesthetic appearances, which can be corrected by orthodontic treatment.[2] Thus, it is commonly recognized and accepted by patients in day-to-day dental practice. Fixed orthodontics is more commonly practiced due to affordability by patients, rapid teeth alignment, and better anchorage. Nevertheless, fixed orthodontic appliances have certain disadvantages.[3]

Numerous studies have reported an upsurge in the amount of dental plaque and the incidence of gingivitis

in patients bonded with fixed orthodontic appliances.[4] Dental plaque and calculus accumulate on the teeth surface and orthodontic appliances. They harbor cariogenic bacteria that cause demineralization of teeth and dental caries consecutively.[5] Apart from dental caries, the bacteria can invade the gingival tissue, causing gingivitis, which is the major cause of bleeding gums during brushing the teeth.[6] Negligence of oral hygiene can be due to a lack of knowledge by patients themselves.[7] Thus, it is very important for the patients to have thorough knowledge about oral health, its maintenance and various devices that help in maintaining oral health.[8]

Before the beginning of orthodontic treatment, patients should be instructed about the importance of regular oral hygiene maintenance.[9] Correct technique of tooth brushing, proper dental flossing techniques, and other devices that are suitable for the fixed appliance oral hygiene maintenance must be demonstrated and told to the patient at the beginning of the treatment and reevaluated during each visit as it is the key factor for successful orthodontic treatment.[8]

From the literature, there are one study addressing oral hygiene awareness and practices in orthodontic patients in Saudi Arabia, that was conducted in Makkah.[10] Obtaining baseline information of the oral hygiene knowledge, attitude, and practices in the Qassim region is essential for understanding the patients' oral healthcare needs and also the patients' compliance to oral hygiene instructions. This information can be used as a reference for future preventive programs for patients wearing fixed orthodontic appliances.

Thus, the aim of our research was to evaluate oral health knowledge, attitude, and practices of orthodontic patients during fixed orthodontic appliance treatment in the Qassim region compared to the non-Qassim region in Saudi Arabia.

Methods

Trial design

This was a descriptive cross-sectional study conducted in the Qassim region and other Saudi regions (Al-Jawf/Aseer/Eastern/Jazan/Mecca/Northern/Riyadh/Tabuk). During the period between November 2020 and January 2021. Sample size determination: Convenient sampling was chosen for the selection of the sampling units. The sample size was determined by using Rasoft software, a sample size calculator.[11] The study was planned on 450 patients undergoing fixed orthodontic appliance treatment under a registered orthodontist in Saudi Arabia. Eligibility criteria: Inclusion criteria: Saudi subjects with age group 13–25, both genders (males and females), patients willing to participate in the research (providing signed informed consent), patients with fixed orthodontic appliances, Exclusion criteria: Subjects not completed any parts of the survey and pathological conditions.

Ethical approval

Ethical approval was obtained from the Institutional Review Board of Mustaqbal University prior to conducting the study with number "EAC102/2021." Informed consent was obtained from all participants after explaining the importance and aim of the study through written information.

Study procedures

Study tool: the survey type was e-questionnaires and e-forms for data collection. all participants were requested to answer a self-administered questionnaire that consisted of four parts. The first part asked to obtain the demographic information of the volunteers (age and gender). The second part consisted of 5 questions based on the knowledge about oral hygiene among the participants during orthodontic treatment (Do you think oral hygiene is important ?, Does orthodontic treatment increase the risk of gum inflammation and teeth decay?, Do you know that there is special aids/tools of oral hygiene maintenance for orthodontic patients?, Did your orthodontist told/demonstrated how to take care of your teeth during the treatment ?, Do you know that there is specific methods for brushing teeth during orthodontic treatment?), The third part contained seven questions were based on the attitude of the participants toward oral hygiene maintenance during orthodontic treatment (Do you think you should follow-up with your dental specialist regarding oral health regularly during orthodontic treatment?, Do you think regular dental visit can enhance oral health?, Do you think it is important to get advice and instructions in Oral hygiene from dental specialist?, Do you think fixed orthodontic appliance makes brushing more difficult?, Do oral hygiene need complex/expensive/manual dexterity and training/Supervision ?, Do you Think Special aids/tool for orthodontic appliance design can help to achieve better oral hygiene compared to normal tooth brush?, is it important to brush meticulously and regularly

