

Interceptive and Orthodontic Treatment by Pediatric Dentists in Jordan

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Abstract

Objectives: The purposes of this study were to document the interceptive and orthodontic treatment currently provided by pediatric dentists in Jordan, to determine the type(s) of treatment and appliances provided, and to ascertain variables that would influence practitioners' treatment patterns.

Methods: A cross-sectional survey was carried out among pediatric dentists. A structured questionnaire was used, distributed directly by hand to individual pediatric dentists at their place of practice, and collected after one week. Descriptive analysis and Chi-square test were used. The level of significance was set as 0.05.

Results: The majority of pediatric dentists (89%) provided orthodontic treatment. Pediatric dentists have unlikely expectations concerning the benefits of orthodontic treatment. The most frequently provided treatments were for space maintenance (99%), and conditions caused by oral habits (94%). The most utilized appliances were those for space maintenance (99%), habit breaking (83%), removable upper orthodontic appliances (with finger or Z spring and anterior expansion screw) (66%), and palatal expansion (53%). Variables that would significantly affect the type of treatment and appliances used were place of practice, annual hours spent in continuing education in orthodontics, confidence level in providing treatment, and nearest orthodontist's location.

Conclusions: Most of the pediatric dentists provide orthodontic treatment with high expectations concerning the benefits of providing it. This study documents the interceptive and orthodontic treatment currently provided by pediatric dentists in Jordan. It summarizes treatment and appliances provided, and variables that would influence practitioners' treatment patterns.

Keywords: Pediatric Dentist, Orthodontics, Interceptive, Dental Education, Jordan.

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Introduction

When treatment is provided earlier than usual, i.e., before the growth spurt, it is described as "interceptive" or "early" treatment [1]. Interceptive orthodontic treatment has many benefits, as it can reduce malocclusion severity and provide a baseline access to orthodontic treatment (OT) [2]. It favors normal teeth

eruption, promotes a favorable growth pattern, improves the patient's self-image and helps in breaking destructive habits [3]. Moreover, it may have a positive effect on adolescents, especially those suffering from bullying related to their occlusion problems, or their oral health as related quality of life [4]. The transition from primary to permanent dentition may announce the onset of malocclusion and beginning of its interception and correction. As such, this highlights the pediatric dentist's role in following up the interaction between teeth morphogenesis,

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dentition development, and complex craniofacial growth [5]. The pediatric dentist has a key role in managing the developing dentition and occlusion, preventing malocclusion and enhancing the well-being of infants, children, and adolescents [6]. Studies have surveyed pediatric dentists to report on their provision of OT, and this is in the range of 19.7–99% performing OT [1, 7–8, 10–14].

The Jordan Medical Council (JMC) is dedicated to the rehabilitation of specialists through the planning, implementation and supervision of scientific programs, plans and academic curricula for various medical and dental specialties in Jordan. The JMC is the only body supervising training in various dental specialties and various institutions. Accordingly, each candidate must fulfil the requirements of the JMC to sit for the Jordanian Board exam.

For proficiency in pediatric dentistry, the management of developing dentition and occlusion is a requirement. Training for eligibility for the Jordanian Board in pediatric dentistry is offered by several institutions through different systems. This is done either in schools of dentistry through a three-year clinical master's program or by both the Ministry of Health and the Royal Jordanian Medical Services through a three-year residency program. Before 2005, registered pediatric dentists in Jordan were licensed by the Jordan Dental Association (JDA). Starting in 2005, the JMC became the principal authority licensing all dental specialties.

A Medline search has shown that no studies have been conducted to assess the interceptive and OT provided by pediatric dentists in Jordan. Therefore, it is essential to explore the extent to which interceptive and orthodontic care is delivered by pediatric dentists and the

factors which might affect this provision. Accordingly, the aims of the present study were to document the interceptive and orthodontic treatment currently provided by pediatric dentists in Jordan, to determine the types of treatment and appliances provided, and to ascertain which variables influence practitioners' treatment patterns.

