

# Assessment of Parents' Knowledge about Space Maintainers, in the Western Black Sea Region

## Batı Karadeniz Bölgesi'nde, Ebeveynlerin Yer Tutucu Konusunda Bilgi Seviyelerinin Değerlendirilmesi

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### ABSTRACT

**Objective:** The increase in the number of pediatric dentists in our country and their accessibility in public hospitals are effective in the spread of preventive dentistry practices. However, the increasing number of caries and malocclusion cases due to early loss of primary teeth shows that there is still a deficiency in informing families about preventive dentistry practices. In this study, it was planned to evaluate the level of knowledge and sources of information about spacemaintainers, among parents in the western Black Sea region of Turkey.

**Methods:** In this study, intraoral examinations were performed in pediatric patients admitted to the clinic and dmft/DMFT scores were noted. Patients' parents were asked to fill out a questionnaire measuring their level of knowledge about spacemaintainers. The questionnaire included questions about socio-economic status, previous dental treatments and early loss of primary teeth. The data obtained were statistically analyzed and parents' level of knowledge about spacemaintainers was evaluated.

**Results:** A total of 412 parents and their children participated in the study. When the spacemaintainer knowledge levels of the parents were evaluated, it was seen that 33% were low, 12.6% were medium and 54.4% were high. According to the results, no significant relationship was found between the space maintainer knowledge levels of the parents and gender ( $P=.270$ ), educational level ( $P=.298$ ), and tooth brushing frequency ( $P=.810$ ). The space maintainer knowledge levels of parents whose child previously had tooth extraction were found to be significantly higher ( $P=.00$ ). The mean dmft/DMFT of the patients was found to be 8.4. The relationship between dmft/DMFT values and knowledge levels was evaluated, and no significant relationship was found ( $P=.09$ ).

**Conclusion:** In this study, it was determined that parents' awareness about spacemaintainers was low. Parents should be informed about space maintainers in order to prevent the problems that early loss of deciduous teeth may cause in the development of the dental arch and the alignment of permanent teeth. At this point, dentists need to inform parents very well about protective and preventive treatments as well as therapeutic approaches.

**Keywords:** Tooth loss, Dental Decay, Malocclusion

### ÖZ

**Amaç:** Ülkemizde çocuk diş hekimi sayısının artması ve devlet hastanelerinde de ulaşılabilir olması, koruyucu diş hekimliği uygulamalarının yaygınlaşmasında etkili olmaktadır. Ancak çürük ve malokluzyon vakalarının giderek artması, koruyucu diş hekimliği uygulamaları konusunda ailelerin hala bilgilendirilmesinde eksiklik olduğunu göstermektedir. Bu amaçla yapılmış olan bu çalışmada da Türkiye'deki ebeveynlerin yer tutucularla ilgili bilgi düzeylerinin ve bilgi kaynaklarının değerlendirilmesi planlanmıştır.

**Yöntemler:** Çalışmamızda kliniğe başvuran çocuk hastalarda ağız içi muayeneler yapılmış ve dmft/DMFT skorları not edilmiştir. Hastaların ebeveynlerinden yer tutucu ile ilgili bilgi düzeylerini ölçen bir anket doldurmaları istenmiştir. Ankette sosyo-ekonomik durum, önceki diş tedavileri ve erken süt dişi kaybı ile ilgili sorular bulunmaktadır. Elde edilen veriler istatistiksel olarak analiz edilerek ebeveynlerin yer tutucu konusunda bilgi seviyeleri değerlendirilmiştir.

**Bulgular:** Çalışmaya toplam 412 ebeveyn katılmıştır. Ebeveynlerin yer tutucu bilgi düzeyleri değerlendirildiğinde %33'ünün düşük, %12,6'sının orta, %54,4'ünün yüksek olduğu görülmüştür. Ebeveynlerin yer tutucu bilgi düzeyleri ile cinsiyet ( $P=.270$ ), eğitim durumu ( $P=.298$ ) ve diş fırçalama sıklığı ( $P=.810$ ) arasında anlamlı bir ilişki bulunmazken, daha önce çocuklarında diş çekimi yapılmış olan ebeveynlerin bilgi düzeyleri anlamlı derecede yüksek bulunmuştur ( $P=.00$ ). Hastaların ortalama dmft/DMFT'si 8,4 olarak bulunmuştur ve çocukların dmft/DMFT değerleri ile ailelerinin bilgi düzeyleri arasındaki anlamlı bir ilişki saptanmamıştır ( $P=.09$ ).



