

# Reasons for the Extraction of Primary Teeth in Primary School-Age Children in Zonguldak, Turkey: A Retrospective Study

Zonguldak İlinde İlkokul Çağı Çocuklarında Süt Diş Çekim Nedenleri: Retrospektif Bir Çalışma

Levent Demiriz, Ebru Hazar Bodrumlu

Bülent Ecevit University Faculty of Dentistry, Department of Pediatric Dentistry, Zonguldak, Turkey

## Abstract

**Objective:** Determination of the factors causing the extraction of primary teeth is important for countries to take the necessary precautions while establishing their health policies. This study aimed to determine the reasons for the extraction of primary teeth in primary school-age children in Zonguldak, Turkey.

**Materials and Methods:** Age, sex, medical condition, type of tooth extracted, and the reason for the primary teeth extraction were examined retrospectively in the records of patients who applied to Bülent Ecevit University Faculty of Dentistry, Department of Pedodontics between 2012 and 2016. As a result of the examination, information about the reasons for the primary teeth extraction, the type of tooth extracted, and each patient's age and gender were collected and analyzed.

**Results:** A total of 2429 primary teeth were extracted from 1812 children (1013 females and 799 males). Caries (51.6%) was the most frequent reason for extraction of primary teeth. Primary molar teeth (73.7%) were the most common type of teeth were extracted. When the distribution of the reasons for extraction was examined based on age groups, the most prominent reason in the 7-, 8-, and 9-year-old age group was tooth caries ( $p<0.05$ ), whereas physiologic mobility was the most prominent reason in the 10- and 11-year-old age groups ( $p<0.05$ ).

**Conclusion:** Based on this study's findings, it can be concluded that tooth caries is the most common reason for extraction of primary teeth in primary school-age children in Zonguldak, Turkey. Primary molars were the most common type of tooth extracted. Oral and dental health programs should be developed and implemented to reduce primary tooth extraction caused by tooth caries.

## Keywords

Tooth extraction, tooth caries, primary teeth

## Anahtar Kelimeler

Diş çekimi, diş çürügü, süt dişleri

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## Address for Correspondence/Yazışma Adresi:

Levent Demiriz MD,  
Bülent Ecevit University Faculty of Dentistry,  
Department of Pediatric Dentistry, Zonguldak,  
Turkey

Phone: +90 506 549 28 24

E-mail: drleventdemiriz@gmail.com

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## Öz

**Amaç:** Süt diş çekim nedenlerinin belirlenmesi ülkelerin sağlık politikalarını oluşturken gerekli önlemleri almaları açısından önem taşımaktadır. Bu çalışma Türkiye'nin Zonguldak ilindeki İlkokul Çağı Çocuklarında süt diş çekimine neden olan etkenlerin belirlenmesini amaçlamıştır.

**Gereç ve Yöntemler:** Çalışmamızda 2012-2016 yılları arasında Bülent Ecevit Üniversitesi Diş Hekimliği Fakültesi, Pedodonti Anabilim Dalı'na başvuran hastaların kayıtlarında yer alan yaş, cinsiyet, tıbbi durum, çekilen diş sayısı ve primer diş çekimi nedeni retrospektif olarak incelenmiştir. İnceleme sonucunda süt diş çekim nedenleri, çekilmiş süt dişlerinin tipleri, ve her hastanın yaşı ve cinsiyeti ile ilgili bilgiler toplanmış ve analiz edilmiştir.

**Bulgular:** Yapılan incelemede, 1812 çocuk hastadan (1013 kız, 799 erkek) 2429 adet süt dişi çekildiği tespit edilmiştir. Diş çürüğu (%51.6) en çok rastlanılan süt dişi çekim nedenidir. Süt molar dişler (%73.7) en çok çekilen diş tipidir. Yaş gruplarına göre çekim nedenlerinin dağılımı incelendiğinde, 7, 8 ve 9 yaş gruplarında en belirgin süt dişi çekim nedeni diş çürügü ( $p<0,05$ ); 10 ve 11 yaş gruplarında ise en belirgin neden fizyolojik mobilitedir ( $p<0,05$ ).

