

Primary Tooth Extraction Pattern Among Turkish Children with Severe Early Childhood Caries Treated Under General Anesthesia

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Abstract

Objective: To determine the frequency and distribution of extracted primary teeth due to severe Early Childhood Caries (ECC) in young pediatric patients treated under general anesthesia. **Material and Methods:** This study employed a retrospective design and consisted of a total of 1644 children (1011 boys, 633 girls) children aged 3 to 5 who had been diagnosed with several ECC and treated under general anesthesia in a dental faculty between 2013-2019. The data was obtained from the medical and dental forms obtained from the faculty database. The patients were divided according to age groups and sex. A total of 2605 teeth were classified according to the sex, tooth number, and age groups. **Results:** Of the subjects, 14% (n = 245) were 3 years old, 31% (n = 505) were 4 years old, 55% (n = 894) were 5 years old. The mean \pm SD age of subjects was 4.2 ± 0.8 yr. While the most extracted teeth were found to be maxillary primary central incisors and molar teeth, the less were found to be mandibular primary canines. While there was a statistically significant difference between canines and incisors with molars ($p < 0.05$), no difference existed between incisors and molars. There was a statistically significance difference among all age groups ($p < 0.05$). While 3 years old group had the less number of extracted teeth, 5 years old group had the most number of extracted teeth. **Conclusion:** Severe ECC causes higher tooth extraction in patients treated under general anesthesia. Effective personal and community programs should be initiated to prevent ECC and mitigate its potential disruptive impacts in children's oral health.

Keywords: Child; Dental Caries; Tooth, Deciduous; Anesthesia, General.

Introduction

Dental caries is one of the most common chronic diseases worldwide, triggered by genetic, behavioral, environmental and microbial factors [1,2]. Early Childhood Caries (ECC) is defined as the presence of one or more decayed, lost or filled tooth surfaces in any tooth in a child aged 71 months or younger [2]. Severe ECC is defined as the number of tooth decay, missing or filled tooth surfaces at least 4 years old at 4 years old, at least 5 years old at 4 years old, and at least 6 years old at 5 years old [3].

The prevalence of ECC also varies greatly with various factors such as race, culture and ethnicity [3,4]. In addition, socioeconomic status, lifestyle, cariogenic diet and inadequate oral hygiene, long-term or faulty bottle use, low birth weight and vertical transition of streptococcus mutans from mother to child, general health status of the child, family income and education level of the mother are among the individual risk factors [5-10]. Although the prevalence rate of ECC is between 1 and 12% in most developed countries, it is as high as 70% among less developed and disadvantaged groups in developed countries [9,11].

Severe ECC causes pain, infection, abscess, chewing difficulty, malnutrition, and gastrointestinal disturbances, thus impairing the patient's quality of life due to oral health [3, 12]. Pain caused by tooth decay adversely affects children's ability to learn or perform emotional states, sleep patterns and normal activities [13]. Malnutrition due to physical growth retardation can be seen [14]. However, dental anxiety can be caused by dental treatments at a very early age [15]. Due to premature milk teeth lost due to ECC, incorrect language repulsion, malocclusion and even speech disorders may occur [16]. Multiple treatment sessions may disrupt the child's attendance and performance, and may also affect their parents' work efficiency [17]. In addition, children may get a negative attitudes towards dentistry since they have tough dental procedures [18].

Young children with severe ECC can often be treated with pharmacological behavior guidance techniques because they show cooperation problems. However, radical treatments such as tooth extraction are generally preferred under general anesthesia. Determining the distribution of the extracted primary teeth according to various variables such as sex, age and jaw location in children treated under general anesthesia and having severe ECC is very important both in the development of protective strategies effectively and in consideration of the factors that cause it. Therefore, this study aimed to determine the frequency and distribution of extracted primary teeth due to severe ECC in young pediatric patients treated under general anesthesia. The null hypothesis tested is that there is no difference between the distributions of extracted primary teeth due to severe ECC in pediatric patients treated under general anesthesia.

Material and Methods

Study Sample

This study employed a retrospective design and was conducted in the Department of Pediatric Dentistry, Sivas Cumhuriyet University between January 2013 - June 2018. The study sample consisted of children aged 3 to 5 who had been diagnosed with several ECC and treated under general anesthesia. The data was obtained from the medical and dental forms obtained from faculty database. Inclusion criteria were as follows: children who were diagnosed with severe ECC between 3-5 years old and had at least one tooth extraction. The teeth that were indicated for extraction and failed despite treatment were included. A total of 1644 children (1011 boys, 633 girls) who met the study criteria were included in the study. The patients were divided according to age groups and sex. A total of 2605 teeth were classified according to the sex, tooth number, and age groups of the children.