after wearing fixed orthodontic appliance?, and the fourth part included 9 questions based on the practices that the participants followed for maintenance of oral hygiene(Do you brush your teeth daily?, Time spent for brushing, How many times do you brush your teeth?, Which type of tooth brush do you use?, Do you change your tooth brush ? if yes how often, Do you use any special tools for teeth brushing, if yes mention., Do you use chemical solutions with or after tooth brushing,if yes mention, Method used to brush/take care of your teeth? When food dislodged between orthodontic wires, can you remove it?

Questionnaire development, translation, and validation

Phase 1: Questionnaire development and translation: The questionnaire was developed by reviewing the literature and group discussions. After seven rounds of group discussions, the final questionnaire comprised four parts containing 26 items. The questionnaire was deciphered from English to the local language Arabic. The validity of the questionnaire was tested by the method described by Tsang *et al*.[12] Phase 2: Questionnaire validation: the survey was tested by a pilot study conducted on 30 samples who did not participate in the final study where the survey was given to the participants and asked them to complete the questionnaire in the waiting room of orthodontic dental clinics and return it within 20 min with direct feedback from them obtained. No amendments were required following feedback from the pilot study. Then the main survey was sent to the participants using the software "WhatsApp" installed on the volunteers' mobiles, with a given duration to complete the questionnaire of 15 min.

Criteria to evaluate outcomes

For the knowledge, attitude, and practice questions, 1 point was given for the correct answer to the questions, 0 points for incorrect. The following classification was considered to report the patients' knowledge level: Score 4–5 as good, score 2–3 as fair, score 0–1 as poor. In the attitude part: Score 6–7 as good, score 3–5 as fair, score <3 as poor in the practice part, a score of 7–9 was considered good, 4–6 as fair, and 3 or less as poor.

Statistical analysis

Data obtained were compiled systematically in a Microsoft Excel sheet, and a master table was prepared. Statistical analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) statistics version 20 (SPSS Inc, Chicago, IL, USA). Categorical data description was made using frequency and percentage. In addition, data comparison was made by applying the Chi-square test of independence. The level of significance in this study was considered <0.05.

Results

Out of the 450 patients asked to complete the questionnaire, 317 responded and completed the survey with a response rate of 70.5%.

Demographic data

Table 1 designates the demographic variables of the patients; the age group was divided into 13–18 years and 19–25 years. Of the 317 completed the survey 71% were female compared to 29% male. Of which 16% of age group 13–18 compared to 84% of age group 19–25 years. More participants who responded and completed the questionnaire belonged to the Qassim region (67.5%) compared to other Saudi regions (32.5%) (Al-Jawf/Aseer/Eastern/Jazan/Mecca/Northern/Riyadh/Tabuk).

Knowledge of oral health outcomes

Table 2 illustrates data related to knowledge gender wise, it was observed that knowledge score rated good in both genders. Furthermore, knowledge of females was higher compared to males and the difference was statistically insignificant.

Table 3 depicts knowledge as per age, where 42.7% of participants in the age group of 19–25 years had good knowledge compared to 44% in 13–18 years' age group. Though the results were statistically insignificant.

Table 4 reveals knowledge as per region (governorates), it was observed that 42.9% of the total participants had good knowledge of oral health. Where knowledge is higher in other Saudi regions (45.6%) compared to the Qassim region (41.6%), with no statistically significant differences between the two groups.

Attitude of oral health outcomes

Table 5 illustrates the overall attitude of participants' gender wise, it was noticed that the attitude of females was better than males and the difference was statistically significant.