**Sonuç:** Çalışmanın bulgularına dayanarak, Zonguldak'da ilkokul çağındaki çocuklarda diş çürüklerinin süt diş çekimi için en yaygın neden olduğu sonucuna varılabilir. Süt molar dişler en sık çekilen süt dişi tipidir. Ağız ve diş sağlık programları süt dişlerinin çürük nedeniyle çekimlerini azaltmak amacıyla geliştirmeli ve uygulanmalıdır.

## Introduction

Primary teeth take on different and important tasks, such as chewing, speaking, space maintaining and providing aesthetics (1), and early loss of them may lead to malocclusion, speech pathology, and functional and aesthetic problems (2). Therefore, reporting the reasons for extraction of primary teeth is crucial for communities to take necessary steps to eliminate those unfavorable results while developing and implementing their own health policies. Additionally, periodic reports about the reasons for primary teeth extraction may help update oral health programs, thereby effectively preventing the loss of primary teeth (2,3). Recent studies have indicated that tooth caries is the most important reason for extraction of primary teeth in children (4-7). In addition to the occurrence of caries, dental trauma, periodontal disease, and orthodontic and physiological factors have also been identified as reasons for extraction of primary teeth (2,3,5,8,9).

Many factors make it important to determine the main reasons for primary teeth extraction in primary school-age children. One of these factors is being far from their parent's observance in school time. Parents play a crucial role in helping their children maintain good oral hygiene by controlling their children's diet and requiring periodic tooth brushing (10). However, it is more difficult to ensure these children adhere to these factors during the hours in which they are in school; thus, the decreasing level of oral hygiene may lead to caries (11). In addition to oral hygiene and diet control, parental observance can protect their children against certain dental traumas; however, it is almost impossible to be diligent about this when their children are in school. Thus, it is well known that school-age children are the target group that is most at risk for dental trauma (12). Additionally, since school-age children are in mixed dentition period, it is more difficult to provide good oral hygiene. Furthermore,

malocclusion may become intensified due to caries or tooth loss so these children should be checked regularly (13,14). Based on these explanations, it is thought that the loss of primary teeth in primary school-age children may occur for a variety of reasons.

The aim of the present study was to determine the reasons for extraction of primary teeth in children who are in primary school and living in Zonguldak, Turkey. The study also sought to identify which of these reasons was most prominent in this group of children.

## Materials and Methods

The present study evaluated archived information of 5986 patients who applied to Bülent Ecevit University Faculty of Dentistry, Department of Pedodontics between 2012 and 2016. From these archives, the records of 1812 patients, ranging in age between 7 and 11 years, and who had at least one primary tooth extracted, were selected and used for the present study. Ethics committee approval to use this collected data in this study was received from the Ethics Committee, Bülent Ecevit University (Protocol no: 2017-19-25/01). The following information was collected and analyzed: the patient's age, gender, medical condition, type of primary tooth extracted, and the reason for extraction.

The evaluated reasons for the extraction of primary teeth, as identified by Kay and Blinkhorn (8) and Alshenehi and Hughes (3), were caries, physiological mobility, orthodontic reasons, trauma, over-retention, periodontal problems, systemic problems, economic reasons, and patient/parent requests (Table 1). For each extracted primary tooth, the reason for the extraction, the type of tooth extracted, and the patient's age and gender were recorded using Excel software (Excel, Office 365, Microsoft, Redmond, WA, USA). The obtained data were analyzed using the SPSS 19.0 program (SPSS, Inc., Chicago, IL, USA). Descriptive statistics were calculated for all age groups, and all the

data were interpreted. The chi-square test was used for statistical analysis, and a p value less than 0.05 was considered to be statistically significant.