Statistical Analysis

Statistical analyses were carried out using SPSS 22.0 software (SPSS, Chicago, IL, USA). Descriptive analysis was used to summarize the demographic characteristics of the study sample. The distribution of extracted tooth according to tested independent variables was analyzed by the Chi-square test at 0.05 significance level.

Ethical Aspects

The study was conducted in accordance with the ethical standards specified in the Helsinki Declaration of 1964 and its subsequent amendments.

Results

Among all subjects, 61% (n = 1011) were males and 39% (n = 633) were females. Of the subjects, 14% (n = 245) were 3 years old, 31% (n = 505) were 4 years old, 55% (n = 894) were 5 years old. The mean \pm SD age of subjects was 4.2 ± 0.8 yr.

Figure 1 shows the distribution of extracted primary teeth according to tooth number and age. While the most extracted teeth were found to be maxillary primary central incisors and molar teeth, the less were found to be mandibular primary canines. Figure 2 shows the distribution of extracted primary teeth according to sex and age. There was no difference regarding sex ($p > 0.05$).

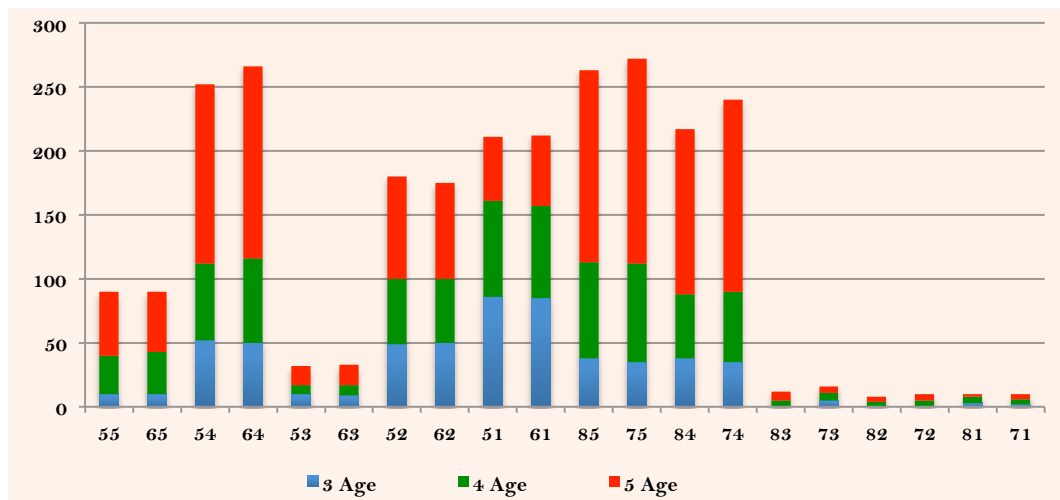


Figure 1. Distribution of extracted primary teeth according to tooth number and age.

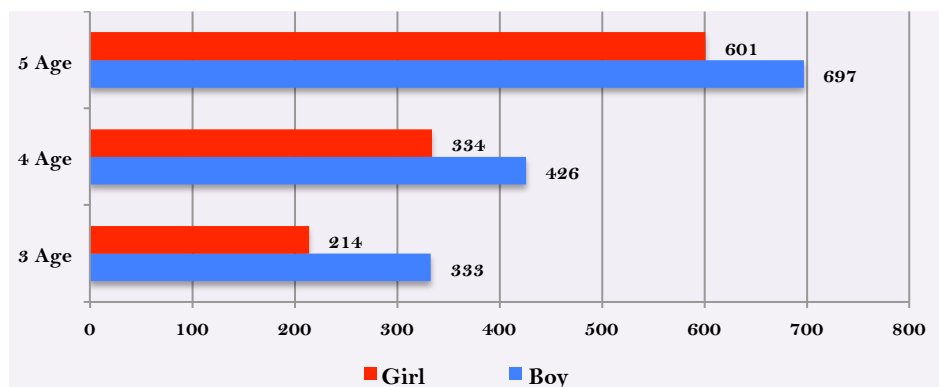


Figure 2. Distribution of extracted primary teeth according to sex and age.

Table 1 shows the distribution of extracted primary teeth according to tooth type. While there was a statistically significance difference between canines and incisors with molars ($p < 0.05$), no difference existed between incisors and molars. Regarding incisor teeth, mandibular teeth had significantly more extraction number than mandibular teeth ($p < 0.05$). In regard with canine and molar teeth, there was no difference between maxilla and mandibula.