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**Sonuç:** Çalışmamızda, yer tutucular konusunda ebeveynlerin farkındalıklarının düşük olduğu saptanmıştır. Süt dişlerinin erken kaybının dental arkın gelişimi ve daimi dişlerin sıralanmasında yol açabileceği sorunları engellemek için, yer tutucular konusunda ebeveynlerin bilgilendirmeleri gerekmektedir. Bu noktada diş hekimlerinin tedavi edici yaklaşımların yanı sıra koruyucu ve önleyici tedaviler konusunda da ebeveynleri çok iyi bilgilendirmesi gerekmektedir.

**Anahtar Kelimeler:** Diş kaybı, Diş çürüğü, Maloklüzyon

## INTRODUCTION

Primary teeth have an important role in the growth and development of children and also guide the eruption of permanent teeth.<sup>1</sup> This physiological process involves the resorption of the roots of primary teeth and subsequent replacement by permanent teeth. However, premature loss of primary teeth due to trauma, extensive caries, infection, among other causes can result in deformities of the dental arch and occlusion.<sup>2,3</sup> The number of children with malocclusion due to premature loss of primary teeth is increasing and has become one of the most common dental problems, along with dental caries and gum disease.<sup>4,5</sup> Extra space loss occurs after the early loss of the adjacent tooth, especially during the active eruption period. With early tooth loss, the balance between the forces holding the tooth in place is disturbed and the adjacent teeth slide into the cavity of the extracted tooth, which prevents the eruption of the permanent tooth. Placing a space maintainer holder allows the permanent tooth to erupt in its normal position, both by balancing the incoming forces and by keeping the adjacent teeth in their normal position.<sup>6</sup>

Parents can gather general information about their child's vaccinations, nutrition, protection from injuries and accidents, and certain diseases during routine health checks. However, the situation regarding oral and dental health is different particularly in developing countries where preventive dental treatments are not widespread. Parents visit dentists mostly after their child has experienced a problem, such as caries, trauma, pain, or malocclusion.<sup>7</sup> In a survey conducted by Zhang et al. on parents whose children were treated with space maintainers, parents gave more importance to treatment than protection. In addition, it has also been observed that most family members are not aware of the harmful effects of loss of space in early primary teeth loss and the treatment that should be performed to correct the problem.<sup>8</sup> Although there is an increasing number of pediatric dentists in Turkey and their availability in state hospitals is effective in expanding preventive dentistry practices, the increasing incidence of caries and malocclusion suggests a lack of parent knowledge about preventive dental practices.<sup>9</sup> In this study, we planned to evaluate the level of knowledge of parents in Blacksea Region of Turkey about space maintainers and the source of their knowledge (ie, from a general dentist, specialist dentist, family physician, acquaintance, social media, etc).

## METHODS

### Study design

This study was a descriptive cross-sectional study conducted in Karabük Oral and Dental Health Training Hospital between November-December 2023. It was a questionnaire-based study and included 412 parents who applied to the pedodontic clinic for treatment of their children. Ethical approval was obtained from Karabük University (Date: 03.11.2023, protocol number: 2023/1433). Parents and legal caregivers were informed, and consent forms were obtained before conducting the study.

### Sample size estimation

The sample size estimation was based on a previous study that used the formula:<sup>7</sup>

$$n = \frac{Z^2 \times pq}{d^2}$$

Z = standard score corresponding to a given confidence level (1.96)

P = prevalence of awareness about space maintainers among parents (50% = 0.5 / obtained pilot study conducted by researcher)

q = 1-p. q = (1 - p) 100-50 = 50% = 0.5

d = precision limit or proportion of sampling error which is usually a 5% confidence limit (0.05)

The sample size was calculated as 384.16 and rounded up to 400.

