Original Research Article

Knowledge and Awareness Among Parents of Children with Functional Orthodontic Appliances in Riyadh City, Saudi Arabia: A Cross Sectional Study

ABSTRACT

Background: To prevent damage to orthodontic appliances, providing comprehensive education to parents and patients is crucial, ensuring successful assessment and treatment in orthodontics. This study aims to assess the level of knowledge and awareness among parents of patients seeking functional orthodontic appliance therapy at the Orthodontic &Pediatric Dentistry Centre of Riyadh Elm University, Riyadh, Saudi Arabia.

Materials and Method: This cross-sectional study was carriedout among the parents of children seeking functional orthodontic appliance therapy at the Orthodontic &Pediatric Dentistry Centre of Riyadh Elm University, Riyadh, Saudi Arabia. A structured, close-ended, and self-administered questionnaire consisting of a demographic section and nine items onknowledge and awareness of functional orthodontic applianceswas distributed to the parents, and the responses were collected and analyzed using descriptive statistics and chi-square test.

Result:A total of 301 parents agreed to participate in the study.Nearly 99.3% of parents said a beautiful smile helps a child's personality develop. Almost 37.9% agree that the malocclusion was caused by heredity and poor oral hygiene. Over half (51.2%) of parents knew that early primary tooth loss would result in permanent teeth or space maintainers. Nearly 42.9 percent of parents agreed to see an orthodontist for their child, but less than half said seven years was the right age. Parents (71.8%) knew age affects orthodontic treatment outcomes. Over half (59.1%) of parents knew about orthodontic appliance breakage, and 20.9%refabricated their children's appliances.In general, 47.8%, 38.2%, and 14% of the participants showed a moderate, high, and low awareness of functional orthodontic appliances.Education (p=0.005) and employment status (p=0.008) were significantly associated with the awareness of functional orthodontic appliances. The knowledge of need forrefabrication of broken orthodontic appliances differed significantly across the age of the parents (p=0.008), while a significant majority of the parents agreed that an orthodontic appliance is used as a habit breaker (p=0.009). The parents' knowledge ofthe causes of malocclusion differed based on employment status (p=0.011) and the number of children (p=0.050).

Conclusion: Parents of children undergoing orthodontic treatment were moderately aware of malocclusion and functional orthodontic treatment. Parents exhibited a lack of awareness ofthe refabrication of functional appliances. The study's findings indicate the need to enhance parents' knowledge of malocclusion and orthodontic functional appliances for their children.

Keywords: awareness; functional orthodontic appliances; knowledge; children; parents.

1. INTRODUCTION

The studies conducted in Saudi Arabia have reported a wide range of prevalence rates for dental malocclusion among healthy adolescents, varying from 21.0% to 55.4% [1–5]. Various factors can impact an individual's or a parent's decision when considering orthodontic treatment for their child. There are multiple reasons why individuals seek orthodontic treatment, which can be categorized into aesthetic, functional, or social factors [6]. Many individuals are driven to pursue orthodontic treatment due to their desire to enhance the appearance of their face, teeth, and smile [7,8]. A pilot study conducted in Saudi Arabia's Qassim region found that most orthodontic patients seek treatment to enhance their facial appearance [9].

A survey conducted in Saudi Arabia revealed that a much higher number of parents believed that their children needed orthodontic treatment compared to the number of dentists who had the same opinion. The number 18 is enclosed in square brackets [10]. Another survey conducted in Turkey revealed that a significant majority of parents, precisely 84.6%, based their decisions on orthodontic treatments on the recommendations provided by dentists [7]. Prior research has indicated that parents who have undergone orthodontic treatment are open to doing so and are more likely to support this course of action for their children[11,12].

Parental awareness is crucial to measures promoting the prevention and treatment of dental problems in children[5].According to most parents, malocclusion is not regarded as a dental issue [13]. Several factors contribute significantly to parents' beliefs and attitudes regarding the decision to seek orthodontic therapy for their children. These factors encompass the financing of orthodontic treatment, socioeconomic level, ethnic background, resource accessibility, literacy rate, and understanding of malocclusion [14].