METHODS

A cross-sectional study was carried out among pediatric dentists in Jordan. The study was approved by the Department of Pediatric Dentistry, the Graduate Studies Committee at the School of Dentistry, and the Council of the School of Graduate Studies at the University of Jordan. Data were collected from February to April 2018. Information about pediatric dentists was obtained from the JDA. The most recent database at the time of data collection included 82 pediatric dentists. The required sample size was calculated, using G* Power Software version 3.1.9.2 [16] with large effect size of 0.5, $\alpha = 0.05$, power = 0.95, to be 52. Taking into consideration the approval rate and drop out, the total sample was increased to attain the desired sample size and all pediatric dentists were targeted to have a final sample comprised of 70 participants. Only licensed, registered, and active pediatric dentists practicing in Jordan were included in the study.

Based on structured questionnaires used in previous studies [7–8, 11, 13–14], a questionnaire was developed and modified to serve the specific requirements of this study (a copy of the questionnaire is included). The questionnaire consisted of 37 questions on demographic data, types of OT, and appliances provided. Ten questions were included to assess the pediatric dentists' opinions and knowledge in OT. So that the aims and possible benefits

arising from the study could be explained, pediatric dentists were contacted by phone, and they were also assured of the confidentiality of any information collected.

The questionnaire was distributed by hand to the pediatric dentist at their place of practice, and collected after one week. A pilot study was carried out on a group of seven pediatric dentists to assess ease of readability and interpreting questions, and the average time needed to complete the questionnaire. The questionnaire took respondents less than ten minutes to complete and was modified based on the suggestions and comments. Reliability was tested by asking 10% of the participants to complete the questionnaire on two separate occasions, two weeks apart, and the test-retest reliability result was 0.79.

Data analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS for Windows, version 23). Descriptive and analytic statistics were performed. Frequencies and percentages were calculated to describe the demographic profile of the sample, respondents' opinions regarding the benefits of providing OT, practice characteristics,

orthodontic conditions treated, and therapies used. The relationship between different types of OT, the appliances provided, and the respondent's variables was explored using a Chi-square test. A p value of <0.05 was considered statistically significant.

RESULTS

The questionnaire was distributed to 82 pediatric dentists. Seven were excluded as they participated in the pilot study. Of the 75 remaining pediatric dentists, 70 (93%) completed the questionnaire. Table 1 shows the demographic characteristics of the respondents. The majority were aged 36–46 years (46%) and had been practicing pediatric dentistry for more than five years (57%). Most were licensed by the JMC (71%), practicing in the private sector (39%), and in the central region of Jordan (74%). Almost all were trained to provide OT (91%) and had acquired their knowledge (86%) during postgraduate studies. The majority considered the adequacy of the orthodontic education during postgraduate education as average (62%). Of all, 47% had no continuing education. Most respondents (89%) provided OT and shared their offices with an orthodontist (82%).

Table 1: Demographic characteristics of the study sample

Variable	N (%)
Gender	52 (74)
Male	18 (26)
Female	34 (50)
Age	
26–35 years	20 (29)
36–45 years	32 (46)
46–55 years	17 (24)
>55 years	1 (1)
Period elapsed since qualification in pediatric dentistry (year)	
<5	30 (43)
5–10	14 (20)
11–15	17 (24)
16–20	6 (9)
21–25	2 (3)
>25	1 (1)
Authority delivering specialty license	
Jordan Medical Council	50 (71)
Jordan Dental Association	20 (29)
Practice of pediatric dentistry	
Universities	17 (24)
Royal Medical Services	10 (14)
Ministry of health	16 (23)
Private practice	27 (39)
Location of practice	
Central (Amman)	52 (74)
North (Irbid)	13 (19)
South (Other)	5 (7)
Source of orthodontic knowledge	
Undergraduate dental education	5 (7)
Postgraduate training education	60 (86)
Continuing education courses	5 (7)
Adequacy of the orthodontic education during postgraduate education	
Poor	3 (4)
Average	43 (62)
Excellent	24 (34)
Hours spent on continuing education in orthodontics annually	
0	33 (47)
1–9	28 (40)
10–20	6 (9)
>20	3 (4)
Providing interceptive and orthodontic treatment	
Yes	62 (89)
No	8 (11)
Nearest orthodontist	
In office	57 (82)
<1 Km	5 (7)
1–5 Km	3 (4)
>5 Km	5 (7)

