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ORIGINAL RESEARCH ARTICLE

Assessment of Parents' Awareness Towards Space Maintainers: A Cross-Sectional Study

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Abstract

Purpose: Premature primary tooth loss in primary and mixed dentition can cause malocclusions in permanent dentition. Children with primary and mixed dentitions require space maintainers to prevent malocclusions. The purpose of this study was to evaluate the level of parental awareness regarding the use of space maintainers, oral hygiene practices, and the significance of primary teeth.

Materials and Methods: In this descriptive cross-sectional study, a survey comprising 20 questions and four primary categories, which were 1) sociodemographic data, 2) parental awareness regarding oral hygiene habits, 3) recognition of the significance of primary teeth and the children's previous tooth extraction experience, and 4) knowledge about the use of space maintainers, was utilized. The survey was administered to 240 parents who had children aged between 2 and 15 years. Descriptive statistical analyses were employed to interpret the results.

Results: While 45% of children lost primary teeth due to decay, trauma, or other reasons, 40.9% of parents declared that they had no idea that the early loss of primary teeth could damage permanent teeth. Additionally, only 35.8% of parents stated that they had knowledge of what a space maintainer is, and it was found that the parents who were familiar with space maintainers also had a high amount of knowledge about their use.

Conclusions: It is concluded that there is a need to raise parental awareness concerning the utilization of space maintainers as a preventive measure following the premature loss of primary teeth.

Keywords: Awareness; Interceptive Orthodontics; Malocclusion; Parents; Space Maintenance

Introduction

Primary dentition is a significant period in a child's growth and development process. Primary teeth are essential for speech, chewing, appearance, and preventing bad habits. Moreover, they play a crucial role in guiding and facilitating the eruption of permanent teeth. Notably, primary teeth serve as optimal space maintainers for permanent dentition. Understanding their role is vital for promoting dental health in children.[1,2]

Although the exfoliation of primary teeth is a natural physiological process, the disruption of the normal process of teeth eruption, whether due to the premature loss of primary teeth, proximal carious lesions, or other factors, can lead to mesial migration of teeth.[3,4] This migration may result in the loss of arch length and manifest as a malocclusion in permanent dentition. The rising prevalence of malocclusions among children resulting from the premature extraction of primary teeth has become a significant concern within the field of pediatric dentistry. This issue is one of the most common dental problems, alongside dental caries, gingival disease, and dental fluorosis. The impact of this trend on the oral health and overall well-being of young individuals should not be overstated.[5,6]

Preventive and interceptive orthodontic treatments aim to address issues observed in children's dental and skeletal development at an early stage, thus preventing them from progressing into severe malocclusions that may require lengthy and complex interventions later. Therefore, it is imperative for oral health professionals to be vigilant in recognizing these cases early on and referring them to orthodontic specialists for timely intervention. Preventive methods include "space maintenance," which involves the use of specific equipment known as "space maintainers." These appliances can be fixed or movable, and their purpose is to maintain arch length after the premature loss of a primary tooth.[7] Malocclusion may present as crowding, the impaction of permanent teeth, or the supraeruption of opposing teeth.[4] Space closure occurs six months after extraction, or in some cases, within days. The best method to

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prevent this is to insert a space maintainer right after extraction.[8] The loss of arch length can have significant consequences for dental health. When arch length is compromised, issues such as crowding, ectopic eruption, dental impaction, crossbite formation, and dental centerline discrepancies may arise. For this reason, the use of space maintainers plays a crucial role in shaping the future of orthodontic treatment.[9]

Parents have a substantial influence in their children's healthcare decisions. Research shows that there is a strong correlation between the opinions and awareness of parents regarding their children's oral health and the actual condition and their perceived need for treatment.[10,11] Therefore, it is expected that the knowledge and awareness of parents regarding the protection of oral health would affect their children's potential to benefit from preventive oral health practices. Several studies on this subject have been conducted in different populations.[12–15] Ali et al. reported the knowledge rate of parents regarding space maintainers as 49.8%, which was considered inadequate.[13] In line with the findings of many studies, it is clear that parents do not have enough information regarding practices involving space maintainers. According to the results of the literature review, there is a lack of studies on the subject in a Turkish population. Therefore, the aim of this study was to evaluate the awareness levels of parents regarding space maintainers as a protective measure for their children's oral health. The hypothesis of this study was the level of parental awareness regarding space maintainers is low.