Parents are the critical driving factors that influence childhood orthodontic care. Consequently, due to a lack of information and awareness, parents may fail to promptly pursue orthodontic treatment for their children, specifically during functional orthodontic appliance therapy. Hence, the present study

aims to evaluate the knowledge and awareness among parents of functional orthodontic appliance patients visiting the Orthodontics &Pediatric Dentistry Centre, REU, Riyadh, Saudi Arabia. This study informs onthe problems of damage and re-making of functional appliances that could impact the final orthodontic treatment outcomes.

2. MATERIAL AND METHODS

2.1 Ethical clearance

The study protocol was approved by the Research Centre at Riyadh Elm University, Riyadh, Saudi Arabia (IRB approval number is FUGRP/2023/312/947/846).

2.2 Study design and setting.

The current study was a descriptive cross-sectional survey carried out among the parents of the children undergoing functional orthodontic appliance therapy attheOrthodontics &Pediatric Dentistry Centre of Riyadh Elm University, Riyadh, Saudi Arabia. This study was conducted as per the STROBE guidelines.

2.3 Study sample

A sample of 310 was decided based on a 5% acceptable margin of error, 95% confidence level, and a population size of 1550 orthodontic patients with a response distribution of 50% for the questionnaire. The sample size calculation was performed using Raosoft online program (http://www.raosoft.com/samplesize.html). Convenience sampling methodology was employed to include the parents of the children undergoing functional orthodontic treatment. Parents of children undergoing another kind of orthodontic treatment were excluded from the study.

2.4 Validity and reliability of the questionnaire

A digital questionnaire was created to evaluate parents' comprehension and awareness of functional orthodontic appliances for their children and their involvement in orthodontic consultations. The questionnaire's face validity was assessed by randomly selecting ten parents to evaluate the clarity and phrasing of the questions. Content validity was assessed by a panel of statistics specialists, two dentists, and an orthodontist.

The questionnaire was given to 10 parents to complete and return to ensure its reliability. Participants completed the questionnaire again after three weeks and were compared to their previous responses.

The awareness survey items' Cohen's kappa values ranged from 0.84 to 0.92, indicating high reliability.

2.5 Questionnaire content

The survey invitation clearly outlined the study's objectives and informed participants that their involvement would remain confidential. Participants were notified that by completing the survey, they were giving their consent and agreeing to participate in the study.

The questionnaire consisted of seven sociodemographic variables of the parents and ten items on the knowledge and awareness of functional orthodontic appliances. The questions elicited questions about the causes of malocclusion, the importance of a good smile, and properly aligned teeth. The questionnaire items also included the child's appropriate age for orthodontic consultation and treatment. Parent's awareness ofthe breaking of the orthodontic appliances and their refabricationwas also elicited. Additionally, the use of orthodontic appliances as oral habit breakers was also included in the parents' knowledge assessment.

2.6 Questionnaire administration

An electronic version of the questionnaire was developed using Google Forms, and the link was shared with the parents of the children undergoing functional orthodontic treatment. The parents' contact numberwas obtained, and the questionnaire was shared on WhatsApp with the parents. It took 5-6 minutes for the parents to answer all the questions. The data collection was carried out from March to April 2023. All the questionnaire responses were downloaded from the Excel sheet and encoded into the specialized statistical analysis program for analyses.

2.7 Statistical analysis

Descriptive statistics of frequency distribution and percentages were calculated for the questionnaire items and characteristics of the study participants. The chi-square and Fisher's exact tests were applied to the data to determine the association between the categorical variables. A significance level was set at $p \leq 0.05$. All the data will be analyzed using version 25 SPSS for Windows software (IBM-SPSS Inc., Armonk, NY: USA).

3. RESULTS

A total of 301 parents were invited to participate in this research, and all responded to the survey, generating a response rate of 100%. Most of the participants were 40 years old and above. Table 1

summarizes the demographics of the survey participants. Females accounted for 67.8% of the participants. Most participants were married (86.0%), 10.3% were divorced, and 3.7% were widowed. About 29.2% of the participants had a high school diploma, and 56.8% completed their bachelor's degree. Only 14% of the participants had less than a high school education, and a few had a postgraduate degree (14%). Nearly half of the participants were employed, while 40.9% were unemployed. Similarly, 142 (47.2%) of the participants had four and above children, and nearly half of their children were aged between 7-10 years.