## Results

According to the data review conducted for the present study, 2429 primary teeth were extracted from 1812 pediatric patients (1013 females and 799 males). The age of the patients ranged between 7 and 11 (average age: 8.7 years). Distribution of the reasons for the extraction of primary teeth is presented in Table 2. Based on that data, the reason most frequently encountered for extraction of primary teeth was tooth caries (51.6%). The second most frequently encountered reason was physiological mobility (44.6%). When the evaluation was based on gender, although more teeth were extracted from female children (1377 primary teeth, 56.6%) than on male children (1052 primary teeth, 43.4%), the difference between the two genders was not statistically significant ( $p>0.05$ ). When the ages of the pediatric patients whose teeth were extracted were

evaluated, the 9-year-old age group was found to be the group with most extracted teeth (24%; 583 teeth). This was followed, respectively, by the 10-year-old age group (22.7%), the 7-year-old age group (19.7%), the 8-year-old age group (18.7%), and the 11-year-old age group (14.9%), as shown in Table 3.

When the percentages of the extracted maxillary and mandibular teeth were examined; it was determined that maxillary teeth (55.7%) were extracted more often than mandibular teeth (44.3%). Primary maxillary molars were determined to be the most commonly extracted teeth (38.6%), followed by the primary mandibular molars (35.1%), as shown in Table 4. The percentages for the types of primary teeth that were extracted were: primary molars (73.7%), primary canines (16.3%), and primary incisors (10%). The relationship between the type of primary tooth and the reasons for the extraction was also examined. Physiological mobility was the most common reason for extraction of primary incisors (85.5%) and primary canines (90.8%). Tooth caries was the most common reason for the extraction of primary molars (67.8%).

**Table 1. Extraction reasons of primary teeth (2,3,7)**

Tooth Caries	Periapical abscess associated with tooth caries, unsuccessful pulpotomy and pulpectomy
Physiological Mobility	Primary tooth in exfoliation period that causes to mastication strength due to its mobility
Orthodontics	Extraction for preventing or correcting malocclusion.
Trauma	Extraction due to acute trauma
Over Retention	Prolonged retention of a primary tooth
Periodontal Problems	Extraction for loss of function or periodontal abscess and pain
Systemic Problems	Tooth extraction for prophylaxis
Economic Reasons	Tooth extraction preferred by the patient due to economical reasons
Patient/Parent Requests	Request of the patient or parents

**Table 2. Distribution of the reasons**

Reasons	Number of the extracted teeth	%
Tooth Caries	1254	51.6
Physiological Mobility	1084	44.6
Orthodontics	18	0.7
Trauma	46	1.9
Over Retention	19	0.8
Periodontal Problems	-	-
Systemic Problems	8	0.3
Economic Reasons	-	-
Patient/Parent Requests	-	-

When the distribution of the reasons for extraction by age groups was examined, it was observed that one reason occurred more often than other reasons in each age group. The distribution of the reasons for extraction by age groups is shown in Table 5. In the 7-year-old age group, the number of primary teeth extracted due to tooth caries was significantly higher ( $p=0.000$ ) than the teeth that were extracted for the other reasons. In the 8-year-old age group, the same result was observed; tooth caries was most often the reason for the extraction of primary teeth ( $p=0.000$ ). In the 9-year-old age group, tooth caries was the most significant reason ( $p=0.000$ ) for the extraction of primary teeth. In the 10-year-old age group, the number of primary teeth extracted due to physiologic mobility was significantly higher than the other teeth

that were extracted for the other reasons ( $p=0.000$ ). In the 11-year-old age group, the same result was observed; physiologic mobility was most often found to be the reason for tooth extraction ( $p=0.000$ ).

## Discussion

Determining the percentages of and reasons for tooth mortality in a population provides information about the prevalence of dental diseases, the availability of dental treatments, and measures that can be taken to prevent tooth loss (2,3). In order to develop and implement a plan to reduce tooth mortality, it is very important to clarify the main reasons for this type of loss (2,15). Although tooth extraction is a prevalent oral health procedure among children attending dental clinics in developing countries (14), data about

**Table 3. Distribution of the extracted primary teeth according to age groups**

Age	Number of Patients	Number of Extracted Teeth	%
7	452	478	19.7
8	416	455	18.7
9	352	583	24
10	341	551	22.7
11	251	362	14.9
Total	1812	2429	100