### Data collection

The parents included in this study were asked to fill in the questionnaire forms. The questions were prepared by the researcher and include the information from the explanation given by physicians to parents about spacemaintainers in clinical practice. The reliability of the questions was tested by Pearson Spearman correlation analysis and values above 0.6 were obtained for all questions. Questionnaire forms consisted of four parts comprising 16 multiple choice questions. Questions evaluated the socioeconomic level of parents, their tooth brushing habits, previous dental treatments for their children, and their knowledge about space maintainers. The last part of questionnaire include seven questions that collected parental knowledge about space maintainers. The parental knowledge score was calculated by quantifying the response options from zero to two based on the importance of the response. For example, for a particular question, a score of two quantified the correct response, one quantified the "do not know" response, and a score of zero quantified the wrong response. This scoring decision was based on the expert opinion that the response of "do not know" is better than having wrong knowledge. When the maximum scores of all the questions were added, it was 10. Thus, a participant could get a final knowledge score ranging from 0 to 10. 0-3 points was considered as low, 4-6 points as medium and 7-10 points as high knowledge level.<sup>3,10</sup> WHO criteria (WHO1997) were used to examine decay-missing-filled index (DMFT/dmft) and loss of teeth and scores were noted in the forms. The obtained data were analyzed and the relationship between the knowledge level of parents about space maintainers, sociocultural status, brushing habits, and previous treatment for their children was evaluated.

### Statistical analysis

Descriptive statistics were obtained as frequency and percentage. Chi-squared test was used in the evaluation of two-way tables. ANOVA post-hoc analysis and Tukey's test were used for multiple comparisons of normally distributed variables among continuous variation variables. Kruskal-Wallis post-hoc analysis and Mann-Whitney U tests were used for data that did not show normal distribution. The statistical significance level was taken as  $P < .05$

RESULTS

A total of 412 parents and their children (N=412), aged 4-12, participated in the study. 74.8% of participants were women and 25.2% were men. The mean age was 37.7±5.8. 42.7% of the parents graduated from university or higher schools, 23.3% graduated from primary school, and 34% graduated from high school. 87.4% of parents had two or more children. Sociodemographic data of the parents are given in Table 1.

Table 1. Sociodemographic data

Variables	Frequency /Percentage
<b>Age</b>	
<30	28 / 6.8%
30-40	272 / 66.0%
More than 40	112 / 27.2%
<b>Gender</b>	
Female	308 / 74.8%
Male	104 / 25.2%
<b>Educational Level</b>	
Primary School	96 / 23.3%
High School	140 / 34.0%
University	140 / 34.0%
Higher Education	36 / 8.7%
<b>Monthly Income</b>	
Minimum wage and below	120 / 29.1%
Above minimum wage-30.000	232 / 56.3%
> 30.000	60 / 14.6%
<b>Number of Children</b>	
1	52 / 12.6%
2	204 / 49.5%
3 or more	156 / 37.9%
<b>Tooth brushing frequency</b>	
Sometimes	40 / 9.7%
Once in a day	228 / 55.3%
Twice or more in a day	144 / 35.0%

60.2% of the children had previously had primary teeth extracted with 46.8% of them extracted by a pedodontist. 83.9% of parents of children who had teeth extracted were informed about the space maintainer and 48.4% of them had a space maintainer previously. 42.7% of parents had heard of space maintainers previously with 6.8% of them learning from social media, 72.7% from the dentist, and 20.5% from their acquaintances. When the space maintainer knowledge levels of the parents were evaluated, 33% scored low, 12.6% scored medium, and 54.4% received high scores. Table 2 presents data about parents' knowledge of space maintainers.

The space maintainer knowledge levels of parents with children who previously had tooth extraction were found to be significantly higher ( $P=.00$ ). The space maintainer knowledge levels of parents of children who had their extractions done by a pediatric dentist did not significantly differ compared with extractions performed by a general dentist ( $P=.067$ ). However, pediatric dentists were found to perform space maintainers at a significantly higher rate than general dentists ( $P=.00$ ). No significant relationship was found between the space maintainer knowledge levels of the parents and gender ( $P=.270$ ), educational level ( $P=.298$ ), or tooth brushing frequency ( $P=.810$ ). The significance of the effect of demographic data and previous experiences of parents on their knowledge levels is given in Table 3.

It was observed that parents of children who had tooth extractions and space maintainers previously, gave more accurate answers to questions about space maintainers. No significant relationship was found between education level and age of the parents with the percentage of correct answers. It was observed that women gave

significantly more correct answers than men. Also, parents with children who previously used space maintainers, had more knowledge about why space maintainers were made ( $P=.02$ ) and how long they should be used ( $P=.03$ ). We found that the parents of children who used space maintainers previously have answered yes to the question of whether space maintainers would be a disturbance. The mean dmft of the patients was found to be 7.3±4.1, DMFT found to be 1.2±1.9. The relationship between dmft values and knowledge levels showed no significant relationship ( $P=.09$ ).