Table 1: Demographic details

Age groups	Gender		Total	Governorate	Gender		Total
	Female	Male			Female	Male	
13–18 years				Qassim region			
Count	41	9	50	Count	145	69	214
% within Age	82.0%	18.0%	100.0%	% within governorate	67.8%	32.2%	100.0%
% within Gender	18.2%	9.8%	15.8%	% within Gender	64.4%	75.0%	67.5%
19–25 years				Other Saudi regions			
Count	184	83	267	Count	80	23	103
% within Age	68.9%	31.1%	100.0%	% within governorate	77.7%	22.3%	100.0%
% within Gender	81.8%	90.2%	84.2%	% within Gender:	35.6%	25.0%	32.5%
Total				Total			
Count	225	92	317	Count	225	92	317
% within Age	71.0%	29.0%	100.0%	% within governorate	71.0%	29.0%	100.0%
% within Gender	100.0%	100.0%	100.0%	% within Gender	100.0%	100.0%	100.0%

Table 2: Knowledge gender wise

Knowledge level	Gender		Total No. (%)
	Female No. (%)	Male No. (%)	
Poor			
Count	58 (65.9)	30 (34.1)	88 (100.0)
Knowledge within gender %	25.8	32.6	27.8
Fair			
Count	64 (68.8)	29 (31.2)	93 (100.0)
Knowledge within gender %	28.4	31.5	29.3
Good			
Count	103 (75.7)	33 (24.3)	136 (100.0)
Knowledge within gender %	45.8	35.9	42.9
Total			
Count	225 (71.0)	92 (29.0)	317 (100.0)

Chi-square value=2.803. *P*=0.246

Table 3: Knowledge as per age distribution

Knowledge level	Age		Total (%)
	13–18 years (%)	19–25 years (%)	
Poor			
Count	15 (17.0)	73 (83.0)	88 (100.0)
Knowledge within age %	30.0	27.3	27.8
Fair			
Count	13 (14.0)	80 (86.0)	93 (100.0)
Knowledge within age %	26.0	30.0	29.3
Good			
Count	22 (16.2)	114 (83.8)	136 (100.0)
Knowledge within age %	44.0	42.7	42.9
Total			
Count	50 (15.8)	267 (84.2)	317 (100.0)

Chi=square value=3.941. *P*=0.349

Table 4: Knowledge as per governorates

Knowledge level	Governorate		Total (%)
	Qassim region (%)	Other Saudi regions (%)	
Poor			
Count	64 (72.7)	24 (27.3)	88 (100.0)
Knowledge within region %	29.9	23.3	27.8
Fair			
Count	61 (65.6)	32 (34.4)	93 (100.0)
Knowledge within region %	28.5	31.1	29.3
Good			
Count	89 (65.4)	47 (34.6)	136 (100.0)
Knowledge within region %	41.6	45.6	42.9
Total			
Count	214 (67.5)	103 (32.5)	317 (100.0)

Chi=square value=1.513. *P*=0.469

Table 5: Attitude gender wise

Attitude level	Gender		Total (%)
	Female (%)	Male (%)	
Poor			
Count	55 (59.8)	37 (40.2)	92 (100.0)
Attitude within gender %	24.4	40.2	29.0
Fair			
Count	111 (74.0)	39 (26.0)	150 (100.0)
Attitude within gender %	49.3	42.4	47.3
Good			
Count	59 (78.7)	16 (21.3)	75 (100.0)
Attitude within gender %	26.2	17.4	23.7
Total			
Count	225 (71.0)	92 (29.0)	317 (100.0)

*Statistical significant *P*<0.05. Chi-square value=8.415. *P*=*0.015

Table 6 Reveals attitude-based questions among both age groups, it was observed that attitude of 19–25 years old group toward oral hygiene was found to be higher than the 13–18 years old group and the difference is statistically insignificant.