Table 2 shows the distribution of the benefits of OT. respondents according to their perception of

Table 2: Distribution of the respondents according to their views on the beneficial effect of orthodontic treatment

Outcome	N (%)
Facilitate normal tooth eruption	70 (100)
Improve some growth patterns	66 (94)
Reduce the severity of malocclusion	70 (100)
Eliminate destructive oral habits	70 (100)
Reduce temporomandibular diseases	57 (81)
Reduce the risk of caries	47 (67)
Reduce the risk of dental trauma	66 (94)
Reduce periodontal disease	64 (91)
Improve self-esteem	70 (100)
Reduce teasing incidents	70 (100)

Table 3 presents information related to OT provided by the respondents. The majority provided treatment during the early mixed dentition stage (89%). Table 3 also shows that respondents mostly provided treatment to manage

space maintenance (99%), oral habits (94%), and the identification of anomalies (87%). The least common treatments were class III skeletal (9%), class II skeletal (11%), and class III malocclusion (11%). Space maintainers were the most

commonly used orthodontic appliances (99%), followed by habit breaking appliances (83%), upper removable orthodontic appliances (with

finger or Z spring and anterior expansion screw) (66%), and palatal expansion appliances (53%).

Table 3: Timing of treatment, orthodontic condition and therapies provided by the study sample

Timing of orthodontic treatment	N (%)
Primary dentition	29 (41)
Early mixed dentition	62 (89)
Late mixed dentition	35 (50)
Permanent dentition	4 (6)
Conditions/malocclusion treated-diagnosed	N (%)
Space maintenance	69 (99)
Space regaining	37 (53)
Anterior cross bite	56 (80)
Posterior cross bite	32 (46)
Open bite	19 (27)
Deep bite	17 (24)
Oral habits	66 (94)
Dental Class II malocclusion with increased overjet	19 (27)
Dental Class III malocclusion	8 (11)
Class II skeletal	8 (11)
Class III skeletal	6 (9)
Minor tooth malposition	26 (37)
Alignment of impacted teeth	9 (13)
Ectopic eruption guidance	40 (57)
Submerged teeth	36 (51)
Extraction cases	45 (64)
Serial extraction procedures	30 (43)
Teeth grinding	31 (44)
First orthodontic screening at age 7	50 (71)
Palpation for the canine bulge for all patients between 8–10 years old	50 (71)
Orthodontic therapies employed	N (%)
Space maintaining appliances	69 (99)
Space regaining appliances	30 (43)
Palatal expansion appliances	37 (53)
Upper removable orthodontic appliances (with finger or Z spring and anterior expansion screw)	46 (66)
Sectional fixed appliances	15 (21)
Full fixed appliances	3 (4)
High pull headgear	5 (7)
Low pull headgear	5 (7)
Straight pull headgear	4 (6)
Medium opening activator	3 (4)
Twin block	17 (24)
Herbst appliance	2 (3)
Bionator	2 (3)
Reversed headgear (facemask)	6 (9)
Chin cup	5 (7)
Reversed twin block	6 (9)
Frankel appliance	6 (9)
Habit breaking appliances	58 (83)

Participants reported they would consult an orthodontist for an average of 44% of orthodontic cases per year. Table 4 shows that 62% of respondents considered their confidence level in providing OT without orthodontic consultation to be excellent, and 64% considered their confidence level in providing OT to be excellent after orthodontic consultation. Table 4 shows that the

difficulty of the case/severity of malocclusion and age of the patient were the leading reasons for consulting an orthodontist. The respondents referred an average of 42% of orthodontic cases per year. The difficulty of the case/severity of malocclusion was the foremost reason (87%) for referring the patient to an orthodontist.