Table 2. Distribution of study participants according to responses for questions

Questions	Options	Frequency / Percentage
1.Do you think all of the decayed primary teeth should be extracted?	Yes	100 / 24.3%
	No	312 / 75.7%
Yes = 0 point / No = 1 point		
2.Have you ever heard space maintainers?	Yes	176 / 42.7%
	No	236 / 53.3%
3.If you heard space maintainers, where did you hear it?	Don't know	236 / 57.3%
	Social media	12 / 2.9%
	Dentist	128 / 31.1%
	Acquaintances	36 / 8.7%
This question did not scored		
4.Why are space maintainers made?	Prevent tooth migration	244 / 59.2%
	I don't know	90 / 21.8%
	Maintain gingival health	78 / 19.0%
Prevent tooth migration = 2 points / I don't know = 1 point / Maintain gingival health = 0 point		
5.How long should space maintainers stay in the mouth?	Until permanent teeth erupt	204 / 49.5%
	Until the growth and development of children is completed	107 / 26.0%
	I don't know	64 / 15.5%
	Until all cavities are treated	37 / 9.0%
Until permanent teeth erupt =3 points / Until the growth and development of children is completed = 2 points I don't know = 1 point /Until all cavities are treated = 0 point		
6.Do space maintainers need regular checking by a dentist?	Yes	300 / 72.8%
	No	112 / 27.2%
Yes = 1 point / No = 0 point		
7.Do you think space maintainers disturb children?	Yes	236 / 57.3%
	No	176 / 42.7%
Yes = 0 point / No = 1 point		

Table 3. Spacemaintainers knowledge levels of parents

Variable		Level of knowledge (N)		
		Low	Medium	High
Gender	Female	96	36	176
	Male	40	16	48
P =.270				
Educational Level	Primary School	36	12	48
	High School	48	20	72
	University	36	12	92
	Higher Education	16	8	12
P =.298				
Tooth brushing frequency	Sometimes	32	0	8
	Once in a day	60	44	124
	Twice or more in a day	44	8	92
P=.810				
Does your child had previous teeth extraction?	Yes	44	36	172
	No	92	16	52
P =.000				
Who did previous teeth extraction?	Pediatric dentist	20	24	72
	General Dentist	24	12	100
P =.067				

## DISCUSSION

People's awareness of dental procedures was limited but has increased with the development of technology and the spread of information via social media. Being aware of some treatments that should be performed during the early period of life minimizes the potential future dental problems. Therefore, parents' knowledge and awareness of oral and dental health plays an important role in their child's oral and dental health.

Although preventive treatments have become widespread, the incidence of dental caries in children is still high.<sup>11</sup> In a study conducted by AlMeedani et al.<sup>10</sup> in Saudi Arabia, the mean dmft value was found to be 5.61, whereas in this study the dmft value was higher. These results show the high rate of dental caries and premature loss of primary teeth in children. In parallel with this idea, we observed that 60.2% of the children had primary tooth extraction previously. Similar to this study, Alotaibi et al.<sup>12</sup> reported that, early primary tooth extraction rate was 65% while Al-Shahrani et al.<sup>11</sup> reported 51%. Although the rate of early primary tooth extraction is high, 57.3% of parents had not heard about space maintainer treatment before attending this study. In a study by Ali et al.,<sup>13</sup> it was observed that parents unaware of space maintainers was at a higher percentage of 82.1% than compared with this study. Similarly, Alduraim et al.<sup>7</sup> reported that less than 20% of parents were aware of space maintainers.

In this study the majority of participants are female (74.8%) because mothers usually accompany children during their dental treatments. In Turkish society, mothers are generally more involved in their children's needs and have more knowledge about their treatments. This may have led the fact that knowledge levels of parents resulted higher.

Talekar et al. reported that space maintainers were applied to only half of patients who experienced early tooth loss.<sup>14</sup> Similarly, Linjawi et al.<sup>3</sup> reported low numbers of space maintainers as treatment in the case of early tooth loss. In this study, it was observed that the majority of dentists informed the parents about the space maintainers after primary tooth extraction, but mostly pedodontists apply space maintainers. These findings show that general dentists could have informed parents about space maintainers but lead them to a pediatric dentist to apply the space maintainers.