Material and Methods

Population

This was a cross-sectional survey study conducted with a sample of 240 parents. The data were collected over a two-month period, from January to March 2024. The survey was administered to parents of patients aged between 2 and 15 years who sought routine examinations and dental treatments at the Pediatric Dentistry Clinics of Ankara Yıldırım Beyazıt University, Faculty of Dentistry Hospital. The study included parents who were physically and psychologically healthy, literate in Turkish, and capable of completing a survey. The sample size needed to conduct the study was calculated by power analysis based on a previous study,[12] wherein the percentage of awareness about space maintainers was 18%, with 95% power and a 5% error margin. The results of the power analysis revealed that at least 227 participants needed to be included. This number was rounded up to 240 participants.

Ethics committee approval was obtained from Ankara Yıldırım Bezayıt University Health Sciences Ethics Committee (no: 09/396, date: 23.11.2023). The principles of the Declaration of Helsinki and good clinical practices were followed during the study. All participants signed an informed consent form after they were informed about the study.

Survey

To evaluate the awareness of the participants regarding space maintainers, the researchers administered a survey in a face-to-face manner. The survey, designed based on a thorough review of the literature, consisted of 20 questions and 4 parts:

- (1) the sociodemographic characteristics of the parents,
- (2) their levels of knowledge about oral hygiene habits,
- (3) their awareness of the importance of primary teeth and their children's previous tooth extraction experiences,
- (4) their levels of knowledge about the use of space maintainers.

The sociodemographic data collected in the study included age, gender, education level, and number of children. The oral health knowledge section comprised four multiple-choice questions aimed at gauging the understanding of the participants regarding brushing habits and parental involvement in children's brushing routines. The section on the importance of primary teeth and children's previous tooth extraction experiences had four multiple-choice questions that were designed to assess the frequency of the dentist visits of the children of the participants, their previous experience with early loss of primary teeth, and their previous exposure to space maintainers. The final section consisted of eight multiple-choice questions focused on assessing the knowledge of the participants regarding the application and maintenance of space maintainers. After the survey was prepared, 25 randomly selected participants were asked to respond to the survey twice at two different time intervals to check the reliability of the form (Kappa=0.876).

Table 1. Sociodemographic characteristics of the participants

		n (%)
Gender	Female	166 (69.2%)
	Male	74 (30.8%)
Age	21-30	28 (11.6%)
	31-40	126 (52.5%)
	41 or older	86 (35.9%)
Education level	Illiterate	7 (3%)
	Literate with no formal degree	23 (9.6%)
	Primary-secondary school	37 (15.4%)
	High school	95 (39.6%)
	University	67 (27.9%)
	Postgraduate	11 (4.5%)
Number of children	1	25 (10.4%)
	2	111 (46.2%)
	3	78 (32.5%)
	4	26 (10.9%)

Statistical analysis

The statistical analyses were performed with the IBM SPSS Statistics 26.0 program (IBM Corporation, Armonk, NY, USA). Descriptive statistics are presented as mean ± standard deviation values for the discrete numeric variables, while the categorical variables are expressed as frequencies (%).

Results

Sociodemographic Characteristics

The sample of the study consisted of a total of 240 parents, including 166 (69.2%) female parents and 74 (30.8%) male parents. The majority of the participants were 31-40 years old (52.5%), 39.6% had completed high school as their highest level of education, and 46.2% had two children (Table 1).

Survey Responses

While 32.5% of the participants stated that they started brushing their children's teeth when their primary teeth erupted, 26.6% expressed uncertainty about the appropriate time for starting brushing. It was stated by 97.5% of the participants that children's teeth should be brushed at least twice a day, 45% were aware of the necessity to use fluoride-containing paste, and 74.2% were aware that they should assist their children in brushing their teeth (Table 2).

It was thought by 89.6% of the participants that their children should be taken to the dentist for regular check-ups. Most participants (77.1%) were aware that primary teeth should be treated in cases of decay, trauma, or pain. While the children of 50.4% of

Table 2. Responses of the participants to the survey questions about their children's toothbrushing habits and their parental involvement

Questions	Options	n (%)
Q1. When did you first start brushing your child's teeth?	When the first primary tooth erupted	78 (32.5%)
	When the first primary molar tooth erupted	43 (17.9%)
	When the first permanent tooth erupted	55 (23%)
	No idea	64 (26.6%)
Q2. Your child's teeth should be brushed at least twice a day.	Yes	234 (97.5%)
	No	2 (0.8%)
	No idea	4 (1.67%)
Q3. Your child's teeth should be brushed with fluoride-containing paste.	Yes	108 (45%)
	No	42 (17.5%)
	No idea	90 (37.5%)
Q4. You should help your child brush his/her teeth until he/she is 10-11 years old.	Yes	178 (74.2%)
	No	45 (18.7%)
	No idea	17 (7.1%)