Table 4: Level of confidence in providing OT and reasons for consulting and referring to an orthodontist

Level of confidence	Level of confidence in providing OT	
	Without orthodontic consultation	After orthodontic consultation
	N (%)	N (%)
Poor	3 (4)	2 (3)
Average	24 (34)	23 (33)
Excellent	43 (61)	45 (64)
Reasons for consulting and referring to an orthodontist		
Factor	Orthodontic consultation	Referral
	N (%)	N (%)
Difficulty of case/severity of malocclusion	46 (66)	61 (87)
Request of patient/parent	22 (31)	28 (40)
Age of patient	45 (64)	43 (61)

Table 5 shows variables which demonstrated a significant relationship with conditions/malocclusion treated ($p<0.05$). A higher percentage of the female participants reported treating oral habits than the males ($p<0.05$). Respondents who practiced at universities and in the private sector tended to treat more anterior and posterior cross bite ($p<0.05$). Regarding the adequacy of their postgraduate orthodontic education, practitioners who considered this to be average treated more anterior cross bite ($p<0.05$). In contrast, those respondents who considered their postgraduate orthodontic education to be

excellent treated more posterior cross bite ($p<0.05$). Respondents who considered their confidence level in providing OT to be excellent treated more open bite, deep bite, class II malocclusion with increased overjet, class III malocclusion, class II skeletal, class III skeletal, and alignment of impacted teeth ($p<0.05$). Pediatric dentists who had had 1–10 continuing education hours per year were more likely to treat a greater variety of conditions ($p<0.05$). Practitioners who shared their offices with an orthodontist ($p<0.05$) tended to treat more anterior cross bite.

Table 5: Variables having a significant relationship with conditions/malocclusion treated

Condition	Variable				
	Gender				
	Female N (%)		Male N (%)		P
Oral habits (N= 66)	52 (79)		14 (21)		0.000
	Place of work				
	Universities	Ministry of health	Royal Medical Services N (%)	Private sector	P
	N (%)	N (%)		N (%)	
Anterior cross bite (N=56)	16 (29)	14 (24)	10 (18)	16 (29)	0.006
Posterior cross bite (N=32)	11(34)	3 (9)	6 (19)	12 (38)	0.046
	Adequacy of orthodontic education during postgraduate education as reported by respondents				
	Poor N (%)		Average N (%)	Excellent N (%)	P
Anterior cross bite (N=56)	1 (2)		32 (57)	23 (41)	0.013
Posterior cross bite (N=32)	1 (3)		14 (44)	17 (53)	0.01
	Annual hours spent on continuing education in orthodontics				
	0 N (%)	1–9 N (%)	10–20 N (%)	>20 N (%)	P
Open bite (N=19)	4 (21)	11 (57)	2 (11)	2 (11)	0.039
Class II malocclusion with increased overjet (N=19)	4 (21)	11 (57)	2 (11)	2 (11)	0.039
Serial extraction procedures (N=30)	11 (37)	11 (37)	6 (20)	2 (6)	0.018
Class III malocclusion (N=8)	4 (50)	2 (25)	-	2 (25)	0.016
Alignment of impacted teeth (N=9)	2 (22)	5 (56)	-	2 (22)	0.014
	Confidence level in providing OT				
	Poor N (%)		Average N (%)	Excellent N (%)	P
Open bite (N=18)	-		7 (39)	11 (61)	0.032
Deep bite (N=16)	-		6 (38)	10 (62)	0.037
Class II malocclusion with increased overjet (N=19)	-		7 (37)	12 (63)	0.007
Class III malocclusion (N=8)	-		1 (13)	7 (87)	0.003
Class II skeletal (N=8)	-		1 (13)	7 (87)	0.003
Class III skeletal (N=6)	-		-	6 (100)	0.002
Alignment of impacted teeth (N=9)	-		2 (22)	7 (78)	0.013
	Location of the nearest orthodontist (km)				
	In office N (%)	<1 N (%)	1-5 N (%)	>5 N (%)	P
Anterior cross bite (N=56)	49 (88)	3 (5)	3 (5)	1 (2)	0.002