In this study, when parents were asked where they heard about space maintainers, only 2.9% of them reported that they heard about it from social media and 31.1% of them heard from dentists. Unlike this study, Ali et al.<sup>13</sup> stated that only 19% of the parents heard about space maintainers from the dentist. This situation indicates that general dentists provide information even if they do not apply to space maintainers and lead the patients to pediatric dentists. Also, we can conclude that even though social media is seen as a source of information for parents, it did not have much effect for this topic.

Parents whom their children previously had primary tooth extraction and used space maintainers have a significantly higher knowledge level, similar to the study of AlMeedani et al.<sup>10</sup> This probably due to the fact that parents were informed by the dentist while the treatments were performed.

There was no significant relationship between parents' gender, education level, or tooth brushing frequency with parents spacemaintainers knowledge level. Consistent with this study, Ali A. et al.<sup>13</sup> reported no significant relationship between spacemaintainers knowledge level and education level of parents. This may indicate that parents' main information source about spacemaintainers is their children's treatment experiences.

Parents with two or more children have higher knowledge levels about space maintainers. Ali et al. found similar results in their study regarding the number of children and their parents' knowledge level.<sup>13</sup> It is possible that parents obtained this information from their experiences with their children's treatments.

In this study, when parents were asked whether space maintainers should be checked regularly, most of the participants answered yes. Unlike this study, Linjawi et al.<sup>3</sup> reported that parents had no idea about what follow-up appointments should be like after space maintainer treatment. In this study, although the parents' knowledge about space maintainers is not sufficient, knowing the significance of regular control appointments suggests that parents understood the importance of regular check-ups regarding oral and dental health.

57.3% of parents answered yes to the question "Do you think space maintainers will disturb children?". This shows that parents believe that their child cannot tolerate extra appliances in the mouth.

In this study, the dmft score was found to be higher. In a study conducted in Bursa, the dmft value was reported as 5.3±0.7.<sup>15</sup> Koçanali et al.<sup>16</sup> reported the mean dfs score 5.7±6.7 in their study conducted in İzmir. It is thought that the reason why dmft values were found to be higher in this study is due to geographical location and opportunities. The number of pedodontists in the surrounding provinces is very low, so dental treatments and preventive practices that children need to receive may be delayed. This situation appeared as a high dmft score.

There are few studies in the literature evaluating the knowledge level of parents on the treatment of early tooth loss and space maintainers.<sup>14,17</sup> As a result of existing studies, it is suggested that parents have a lack of information on this subject. Nagarajappa et al.<sup>18</sup> stated that dental diseases and their accepted treatments were significantly related to parents' perceptions and awareness of their child's disorders. In a study conducted in India, it was reported that 65% of parents only took their children to the dentist in case of toothache and do not care about the treatment of primary teeth.<sup>19</sup> When the data obtained from this study are compared with other studies in the literature, it is evident that the awareness about space maintainers and early primary teeth extraction is higher in Turkey, but still not at a sufficient level. It is thought that the reason for this problem is that daily dental practice focuses on therapeutic practices rather than preventive dentistry.

### Limitations of the study

To the best of our knowledge, there only very few reported studies in the literature assessing parents' knowledge of space maintainers, especially in Turkey. However, there might be some disadvantages about the population of this study. Although the fact that this study was conducted in a single hospital that limited the diversity of participants, this cohort included a population that reflects the majority of the Western Black Sea Region due to the lack of specialist pediatric dentists in the surrounding provinces. An important limitation of this study is that nearly half of the participants were treated by a pediatric dentist, therefore, the knowledge level of the parents was higher. There might be a gap in making a clear observation between the knowledge levels of parents of children who had previously been treated by general dentists.

## CONCLUSION

In this study, parents' knowledge levels of space maintainers were higher compared with studies in the literature. Unlike other studies, we observed that variables such as age, gender, and education level did not affect the knowledge levels of parents. However, parents of



children with a previously extracted primary tooth or had received a space maintainer, significantly increased their knowledge level.

Early loss of primary teeth can lead to orthodontic problems if not treated properly. Therefore, dentists should focus on preventive treatments rather than therapeutic approaches and better inform parents.

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**Ethics Committee Approval:** This study was approved by the Karabük University Ethics Committee (Date: 03.11.2023 Decision No: 2023/1433).

**Informed Consent:** Verbal consent for intraoral examination was obtained from the children participating in the study, and written consent was obtained from their legal guardians on behalf of both themselves and their children.

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