Table 1. Characteristics of the study participants (N=301)

Variables		n	%
Nationality	Saudi	281	93.4%
	Non-Saudi	20	6.6%
Gender	Female	204	67.8%
	Male	97	32.2%
Age	18-29	48	15.9%
	30-39	110	36.5%
	40 and above	143	47.5%
Education	High school	88	29.2%
	Bachelor's	171	56.8%
	Postgraduate	42	14.0%
Marital Status	Married	259	86.0%
	Divorced	31	10.3%
	Widowed	11	3.7%
Employment	Employed	178	59.1%
	Unemployed	123	40.9%
No of Children	One	46	15.3%
	Two	51	16.9%
	Three	62	20.6%
	Four and above	142	47.2%
Age of child (Years)	7-10	148	49.2%
	11-12	60	19.9%
	13-14	93	30.9%

Almost 99.3% of the parents agreed that a beautiful smile is essential for the healthy development of the child's personality. Heredity and bad oral habits (37.9%) were found to be the cause of the malocclusion. More than half (51.2%) of the parents knew of the consequences of early loss of primary teeth, whichpermanent teeth or space maintainers would replace. Almost (42.9%) parents agreed to consult an orthodontist for their child's treatment; less than half saidseven years is the

appropriate age for consulting the orthodontist. Age affects the starting of the orthodontic treatment outcomes was known to (71.8%) of the parents. Children can have orthodontic treatment during their growing period (60.5%) of the parents agree. More than half (59.1%) of the parents were aware of the breakage of orthodontic appliances, and (20.9%) refabricated the broken orthodontic appliances of their children. Almost (64.8%) of the parents knew about the oral habits' breaker appliances (Table 2).

Table 2.Parents' responses to the questionnaire items (N=301)

Variables		n	%
A beautiful Smile is essential for the healthy development of the child's personality	Yes	299	99.3
	No	2	0.7
The causes of malocclusion in children are	Heredity	26	8.6
	Bad oral Habits	78	25.9
	Both	114	37.9
	I don't know	83	27.6
If a primary tooth was lost prematurely due to decay. What should be done?	Nothing	70	23.3
	The permanent tooth will be replaced; check if a space maintainer is needed	154	51.2
	I don't know	77	25.6
Whom will you first go to consult regarding orthodontic treatment for your child?	General physician/pediatricians	87	28.9
	General Dentist	78	25.9
	Orthodontist	129	42.9
	I don't know	7	2.3
At what age should your child attendtheir first orthodontic consultation?	7 years	142	47.2
	10 years	57	18.9
	13 years	53	17.6
	18 years	11	3.7
	I don't know	38	12.6
Do you think a person's age when starting orthodontic treatment can affect the treatmentoutcome?	No	48	15.9
	Yes	216	71.8
	I don't know	37	12.3
Do you think children can have orthodontic treatment during their growing period?	No	70	23.3
	Yes	182	60.5
	I don't know	49	16.3
Are parents aware of what may break the orthodontic appliance?	Yes	178	59.1
	No	123	40.9
Has your child's orthodontic appliance been broken and needs to be refabricated?	Yes	63	20.9
	No	238	79.1
Did you know that there are appliances to oral habit breakers?	Yes	195	64.8
	No	106	35.2

Theparents' knowledge ofthe causes of malocclusion showed a significant difference across employment status (p=0.011) and the number of children (p=0.050) (Table 3).

Table 3. Association between characteristics of the study participants and causes malocclusion

Variables		Causes of malocclusion				
		Heredity	Bad oral Habits	Both	I don't know	p
Employment	Employed	53.8	53.8	71.1	49.4	0.011
	Unemployed	46.2	46.2	28.9	50.6	
Number of Children	One	3.8	20.5	20.2	7.2	0.050
	Two	19.2	19.2	14.9	16.9	
	Three	19.2	25.6	20.2	16.9	
	>=4	57.7	34.6	44.7	59.0	

The questionnaire item age at which a person can start orthodontic treatment and orthodontic treatment at the growth period showed a statistically significant difference across parental education categories (p<0.001 and p=0.006). Similarly, the starting age for orthodontic treatment showed a significant difference across the parents' employment status (p=0.048), as shown in Table 4.