Table 6 shows variables which demonstrated a significant relationship with therapies used ($p<0.05$). Females tend to use more habit breaking appliances than males ($p<0.05$). Participants who had acquired a postgraduate degree within 5–10 years used more sectional fixed appliances ($p<0.05$). Pediatric dentists who had attained their postgraduate degree within five years used more habit breaking appliances ($p<0.05$). Pediatric dentists who considered that

their postgraduate orthodontic education was excellent used more reversed twin block ($p<0.05$). Respondents who spent between 10–20 hours annually on continuing orthodontic education used more Frankle appliances ($p<0.05$). In addition, respondents who spent 1–9 hours annually on continuing education used more habit breaking appliances ($p<0.05$). Respondents who considered their confidence level in providing OT excellent used more

headgear appliances ($p<0.05$). The appliances that were most used due to the presence of an orthodontist in the practice were palatal

expansion appliances and upper removable orthodontic appliances (with finger or Z spring and anterior expansion screw) ($p<0.05$).

Table 6: Variables having a significant relationship with therapies employed

Therapies employed	Variable						
	Gender						
	Female	Male					P
	N (%)	N (%)					
Habit breaking appliances (N=58)	48 (83)	10 (17)					0.000
	Period passed since obtaining specialty degree (years)						
	> 25	21–25	16–20	11–15	5–10	< 5	P
	N	N (%)	N (%)	N (%)	N (%)	N (%)	
	(%)						
Sectional fixed appliances (N=15)	0(0)	1(7)	2(13)	2(13)	7(47)	3(20)	0.038
Habit breaking appliances (N=58)	0(0)	2(3)	6(10)	11(19)	13(23)	26(45)	0.039
	Adequacy of orthodontic education during postgraduate education as reported by respondents						
	Poor	Average				Excellent	P
	N (%)	N (%)				N (%)	
Palatal expansion appliances (N=37)	-	20 (54)				17 (46)	0.028
Reversed twin block (N=6)	-	1 (17)				5 (83)	0.03
	Annual hours spent on continuing education in orthodontics						
	0	1–9	10–20			>20	P
	N (%)	N (%)	N (%)			N (%)	
Chin cup (N=5)	2 (40)	-	1 (20)			2 (40)	0.000
Frankel appliance (N=6)	1 (17)	1 (17)	3 (49)			1 (17)	0.023
Habit breaking appliances (N=58)	25 (43)	26 (45)	6 (10)			1 (2)	0.001
	Confidence level in providing IOT						
	Poor	Average				Excellent	P
	N (%)	N (%)				N (%)	
Palatal expansion appliances (N=37)	1(2)	18(49)				18(49)	0.026
Upper removable orthodontic appliances (with finger or Z spring and anterior expansion screw) (N=46)	-	29(63)				17(37)	0.048
Sectional fixed appliances (N=15)	-	4(27)				11(73)	0.001
High pull headgear (N=5)	-	-				5(100)	0.006
Low pull headgear (N=5)	-	-				5(100)	0.006
Straight pull headgear (N=4)	-	-				4(100)	0.017
Reversed headgear (facemask) (N=6)	-	1(17)				5(83)	0.03
Reversed twin block (N=6)	-	1(17)				5(83)	0.03
	Location of the nearest orthodontist (km)						
	In office	<1	1–5			>5	P
	N (%)	N (%)	N (%)			N (%)	
Palatal expansion appliances (N=37)	35 (94)	1 (3)	1 (3)			-	0.019
Upper removable orthodontic appliances (with finger or Z spring and anterior expansion screw) (N=45)	41 (90)	1 (2)	3 (6)			1 (2)	0.008

DISCUSSION

This cross-sectional study is the first conducted to explore practices related to interceptive and orthodontic treatment among

pediatric dentists in Jordan. The study sample is considered representative since almost all active pediatric dentists were included. The questionnaire was piloted and administered by

being handed to all pediatric dentists at their practices. This method helped ensure completion of the questionnaires, producing an excellent response rate of 93%, which is higher than is generally reported in surveys conducted among healthcare professionals [17]. This high response rate might reflect the great interest of respondents in orthodontic treatment.