**Table 4. Distribution of the extracted primary teeth according to jaws and type of the teeth**

Jaw / Tooth Type	Number of extracted teeth	%
Maxillary Incisor	178	7.3
Mandibular Incisor	65	2.7
Maxillary Canine	239	9.8
Mandibular Canine	157	6.5
Maxillary Molar	938	38.6
Mandibular Molar	852	35.1
Total	2429	100

**Table 5. Distribution of the reasons for the extraction of primary teeth by age.**

	Tooth Caries	Phys. Mobility	Ortho.	Trauma	Over Ret.	Perio. Prob.	Syste. Prob.	Eco. Reas.	Pat/Par. Requests	Total
Age 7	344 <sup>a</sup>	123 <sup>b</sup>	2 <sup>b</sup>	1 <sup>b</sup>	5 <sup>b</sup>	-	3 <sup>b</sup>	-	-	478
Age 8	326 <sup>a</sup>	105 <sup>b</sup>	4 <sup>b</sup>	10 <sup>b</sup>	8 <sup>b</sup>	-	2 <sup>b</sup>	-	-	455
Age 9	342 <sup>a</sup>	223 <sup>b</sup>	1 <sup>b</sup>	12 <sup>b</sup>	3 <sup>b</sup>	-	2 <sup>b</sup>	-	-	583
Age 10	188 <sup>b</sup>	347 <sup>a</sup>	3 <sup>b</sup>	10 <sup>b</sup>	2 <sup>b</sup>	-	1 <sup>b</sup>	-	-	551
Age 11	54 <sup>b</sup>	286 <sup>a</sup>	8 <sup>b</sup>	13 <sup>b</sup>	1 <sup>b</sup>	-	-	-	-	362

<sup>a</sup>:means the significant value ( $p=0.000$ )

the reasons for tooth loss in primary dentition are limited (2,3). In addition, studies that focus on groups of primary school-age children are also limited, even though schools are accepted as favorable places to provide oral health education and efficient and effective preventive services (16). Moreover, school-based oral health programs have been reported to be more efficient in delivering preventive and curative services than community-based approaches (17). Therefore, in the present study, primary school-age children were chosen as the population to be investigated.

When our study results were evaluated, it was found that, in primary school-age children in Zonguldak, Turkey, 51.6% of the primary teeth extractions were due to tooth caries. This result is similar to the finding reported in previous studies (2,3,5,14). In the study by Chukwumah et al. (14), 712 children between the ages of 0 and 16 were evaluated, and tooth caries was the leading reason (46%) for the extraction of primary teeth. In the study by Alsheneifi and Hughes (3), 277 children between the ages of 3 and 13 were investigated; they reported that tooth caries was the main reason (53%) for extraction. In the study by Mansour and Bågesund (5), 206 children between the ages of 3 and 8 were evaluated, and they reported higher rates of tooth caries (60.5%). In a study by Bani et al. (2) in Turkey, 1755 children between the ages of 2 and 13 were evaluated; similar to other studies, they found that tooth caries was the most encountered reason (57.4%) for tooth extraction. Although the rates reported in these studies varied, they share a common result, which is that caries was the main reason for extraction of primary teeth in children. However, while the results from these previous studies are similar to our study's results, we evaluated more children with a narrower age range. Thus, we tried to obtain a homogenous study group by eliminating children in pre-school who are able to spend more time with their family than primary school-age children. In addition, no previous study in the literature only targeted primary school-age children.

Distinct from the results reported in previous studies and our results, another study was performed in Turkey by Ak et al. (17); it reported that extraction due to caries was not the main reason. Caries was only found to be the reason in 31% of extracted

primary teeth (17). The difference in that study's result may be due to the fact that the authors only investigated primary molars (17). In addition to caries, Ak et al. (17) also evaluated other reasons for the extraction of primary molar teeth, such as pain and sepsis. Moreover, the authors explained that a small sample size was a limitation of their study (17). The differences in the rates for tooth caries as the reason for extraction could also be due to differences in the sample sizes or study protocols used in various studies.