Table 4. Association between characteristics of the study participants and questionnaire items

Variables		Age of person starting orthodontic treat				Ortho treatment at growth period			
		No	Yes	I don't know	p	No	Yes	I don't know	p
Education	High school	41.7	22.2	54.1	<0.001	32.9	23.1	46.9	0.006
	Bachelor's	41.7	63.9	35.1		60.0	59.3	42.9	
	Postgraduate	16.7	13.9	10.8		7.1	17.6	10.2	
Employment	Employed	45.8	63.4	51.4	0.048	54.3	62.1	55.1	0.434
	Unemployed	54.2	36.6	48.6		45.7	37.9	44.9	

Parent's knowledge ofthe need forrefabrication of broken orthodontic appliances differed significantlyacross the age of the parents (p=0.008), while a significant majority of the parents agreed that there is orthodontic appliances used as habit breakers (p=0.009) as shown in Table 5.

Table 5. Association between characteristics of the study participants and questionnaire items

Variables		Breakage of orthodontic appliance			Need refabrication of broken orthodontic appliance			Appliance oral habit breakers		
		Yes	No	p	Yes	No	p	Yes	No	p
Age	18-29	16.3	15.4	0.609	27.0	13.0	0.008	16.9	14.2	0.764
	30-39	34.3	39.8		23.8	39.9		35.4	38.7	
	>=40	49.4	44.7		49.2	47.1		47.7	47.2	
Employment	Employed	62.4	54.5	0.171	66.7	57.1	0.172	64.6	49.1	0.009
	Unemployed	37.6	45.5		33.3	42.9		35.4	50.9	

In general, most of the participants showed a moderate (47.8%) level of awareness of functional orthodontic appliances, followed by high (38.2%) and low (14%) awareness levels, as shown in Figure 1.