In the present study, orthodontic knowledge was acquired by the majority of respondents (86%) during postgraduate studies. This finding is higher than that found by the Diplomats of the American Board of Pediatric Dentistry (48%) [11]. It is worth noting that the number of continuing education hours for OT was negligible in recent years and the very limited number of continuing education courses in OT may explain why the respondents referred mostly to their postgraduate education. The adequacy of the orthodontic education received during postgraduate studies was rated average by most respondents (62%), which is higher than the 37% reported by Hilgers et al. [11]. This difference might be attributed to the recent increased focus on orthodontic education in postgraduate programs of pediatric dentistry. In this survey, most respondents provided OT to their pediatric patients, conforming to other studies in which pediatric dentists were involved in OT [7–8, 16]. The high percentage (89%) of pediatric dentists involved in OT indicates that pediatric dentists are highly interested and motivated to diagnose, treat and prevent malocclusion. However, a lower percentage was found by Hilgers et al. (55%) [11] and Aldrees et al. (39%) [14]. These lower percentages might be due to the differences in methodology and definitions applied.

With regard to the perceived benefits of OT, almost all the respondents stated that it would facilitate normal tooth eruption, improve some

growth patterns, reduce the severity of malocclusion, eliminate destructive oral habits, reduce the risk of dental trauma, and reduce teasing incidents. These benefits have been confirmed in previous studies [2–4, 18]. The findings of the present study corroborate the reported results by Aldress et al. [14] in that the psychosocial variables received the highest ratings. On the psychological aspect, several authors reported that OT before the age of 18 enhances some aspects of oral health-related quality of life; however, self-esteem is a topic of conflict [4, 19–20]. A high percentage of respondents in this study (81%) believed that successful OT will reduce the risk of temporomandibular diseases, in contrast to the lower percentage reported by Aldress et al. (58%) [14]. A recent systematic review conducted to determine the association between the signs and symptoms of temporomandibular diseases and OT found that there was no evidence for a cause-effect relationship between OT and temporomandibular disorders, or that such treatment might improve or prevent them [21]. Similar to results found by Aldress et al. [14], dental health factors were rated lower than the psychosocial variables. In this study, only 67% of the respondents assumed that successful OT would reduce the risk of caries, which is comparable to the results reported by Aldress et al. (62%) [14]. Linking teeth crowding and dental caries development would prioritize OT as a measure of dental caries prevention and oral health improvement [22]. The more limited consideration of the benefits of OT in relation to caries, as scored by the respondents, may be due to the multifactorial nature of dental caries. When answering questions, the respondents might have considered the multifactorial aspect of dental caries and the multiple variables that can affect the outcome (e.g., good oral hygiene,

proper brushing, diet, type of malocclusion, type of appliance). Among the respondents of this study, 91% thought that successful OT would reduce the risk of periodontal disease. A lower percentage was reported by Aldress et al. (55%) [14]. However, it has been suggested that OT can improve periodontal status through mechanisms such as increased ease of plaque removal and reduced occlusal trauma. A systematic review assessed the direct evidence regarding the effect of OT on periodontal health and identified an absence of reliable evidence describing its positive effects [23]. The results of the present study accord with those reported by Aldress et al. [14] and indicate that participants were interested and motivated to prevent and treat malocclusion. However, the answers of respondents to questions testing knowledge of the benefits of OT for oral health suggest that they have unlikely expectations of the dental health benefits of OT. This points to the need for multidisciplinary continuing dental education for pediatric dentists, with evidence-based courses to address these views.

The results of this study confirm those of previous studies [11, 13–14] in which the majority of pediatric dentists provided OT during the early mixed dentition stage. Almost all respondents provided treatment for space maintenance. This was similar to the results of previous studies [8, 11, 13]. A recent study has reported that 72.5% and 77.2% of Jordanian children aged 4–5 suffer from early childhood caries, respectively [25], and dental visits were mostly prompted by symptoms or problems with teeth which are often solved by tooth extraction [26], indicating the strong need for space maintenance.