Table 1. Distribution of primary teeth extraction according to tooth type.

Age	Tooth Type						Total N
	Incisor		Canine		Molar		
	Maxillary N	Mandibular N	Maxillary N	Mandibular N	Maxillary N	Mandibular N	
3	260	10	19	9	124	125	547
4	264	18	21	7	184	266	760
5	271	20	31	12	378	586	1298
Total	795	48	71	28	686	977	2605

Table 2 shows the distribution of extracted primary teeth according to age groups. There was a statistically significance difference among all age groups ($p < 0.05$). While 3 years old group had the less number of extracted teeth, 5 years old group had the most number of extracted teeth.

Table 2. Distribution of primary teeth extraction according to localization of jaw.

Age	Localization of Jaw								Total N
	Right Maxillary		Left Maxillary		Right Mandibular		Left Mandibular		
	N	%	N	%	N	%	N	%	
3	175	37.4	43	13.3	168	36.2	41	12.9	427
4	198	30.0	112	18.6	211	31.7	186	19.6	707
5	377	24.0	405	25.7	373	23.8	316	26.3	1471
Total	750	28.0	560	21.6	752	28.0	543	22.2	2605

Discussion

Despite contemporary preventive and treatment approaches in pediatric dentistry, dental diseases are still one of the most common health problems worldwide [1]. Early tooth loss due to dental caries provides insight into the availability of oral health services in the relevant population, as well as common attitudes towards oral health. In order to develop effective methods and protocols for reducing early tooth extraction, it is important to determine the incidence and distribution of early tooth extraction due to caries in children. In addition, extensive dental caries seen at a young age lead to treatment under general anesthesia due to cooperative problems in children [19]. This results in more radical dental treatments preferred by dentists [20] and higher costs [21].

In this hospital-based retrospective study, dental records of pediatric patients with severe ECC between the ages of 3-5 years and treated under general anesthesia were examined. The findings of the study showed that in the patient group with severe ECC and treated under general anesthesia, the maximum tooth extraction was performed in the 5-year-old group, while the molar teeth were the most extracted. However, it was found that the maxillary teeth were found to be more extracted than mandibular teeth. There was no significant difference according to gender.

In the present study, the difference in the age group of extracted teeth is consistent with various studies in the literature [22-26]. Tooth extraction was found to be higher in higher ages. One of the reasons

for this may be that treatment under general anesthesia is not considered very favorable by the parents and they desire continuous procrastination [27]. In addition, the increased risk of complications due to general anesthesia in small age groups may have resulted to delay dental appointment and in more surgical and dental extraction in the 5-year-old group. Similarly, previous authors reported that more shoots were performed in higher age groups, probably due to differences in the chronology of tooth development [26].

In this study, the most common tooth types were maxillary incisions and first molar teeth. Similarly, some authors reported that primary molar teeth were most commonly extracted [23,26]. This may be due to the anatomic structure of these teeth. The deep pits and cracks on the occlusal surface and the proximal surface of the molars are more prone to caries due to their smooth surfaces [28]. Another reason may be due to the chronological age difference between the two molar tooth types. Furthermore, the success rate of pulp treatment for the primary first molar is generally considered to be low, while the second primary molar is generally maintained preferentially to preserve the area.


Maxillary central incisors are the most commonly extracted teeth in the study group, similar to previous studies [22,29]. Factors such as prolonged breastfeeding, increased sugar intake, delays in the initiation of tooth brushing lead to tooth decay. In addition, it has been reported that the highest incidence of trauma in the first dentist occurred at the age of 2-3 when the child learned to walk and improve coordination [30].


This study had several limitations. Since the sample selected in the study is from a single hospital, this may prevent the generalization of the study data. In addition, because the data were obtained from hospital records, the diagnosis of severe ECC was made by different dentists who were not calibrated.

Conclusion

This study highlights the high prevalence of primary tooth extraction under general anesthesia due to severe ECC in a Turkish pediatric population. The findings revealed that severe ECC causes higher tooth extraction in patients treated under general anesthesia. Effective personal and community programs should be initiated to prevent ECC and mitigate its potential disruptive impacts in children's oral health.

Authors' Contributions

MC  0000-0002-9839-871X Conceptualization, Methodology, Investigation, Writing – Original Draft Preparation, and Writing – Review and Editing.

BB  0000-0003-4764-819X Conceptualization, Methodology, Formal Analysis, Writing – Original Draft Preparation, and Writing – Review and Editing.

All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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None.

Conflict of Interest

The authors declare no conflicts of interest.

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