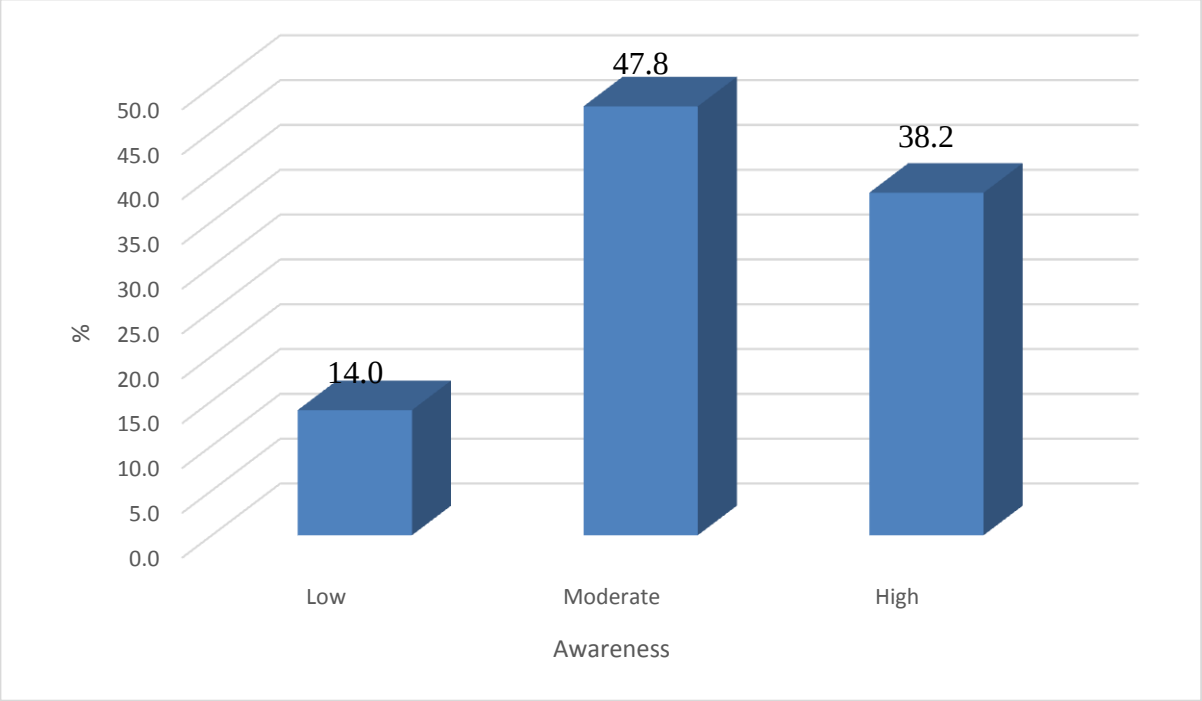

Fig1: Parents orthodontic awareness level

The association between awareness of functional orthodontic appliances and demographic factors is shown in Table 6. Education (p=0.005) and employment status (p=0.008) were the only factors significantly associated with the awareness of functional orthodontic appliances. However, other factors did not reveal any significant association.

Table 6. Association between orthodontic awareness level and demographic factors

Variables		Low		Moderate		High		Total		p
		n	%		%	n	%	n	%	
Nationality	Saudi	39	92.9%	135	93.8%	107	93.0%	281	93.4%	0.965
	Non-Saudi	3	7.1%	9	6.3%	8	7.0%	20	6.6%	
	Total	42	100.0%	144	100.0%	115	100.0%	301	100.0%	
Gender	Female	26	61.9%	97	67.4%	81	70.4%	204	67.8%	0.593
	Male	16	38.1%	47	32.6%	34	29.6%	97	32.2%	
	Total	42	100.0%	144	100.0%	115	100.0%	301	100.0%	
Age	18-29	2	4.8%	21	14.6%	25	21.7%	48	15.9%	0.095
	30-39	20	47.6%	52	36.1%	38	33.0%	110	36.5%	
	≥40	20	47.6%	71	49.3%	52	45.2%	143	47.5%	
	Total	42	100.0%	144	100.0%	115	100.0%	301	100.0%	
Education	High school	22	52.4%	41	28.5%	25	21.7%	88	29.2%	
	Bachelor's	15	35.7%	85	59.0%	71	61.7%	171	56.8%	0.005

	Postgraduate	5	11.9%	18	12.5%	19	16.5%	42	14.0%	
	Total	42	100.0%	144	100.0%	115	100.0%	301	100.0%	
Marital Status	Married	38	90.5%	123	85.4%	98	85.2%	259	86.0%	0.920
	Divorced	3	7.1%	15	10.4%	13	11.3%	31	10.3%	
	Widowed	1	2.4%	6	4.2%	4	3.5%	11	3.7%	
	Total	42	100.0%	144	100.0%	115	100.0%	301	100.0%	
Employment	Employed	17	40.5%	83	57.6%	78	67.8%	178	59.1%	0.008
	Unemployed	25	59.5%	61	42.4%	37	32.2%	123	40.9%	
	Total	42	100.0%	144	100.0%	115	100.0%	301	100.0%	
Number of Children	One	4	9.5%	17	11.8%	25	21.7%	46	15.3%	0.122
	Two	7	16.7%	25	17.4%	19	16.5%	51	16.9%	
	Three	5	11.9%	33	22.9%	24	20.9%	62	20.6%	
	≥Four	26	61.9%	69	47.9%	47	40.9%	142	47.2%	
	Total	42	100.0%	144	100.0%	115	100.0%	301	100.0%	

4. DISCUSSION

Interceptive orthodontics refers to the specific stage of orthodontics that focuses on identifying and correcting possible abnormalities and misalignments in the growing dentofacial complex [15]. An early orthodontic consultation is crucial for youngsters. According to the American Association of Orthodontists, it is recommended for children to receive their first orthodontic visit at the age of 7 years [16]. Malocclusion can arise from various circumstances, including oral habits, dental malformations, and the developmental positioning of the teeth. Malocclusion can lead to periodontal issues, caries, and temporomandibular joint difficulties[17]. Hence, the recognition of malocclusion is exceedingly significant. The majority of orthodontic patients consist of children and adolescents. Consequently, the level of awareness that parents possess regarding malocclusion plays a crucial role in determining their motivation during orthodontic treatment [16].

In the current study, parents exhibited moderate knowledge and awareness offunctional orthodontic appliances. Almost all parents believe that a beautiful smile is essentialto the healthy development of the child's personality. This finding is in line with the many previous studies reported by Aldweesh et al.and Alnaafaet al.found that dentofacial appearance significantly influences an individual's level of attractiveness[18,19].