In this study, treatment for oral habits was reported by 94% of respondents, which is very close to that reported in previous studies, with a

range of 86–94% [8, 11, 13]. The least provided treatments were class III skeletal, class II skeletal, and class III malocclusion. Hilgers et al. [11] reported that, despite many practitioners providing comprehensive OT (serial extractions, dental Class II, dental Class III, open bites, skeletal Class II, and skeletal Class III), more provided only limited treatment or did not provide OT at all. In addition, Aldrees et al. [14] found that the least provided treatments were Class II and III malocclusions. Deluke [13] reported that 100% and 94% of pediatric dentists provided treatment for class II and class III malocclusions, respectively. The reason for these high percentages could be ascribed to the fact that the pediatric dentists in Deluke's study had acquired more continuing education [13].

Approximately two thirds of the respondents considered their confidence level in providing OT to be excellent, without the need for orthodontic consultation. Furthermore, two thirds of the respondents considered their confidence level in providing OT to be excellent after orthodontic consultation. This suggests that, as long as the treatment needed is within the line of training, practitioners are supposed to be confident in providing OT, even without orthodontic consultation. The respondents in this study reported that they would refer 42% of their cases annually to an orthodontist. The difficulty of the case/severity of malocclusion was the leading reason for referral. This supports the result found by Deluke [13], who reported that pediatric dentists have the legal and professional right to provide orthodontic services to their pediatric patients, as long as their provided treatment remains in the scope of their practice. Accordingly, they have to treat cases that are within the level of difficulty/severity, which is in line with the training they have received [13].

In this study, several factors influenced the

types of conditions treated and the therapies rendered. A significantly higher percentage of females reported providing some types of OT and appliances; females treated oral habits more than males. Although a previous study reported that female dentists had a greater preventive orientation in oral health for adults and pediatric patients than male dentists [24], the results of our study should be interpreted with caution as the majority of pediatric dentists in Jordan are females and this might have affected the accuracy of the results. Practicing at universities or in the private sector influenced practitioners to treat more anterior and posterior cross bite. This might be attributed to the privileges given to pediatric dentists in the different institutions.

New graduates seem to provide more sectional fixed appliances and habit breaking appliances than others, and practitioners who have more than 25 years of experience did not provide these appliances. Pediatric dentists with less experience seemed to be more enthusiastic and motivated to provide OT compared to those with more years of experience. In this regard, Aldrees et al. [14] reported that practitioners with fewer years of experience provided more orthodontic services. Hilgers et al. [11] found that practitioners who had practiced more than 20 years, as they neared retirement, were providing less OT than in the past or none at all.

Practitioners who considered the level of the adequacy of orthodontic education during postgraduate studies average treated more anterior and posterior cross bite. Often, students underestimated the quality of teaching or education they received. Those who had received 1–10 hours per year were more likely to treat more types of malocclusion. Habit breaking appliances were still the most used appliances by respondents, whatever the amount of continuing

education they received per year.

The degree of difficulty of the case treated matched the level of the respondent's confidence: respondents who considered that their confidence level in providing OT was excellent treated more open bite, deep bite, class II with increased overjet, class III, class II skeletal, class III skeletal, and alignment of impacted teeth. When the office was shared with an orthodontist, more respondents treated anterior cross bite and the most provided appliances were palatal expansion and upper removable orthodontic appliances (with finger or Z spring and anterior expansion screw). It may be that it is a matter of confidence from the parents, who would prefer to accompany their child to a pediatric dentistry/orthodontic clinic to resolve a malocclusion problem.

The present study has limitations inherent to the cross-sectional design; when questionnaires are used, there is no assertion that what respondents stated in their survey responses matched what they practiced daily. Using a validated questionnaire and a representative sample may have neutralized the effect of these limitations. Comparing the results of the present study with the few previous studies may not be appropriate since most of these are relatively old and trends have been changed over time.