Table 7 depict attitude as per governorates. It was observed that attitude score fair in both groups, with Qassim scored marginally higher than other Saudi regions with no statistically significant differences.

Practice of oral health outcomes

Table 8 illustrates gender-wise practices related to oral hygiene during the orthodontic treatment. Where the practice of females was higher compared to males and the difference was statistically significant.

Table 9 reveals practice-based questions among both age groups, it was observed that the practice of both groups to be poor, with no statistically significant differences.

Table 10 shows practices of oral hygiene as per governorates, it was observed that practice scored poor in both groups, with Qassim scored marginally higher than other Saudi regions with no statistically significant differences.

In the present study, 56.4% of the patients brushed every day and majority of them brushed only once a

Table 6: Attitude per age distribution

Attitude level	Age		Total (%)
	13–18 years (%)	19–25 years (%)	
Poor			
Count	15 (16.3)	77 (83.7)	92 (100.0)
Attitude within age %	30.0%	28.8%	29.0
Fair			
Count	25 (16.7)	125 (83.3)	150 (100.0)
Attitude within age %	50.0	46.8	47.3
Good			
Count	10 (13.3)	65 (86.7)	75 (100.0)
Attitude within age %	20.0	24.3	23.7
Total			
Count	50 (15.8)	267 (84.2)	317 (100.0)

Chi-square value=0.446. *P*=0.8

Table 7: Attitude as per governorates

Attitude level	Governorate		Total (%)
	Qassim region (%)	Other Saudi regions (%)	
Poor			
Count	65 (70.7)	27 (29.3)	92 (100.0)
attitude within governorate %	30.4	26.2	29.0
Fair			
Count	97 (64.7)	53 (35.3)	150 (100.0)
attitude within governorate %	45.3	51.5	47.3
Good			
Count	52 (69.3)	23 (30.7)	75 (100.0)
attitude within governorate %	24.3	22.3	23.7
Total			
Count	214 (67.5)	103 (32.5)	317 (100.0)

Chi-square value=1.081. *P*=0.583

Table 8: Practices gender wise

Practices level	Gender		Total (%)
	Female (%)	Male (%)	
Poor			
Count	30 (57.7)	22 (42.3)	52 (100.0)
practices within gender%	13.3	23.9	16.4
Fair			
Count	104 (69.8)	45 (30.2)	149 (100.0)
practices within gender%	46.2	48.9	47.0
Good			
Count	91 (78.4)	25 (21.6)	116 (100.0)
practices within gender%	40.4	27.2	36.6
Total			
Count	225 (71.0)	92 (29.0)	317 (100.0)

*Statistical significant *P*<0.05. Chi-square value=7.699. *P*=*0.021

Table 9: Practices per age distribution

Practices level	Age		Total (%)
	13–18 years (%)	19–25 years (%)	
Poor			
Count	25 (16.7)	125 (83.3)	150 (100.0)
Practice within age %	50.0	46.8	47.3
Fair			
Count	15 (16.3)	77 (83.7)	92 (100.0)
Practice within age %	30.0	28.8	29.0
Good			
Count	10 (13.3)	65 (86.7)	75 (100.0)
Practice within age %	20.0	24.3	23.7
Total			
Count	50 (15.8)	267 (84.2)	317 (100.0)

Chi-square value=0.446. *P*=0.8

Table 10: Practices as per governorates

Practices level	Governorate		Total (%)
	Qassim region (%)	Other Saudi regions (%)	
Poor			
Count	94 (63.1)	55 (36.9)	149 (100.0)
Practices within governorate %	43.9	53.4	47.0
Fair			
Count	83 (71.6)	33 (28.4)	116 (100.0)
Practices within governorate %	38.8	32.0	36.6
Good			
Count	37 (71.2)	15 (28.8)	52 (100.0)
Practices within governorate %	17.3	14.6	16.4
Total			
Count	214 (67.5)	103 (32.5)	317 (100.0)

Chi-square value=2.507. *P*=0.285

day for 1 min. About 43.3% of the participants used medium-consistency brushes and 45% replaced the brushes every 3 months. 29% of the participants used special tools after brushing for the maintenance of oral hygiene; 99% used interdental brushes and 1% reported that they used the dental floss. 43% used chemical agents for maintaining oral hygiene.