Table 3. Responses of the participants to the survey questions about the importance of primary teeth and their children's dental experiences

Questions	Yes n (%)	No n (%)	No idea n (%)
Q5. Your child should be taken to the dentist for check-ups at regular intervals of 3-6 months.	215 (89.6%)	8 (3.3%)	17 (7.1%)
Q6. Since primary teeth are replaced by permanent teeth, it is not necessary to treat them in cases of decay, trauma, or pain.	22 (9.2%)	185 (77.1%)	33 (13.7%)
Q7. Has your child ever lost any primary teeth due to decay, trauma, or any other reason?	108 (45%)	121 (50.4%)	11 (4.6%)
Q8. Premature loss of primary teeth could damage permanent teeth.	122 (50.8%)	20 (8.3%)	98 (40.9%)

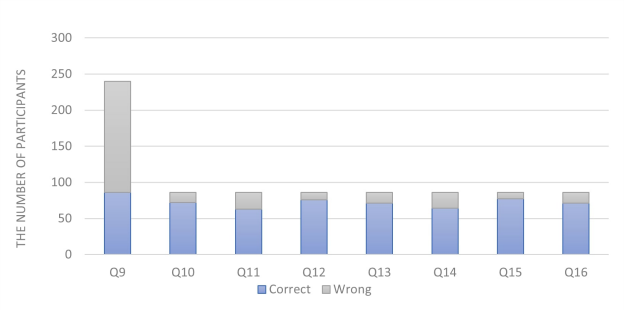

Figure 1. Responses of the participants to the knowledge and awareness questions regarding the use of space maintainers.

the participants had not experienced a loss of primary teeth before, the children of 45% of the participants had previous experience of tooth extraction. Besides, 50.8% of the participants believed that the premature loss of primary teeth could damage permanent teeth (Table 3).

Table 4 and Figure 1 detail the answers given by the participants to questions about the use of space maintainers. The rates of parental knowledge and awareness concerning the use of space maintainers were calculated based on responses from the participants acquainted with the concept of a space maintainer. Although the majority of the participants were unfamiliar with space maintainers (64.2%), those who were familiar exhibited a significantly higher proportion of correct responses to inquiries regarding their application. The percentages of correct responses to questions 10-16 ranged between 73.2% and 89.5%.

Discussion

Tooth decay remains a significant public health problem in the present day. According to a systematic review and meta-analysis published in 2020, the prevalence of caries was 46.2% in primary teeth and 53.8% in permanent teeth in children worldwide.[16] Moreover, with its high prevalence, caries remains the most common reason for tooth extraction in children.[17] As in all treatments, parents are accountable for their children's dental health and should be aware of the potential impacts of space loss. There is limited information on parents' awareness regarding the management of early primary tooth loss and the use of space maintainers.[13,14,18,19] Therefore, the primary purpose of this study was to evaluate the knowledge and attitudes of a group of parents regarding the importance of using space maintainers. Besides, the knowledge of parents about oral hygiene habits and the significance attributed to primary teeth and their children's previous tooth extraction experiences was questioned.

The main finding of this study was that the participants had low levels of knowledge about the use of space maintainers in general. The rate of participants who were aware of space maintainers was 35.8%. Studies conducted in different populations have shown variations in the awareness levels of parents, with figures of 17.9%, 18.5%, and 42.5% reported in Saudi Arabia and 57% in Iran.[12–15,20] It is worth noting that differences in findings may be attributed to factors such as variations in sample size, geographical differences, and cultural distinctions among the populations under study.