In the light of the present study, it is recommended that the program directors and administrative faculty involved in the curriculum development of postgraduate pediatric dentistry engage students/residents in further education and more advanced OT training. More attention should be paid by the Jordanian Society of Pediatric Dentistry to continuing education courses to refresh and the strengthen competencies of pediatric dentists in OT. When treating orthodontic cases, the pediatric dentist

must consider the treatment that falls within the level of difficulty/severity of their line of training, education and confidence.

CONCLUSIONS

Although pediatric dentists in Jordan have high expectations concerning the benefits of OT, the majority limited their practice to treating space maintenance, and anterior and posterior cross bite. The most used appliances were space maintainers, upper removal orthodontic appliances (with finger or Z spring in addition to anterior expansion screw) and palatal expansion appliances. The variables that would significantly affect the type of treatment and appliances used were gender, place of practice, period elapsed since obtaining a specialty degree, adequacy of the orthodontic education during postgraduate study, annual hours spent in continuing education in orthodontics, confidence level in providing OT, and nearest orthodontist's location.

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Authors' contributions

LDR and SBA conceived the study and supervised the work. EZM collected the data. Both LDR and EZM analyzed the data. LDR wrote the manuscript. All authors have read and approved the final manuscript.

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CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest concerning the publication of this article.

AVAILABILITY OF DATA AND MATERIAL

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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التدخل التقويمي المبكر وعلاج تقويم الأسنان الذي يقدمه أطباء أسنان الأطفال في الأردن

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الملخص

الأهداف: هدفت هذه الدراسة إلى توثيق التدخل التقويمي المبكر وعلاج تقويم الأسنان الذي يقدمه أطباء أسنان الأطفال في الأردن؛ وذلك لتحديد أنواع العلاج والأجهزة المستخدمة، ودراسة المتغيرات التي من شأنها أن تؤثر على أنماط العلاج. **الطريقة:** تم إجراء دراسة عرضية مقطعية بين أطباء أسنان الأطفال، وتم استخدام استبيان منظم، وُزع مباشرة باليد على أطباء أسنان الأطفال في مكان الممارسة، وتم جمعه بعد أسبوع واحد، وتم استخدام التحليل الوصفي، واختبار مربع كاي، وتم تحديد الأهمية الإحصائية على 0.05.

النتائج: تم تقديم علاج تقويم الأسنان من قبل غالبية أطباء أسنان الأطفال (89%)، حيث تبين أن لدى أطباء أسنان الأطفال توقعات مختلفة فيما يتعلق بفوائد علاج تقويم الأسنان، وكان العلاج الأكثر شيوعاً هو الحفاظ على المسافة (99%)، وإيقاف العادات الفموية السلبية (94%)، وكانت الأجهزة الأكثر استخداماً هي أجهزة الحفاظ على المسافة (99%)، وأجهزة كسر العادات الفموية السلبية (83%)، وأجهزة تقويم الأسنان العلوية المتحركة باستخدام زنبرك الإصبع (66%)، وأجهزة توسيع الحنك (53%)، ولعلمن أهم المتغيرات التي من شأنها أن تؤثر بشكل كبير على نوع العلاج والأجهزة المستخدمة هي مكان الممارسة، والساعات السنوية التي يتم قضاؤها في التعليم المستمر في مادة تقويم الأسنان، ومستوى الثقة في تقديم العلاج، وأقرب موقع جغرافي لأخصائي تقويم الأسنان.

الاستنتاجات: معظم أطباء أسنان الأطفال يقدمون علاج تقويم الأسنان، ولديهم توقعات عالية فيما يتعلق بفوائد تقديمه، وتوثق هذه الدراسة التدخل التقويمي المبكر وعلاج تقويم الأسنان الذي يقدمه حالياً أطباء أسنان الأطفال في الأردن، وتلخص هذه الدراسة العلاج والأجهزة المقدمة والمتغيرات التي من شأنها أن تؤثر على أنماط علاج أطباء أسنان الأطفال في الأردن.

الكلمات الدالة: طب أسنان الأطفال، تقويم الأسنان الوقائي، الأردن.