Most parents were aware of the causes of malocclusion among children, and (42.9%) were willing to consult an orthodontist. This finding coincided with the past study by Aldweesh et al.wherein many parents reported that their children had problems with their teeth, and 76.02% consulted an

orthodontist[18].This number was more higher than the current study. This variation could be due to the disparity of sample sizes between the studies.

The parents' determination to commence orthodontic treatment for their children is influenced by various factors beyond their control, including the opinions of the dentist, speech therapist, and other medical professionals[20]. However, in this survey, most parents knew that children should see an orthodontist at age 7, and most believed that age is a crucial factor in orthodontic treatment that can affect the treatment outcome. Similarly, many participants agreed that children can have orthodontic treatment during their growing period.

Appliance breakage is one of the disadvantages of functional orthodontic appliance therapy. According to Meeran et al. it is necessary to visually examine all metal retentive components during each appointment to detect any fractures caused by repeated use. If this is observed, engaging in the refabrication of the appliance is recommended[21]. Lina et al. noted that the parents of more than half of the functional orthodontic appliance group reported about the damageto the appliance [22]. However, in this study, most parents were aware of the breakage of functional orthodontic appliances and the use of appliances for habit-breaking. Despite this, only 20.9% of the parents were mindful of the refabrication of the functional appliances, suggesting lower awareness of the refabrication of the appliances.

Parents with different employment statuses differed significantly in the knowledge of causes of malocclusion. It was evident that the employed parents showed a higher understanding of the causes of malocclusion compared to the unemployed parents. This suggests that socioeconomic conditions could affect normatively measured orthodontic needs. Similarly, parents with more than four children had more knowledge of the causes of malocclusion than those with fewer children. These findingscontradict the study reported by Alsaggafet al.,who found no significant differences in awareness levels based on employment status and number of children[23].

Parents with a bachelor's level of education and those employed were more likely to perceive that age is essential in commencing orthodontic treatment,which can affect treatment outcomes. Similarly, parents with bachelor's education believed children could have orthodontic treatment during growth. Our findings contradict the study reported by Almarhoumi et al., who found no significant difference in parental knowledge of malocclusion based on educational level[24].

Parental age is significantly associated with the knowledge of the need to refabricate the broken orthodontic appliance. Most parents aged 40 years and above believe that broken functional appliances could be refabricated. This finding reflects a lack of awareness regarding appliance refabrication among younger parents. In addition, employed parents believed that orthodontic appliances could be used as an oral habit breaker.

The overall knowledge and awareness of malocclusion and orthodontic treatment were significantly associated with the parent's educational level and employment status. The parents with bachelor's education and those being employed demonstrated higher knowledge compared to their counterparts. This finding aligns with the study reported by Alsaggaf et al., who acknowledged that unemployment status was a significant predictor of low awareness levels relative to moderate awareness[23].

This study enhances our understanding of parents' awareness regarding malocclusion and orthodontic functional appliances for their children. Additionally, it is beneficial to identify parental traits commonly associated with their levels of awareness. However, it is essential to note that the results of this study have limitations and may not apply to the entire population of Saudi Arabia. This is because the study used a sample exclusively from an orthodontic Centre in Riyadh. Hence,multicentric, ample representative sample research from diverse locations in Saudi Arabia is needed to confirm the current study findings. Moreover, social media can be effectively utilized as a powerful tool to improve orthodontic awareness among parents in Saudi Arabia.

Conclusion

Parents of children having orthodontic treatment at Riyadh Elm University's Orthodontics and Pediatric Dentistry Centre were moderately aware of malocclusion and functional orthodontic treatment. However, parents demonstrated a need for more information regarding the refabrication of functional appliances. The study's findings indicate the need to enhance parents' knowledge of malocclusion and functional orthodontic appliances for their children. The data also imply that orthodontists can raise their patients' awareness about orthodontic treatment for their children.

CONSENT

As per Riyadh Elm University's guidelines, the author(s) has obtained and preserved participants' written consent.

ETHICAL APPROVAL

The study was conducted after obtaining ethical clearance from the Research and Innovation Centre of Riyadh Elm University, Riyadh, Saudi Arabia.

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