Discussion

Active participation and cooperation of patients undergoing orthodontic treatment are crucial factors determining the success of orthodontic treatment.[10] The present study assessed the knowledge of patients undergoing orthodontic treatment regarding oral hygiene maintenance, their attitude toward it and the practices they follow. There was more participation from the females compared to the males. This indicated that females were more concerned about their oral hygiene and esthetics; thus, they had better attendance and presentation in the study. This finding was consistent with the findings of Al-Harbi *et al*., whose study witnessed high participation from females.[13] It was also similar to the findings of Sharma who also witnessed more participation from women in their study.[14] However, according to a study conducted by Darout both genders had equal awareness of oral hygiene importance and both equally participated in his study.[15]

When comparing between Qassim and other Saudi regions, both groups scored a good knowledge, with the other Saudi regions group showed a marginal better knowledge, this could be explained by the scarcity of orthodontic-related community service programs and/or deficiency of dental auxiliaries in the Qassim region.

Qassim region scored higher in attitude and practice compared to other Saudi regions, explaining this point might require further investigations as a higher sample might be required from other Saudi regions.

90% of the participants in the present study agreed that regular follow-up with the dental specialist regarding oral health during orthodontic treatment is necessary. About 86% of them brushed daily and maintained oral hygiene. This finding can be explained by the fact that regular visits to the orthodontist and their motivation help in the improvement of oral hygiene and gingival health of the patients.[16] Apart from the correct brushing technique practice, mouthwashes are regularly prescribed by dentists for plaque control.[17] In the present study, it was seen that only 30% of the study samples used mouthwash, which is commendably less compared to 45% reported by Uppal and Khan and 57.4% reported by Baheti and Toshniwal[4,18] Thus, there is a great need to create awareness regarding the use of mouthwashes among the orthodontic treatment seekers.

In our study, 49% of the patients used special aids for oral hygiene maintenance, but this was found to be less compared to studies conducted by Almoammar *et al*.[19] wherein 96% of the participants used special oral hygiene aids.[20] Wites *et al*. also reported that majority of the patients in his study used special oral hygiene aids.[20] This highlights the necessity to increase the oral health education among patients undergoing orthodontic treatment. Orthodontists treat the patients over a long period by which they can actively and responsibly tutor the patients regarding gingival and periodontal health to encourage good oral health behavior by stressing on the prevention of periodontal diseases. Nevertheless, self-explanatory informative materials such as recorded videos, pamphlets, and leaflets can be given to patients to read and follow. This can be an economical and useful method to educate the population and consider health change.

Conclusion

From the present study, it can be concluded that even though most of the participants had the awareness of the importance of oral hygiene maintenance during orthodontic treatment; however, very few of them had a positive attitude toward oral hygiene maintenance, and only few of them practiced it. There is a need for creating awareness and imparting knowledge about oral health maintenance to the patients by various methods such as social media, distribution of pamphlets, short videos, demonstrations, and educational programs. It is necessary for the orthodontists to spend some time with the patients and entice them to practice good oral hygiene methods. Further studies required on the proper educational methods that might be used to enhance the oral health literacy and thus attitude and practice among orthodontic patients.

Limitations

Further, Saudi Arabian regions should be investigated and compared. In addition, higher sample size of other Saudi regions (Al-Jawf/Aseer/Eastern/Jazan/Mecca/Northern/Riyadh/Tabuk) should be selected. Socioeconomic and educational levels can be investigated in relation to oral hygiene of orthodontic patients.

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