Although extraction of primary teeth is a treatment approach,(18) if the necessary practices such as making space maintainer, are not carried out, early extraction of those teeth due to caries may result in other problems, such as decrease of dental arch length, migration of adjacent or opposite teeth, rotation, and crowding of teeth and permanent teeth's remaining impacted without eruption (19). Despite these negative results, most parents do not pay attention to the functions of primary teeth and they do not contact their dentists unless their children experience pain or other problems while eating. This can lead to the fact that treatable primary teeth with caries can become untreatable due to delays in referring a dentist; thus, they are extracted by necessity (19,20). In children, one of the most important factors related to tooth extraction is that their parents do not take them to see dentists early enough to receive treatment for primary teeth, because it is the thought that primary teeth do not need treatment since they will be replaced by permanent teeth in the future (19). Another factor that impacts tooth extraction in children is the different approaches taken by dentists to treat primary teeth. Ahamed et al. (20) emphasized that there are dentists who prefer to extract primary teeth rather than treat them.

In evaluating our study results, in addition to tooth caries, two other factors were found to cause the extraction of primary teeth: physiological mobility (44.6%) and trauma (1.9%). These results were similar to the findings reported by Bani et al. (2) and Chukwumah et al. (14). However, it is important to note that, in our study, factors, such as periodontal problems, which are regarded as being important (21,22), did not cause the extraction of primary teeth in children in the primary school-age group. We believe that the findings from the population we evaluated

support this result. Thus, Jafarian and Etebarian (23) emphasized that periodontal disease-related tooth extraction was not observed in individuals younger than 20; rather, periodontal disease-related tooth extraction emerges as people age.

When all the primary teeth that were extracted for different reasons were evaluated, primary molars were the type of teeth most often extracted (73.7%). This result is similar to the result (74.5%) reported by Bani et al. (2) in Turkey. Additionally, in previous studies, primary molars were the primary teeth most often extracted (2,3,14,19,20). Primary molars are teeth that erupt 16 months and 29 months after birth, and they are present in the oral cavity for a very long time. Mixed dentition, which occurs as the number of erupting teeth increases over time, and the location of primary molars make it more difficult to remove plaque from those teeth. Additionally, fissures and pits present on the chewing surfaces of primary molars provide a suitable environment for *Streptococcus mutans* bacteria to adhere to these teeth (19,20). Exfoliation of primary molars generally begins at the age of 9 (24). Consequently, because the exfoliation period is active in children between the ages of 7 and 11, which is the age range we evaluated, the number of primary molars extracted due to physiological mobility (apart from caries) is increasing. In conclusion, all of these stated situations explain why primary molars are the type of primary teeth most often extracted in children. The above-mentioned reasons can also explain the fact that, in the present study, 9 was found to be the age during which tooth extraction most often occurs.

When the age groups were evaluated separately in the present study, the extraction of primary teeth due to caries was found to significantly higher ( $p=0.000$ ) than the other reasons in children at 7, 8 and 9 years of age. However, physiological mobility has taken the place of caries as the most common reason for extraction of primary teeth in the 10- and 11-year-old age groups; the results for both of these age groups was statistically significant ( $p=0.000$ ). This result is compatible to the results reported by Bani et al. (2), which stated that primary teeth extracted due to physiologic exfoliation were most often observed in children between the ages of 10 and 13. Thus, in the same study (2), physiologic exfoliation was ranked

second behind tooth caries as the reason for tooth extraction in the 6-year-old to 9-year-old age groups. Based on these results, the most common reason for tooth extraction may change as a child ages, and exfoliation on primary molars, which begins to be observed after the age of 9, has an effect on this change.

## Conclusion

In conclusion, the rate of caries-related losses of primary teeth is remarkable. This situation indicates that extraction of primary teeth due to caries is still a current health problem. In the programs that need to be developed and implemented to reduce this, it is necessary to provide school-age children with information about the importance of primary teeth and what can happen if those teeth are extracted. Furthermore, teachers and parents should be trained in oral hygiene, parents should be informed about the importance of consulting dentists for primary teeth in need of treatment, and it should be recommended that they should not be late in ensuring that their children receive treatment. Childhood encompasses various periods in which different factors can play major roles in primary dentition. Therefore, further studies are needed to evaluate the major reason for extraction of primary teeth in specific age groups of children.

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