In this study, it was also found that although the children of 45% of the participants had experienced primary tooth loss, only 35.8% of the participants were aware of space maintainers. Similarly, Al Maaedeni et al. stated that while the incidence of premature loss of primary teeth in children was 20%, only 18.5% of parents were aware of space maintainers.[20] Moreover, Ali et al. reported that although 37% of the studied children had lost primary teeth before, a mere 17% of the dentists who conducted the extractions informed the patients about the potential application of space maintainers thereafter.[13] Additionally, in the study conducted by Andreeva et al. with 200 dentists, it was revealed that 87% of the dentists treated patients under the age of 12 and performed primary tooth extractions, whereas only 8% administered space maintainer applications.[21] In Türkiye, this rate was determined as 40%.[22] In accor-

Table 4. Responses of the participants to the survey questions regarding the use of space maintainers

Questions	Options	n (%)
Q9. Do you know what a space maintainer is?	Yes	86 (35.8%)
	No	154 (64.2%)
Q10. Space maintainers are applied to preserve the spaces of prematurely lost permanent teeth.	Yes	72 (83.7%)
	No	2 (2.3%)
	No idea	12 (14%)
Q11. What is the source of your knowledge about space maintainers?	Dentist	63 (73.2%)
	Social circle	17 (19.8 %)
	Internet	3 (3.5%)
	I don't know	3 (3.5%)
Q12. The use of space maintainers requires regular dentist check-ups.	Yes	76 (88.4%)
	No	5 (5.8%)
	No idea	5 (5.8%)
Q13. What type of food is prohibited for children wearing a fixed space maintainer?	Sticky foods (such as gum, jellybeans)	71 (82.6%)
	Fruits-vegetables	2 (2.3%)
	No idea	13 (15.1%)
Q14. Removable space maintainers need to be cleaned daily.	Yes	64 (74.4%)
	No	1 (1.2%)
	No idea	21 (24.4%)
Q15. What would you do if a space maintainer breaks or is lost?	I would leave it	1 (1.2%)
	I would wait for the time of a dentist appointment	5 (5.8%)
	I would immediately go to the dentist	77 (89.5%)
	No idea	3 (3.5%)
Q16. What would you do if permanent teeth start erupting while the child is still wearing space maintainers?	I would leave them	1 (1.2%)
	I would wait for the time of a dentist appointment	8 (9.3%)
	I would immediately go to the dentist	71 (82.5%)
	No idea	6 (7%)

dance with the findings of this study, only 32.4% of the parental cohort had university education or beyond. The cognizance of parents is influenced by various factors including education levels, income, and occupation.[14,23] Considering the data obtained in different studies, the improvement of parental knowledge concerning this matter necessitates the formulation of comprehensive social awareness initiatives and educational programs targeting all strata of society.

Space maintainers require diligent care, including dietary choices, regular dental appointments, and ongoing monitoring. A significant percentage of the participants of this study who were aware of space maintainers answered the questions in the survey regarding the use of space maintainers (questions 12-14) correctly. These findings differed from the results reported by Almeedani et al., who demonstrated low parental awareness levels regarding space maintainer utilization and dietary restrictions.[20] Similarly, studies conducted by Ali et al., Shamsaddin et al., and Linjawi et al. underscored the widespread lack of parental awareness regarding suitable dietary practices while employing space maintainers.[13–15] These results can be attributed to the possibility that the dentists visited by these parents provided sufficient information regarding the proper utilization of space maintainers.

The current study yielded notable findings concerning parental awareness of children's oral hygiene practices. While the participants demonstrated satisfactory knowledge regarding the frequency of daily brushings, the use of fluoride toothpaste, and parental involvement in tooth brushing, only 32.5% accurately identified the appropriate age for initiating their children's toothbrushing routine. This indicates that many parents do not have clear knowledge of when to start brushing their children's teeth. Hence, there is a need for educating parents about oral hygiene practices which is consistent with many other studies.[24,25]

This study was a hospital-based study which included participants whose children attended dental treatments and follow-up visits in two Pediatric Dentistry Clinics of a University Hospital located in Central and Western Türkiye. Therefore, the results of this study might not accurately reflect the broader population. Hence, the findings of the study should be generalized carefully, and further studies involving larger samples are warranted to provide comprehensive insights into the subject matter.

Conclusion

In conclusion, the results of this study revealed that parents lack adequate awareness of space maintainers as a preventive approach. It is crucial for pediatric dentists to educate parents during routine dental appointments about the importance of space maintainers and their longevity. This education is essential for preserving arch integrity and minimizing occlusal discrepancies.

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Author Contributions

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Data Collection : E.C.T.
Writing the Main Text : E.C.T. , N.Y.
Editing and Supervising : E.C.T. , N.Y.

Conflict of Interest

The authors declare that they have no competing interests.

Ethics Approval

Ethics committee approval was obtained from Ankara Yıldırım Bezayıt University Health Sciences Ethics Committee (no: 09/396, date: 23.11.2023). The principles of the Declaration of Helsinki and

good clinical practices were followed during the study. All participants signed an informed consent form after they were informed about the study.

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