

EXTRACTION OF FIRST PERMANENT MOLARS IN CHILDREN AND ADOLESCENTS

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ABSTRACT

The aim of the study was to assess the frequency, pattern and reasons for extraction of FPMs in children and adolescents from a university dental clinic. Material and methods. A cross-sectional retrospective study was performed on dental files of 1072 patients (494 boys, 578 girls) aged 8-17 years old (mean age = 11.58 ± 2.51 years), examined and treated in the Pediatric Dentistry Department, Carol Davila University Bucharest. The frequency of patients who required FPM extraction at the first visit was assessed and the distribution of these patients according to the number of FPM to be extracted, living area (urban, rural), general health status and the reason for extraction (caries with poor prognosis, MIH) was analyzed. Caries experience indices (DMF-T/S) were also calculated. Results. From the entire study sample, 133 (12.40%) children required extraction of at least one FPM; 59 (11.94%) of boys and 74 (12.80%) of girls, with male to female ratio of 0.79:1. Mean age of the children with FPM proposed for extraction was 12.87 ± 2.39 years. Extraction of FPMs was noticed more frequently in children with special needs (37.83%) than in healthy children (10.52%) and also in children from rural areas (16.66%) than those from urban areas (11.07%). Caries with poor prognosis was the main reason for extraction in most cases – 96.24%. Conclusions. There was a high rate of Romanian children and adolescents who required FPM extraction. This result emphasizes the need for early application of prevention and treatment methods. The children who required extraction of FPMs were older than the recommended age for achieving spontaneous space closure. National guidelines on the treatment and extraction of FPMs are needed.

Key words: first permanent molar, extraction, children, adolescents

INTRODUCTION

The first permanent molar (FPM) is often one of the first permanent teeth to erupt in the oral cavity and has an important role in normal occlusion, maintaining normal masticatory function and dento-facial harmony [1-3].

FPM is considered the most caries-prone tooth in the permanent dentition [4], starting even at short time after its eruption [5]. Additionally, about 13% of children have MIH syndrome and more than one third of them have moderate-to-severe lesions of hypomineralization in FPMs. These MIH lesions might cause hypersensitivity, substantial hard tissues

damage and increased caries risk [3, 6]. Consequently, FPMs may require extraction at an early age [7].

Enforced early extraction of poor prognosis FPMs can lead to changes in positioning of the neighboring and opposing teeth and even in the facial profile [8].

In Romania, there are few studies regarding the reasons for and the pattern of extraction of FPMs in children and adolescents [5, 9].

The aim of the study was to assess the frequency, pattern and reasons for extraction of FPMs in children and adolescents from a university dental clinic.

MATERIAL AND METHODS

The research was performed on a sample of 1072 children and adolescents (494 boys, 578 girls) aged between 8 and 17

years (mean age = 11.58 ± 2.51 years), patients examined and treated in Pediatric Dentistry Department from Carol Davila University Bucharest (fig. 1

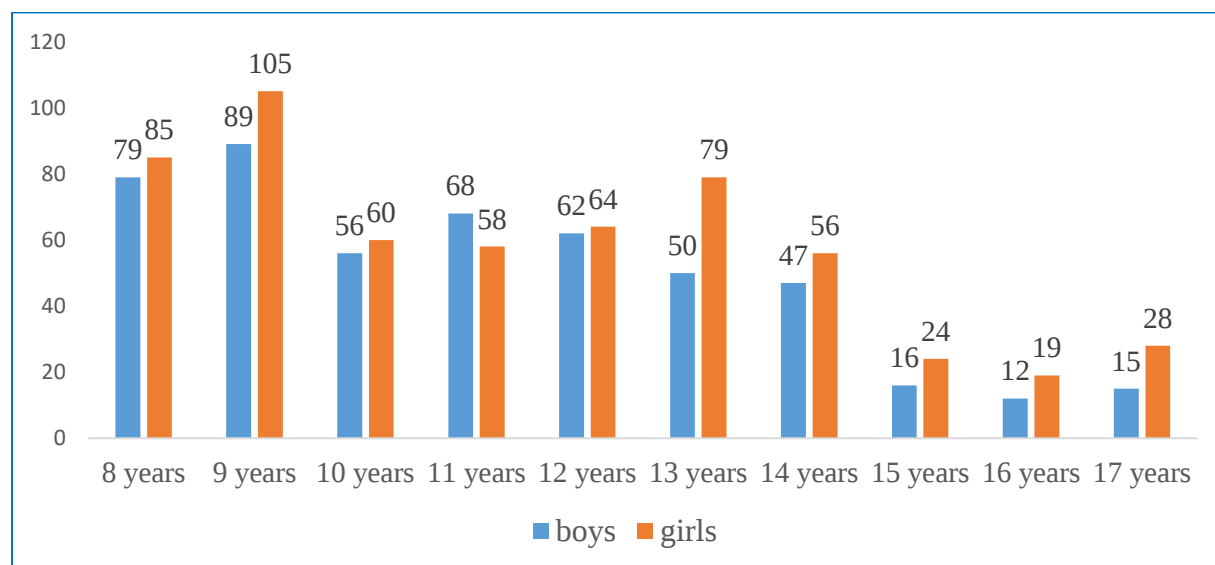


Fig. 1 – Age and sex distribution of the study sample (n = 1072 patients)

Criteria for inclusion in the study sample was: patients aged between 8 and 17 years, children from Caucasian origin, patients with and without special needs.

A cross-sectional retrospective study was performed using data from the dental files of patients examined and treated by one dentist (MA). Data obtained from the dental files were: demographic information (age, gender, living area), dental status (caries-free, decayed, filled, extracted teeth) at the first visit, the presence of MIH lesions.

The frequency of patients who required FPM extraction at the first visit was assessed and distribution of these patients according to the number of FPM to be extracted, the reason for extraction (caries with poor prognosis, MIH), living

area (urban, rural), general health status was analyzed. Caries experience indices DMFT and DMFS were also calculated.

Data obtained were collected and processed using SPSS 20.0 program for Windows (SPSS Inc., Chicago, IL, SUA). One-way ANOVA test was used to compare mean values and the level of statistical significance was set at $p=0.05$.

RESULTS

The study sample comprised 1072 children: 832 (76.61%) from urban areas and 138 (12.87%) from rural areas. From the whole group, 998 (93.10%) were healthy and 74 (6.90%) had associated general conditions (neuropsychiatric, cardiac, genetic syndromes etc.).

The analysis of patients' dental status showed that 138 (12.87%) patients had MIH syndrome.

From the entire study sample, 133 (12.40%) children required extraction of at least one FPM; 59 (11.94%) of boys and 74

(12.80%) of girls, with male to female ratio of 0.79:1.

Distribution of children who require extraction of FPM according to their age is presented in fig. 2.

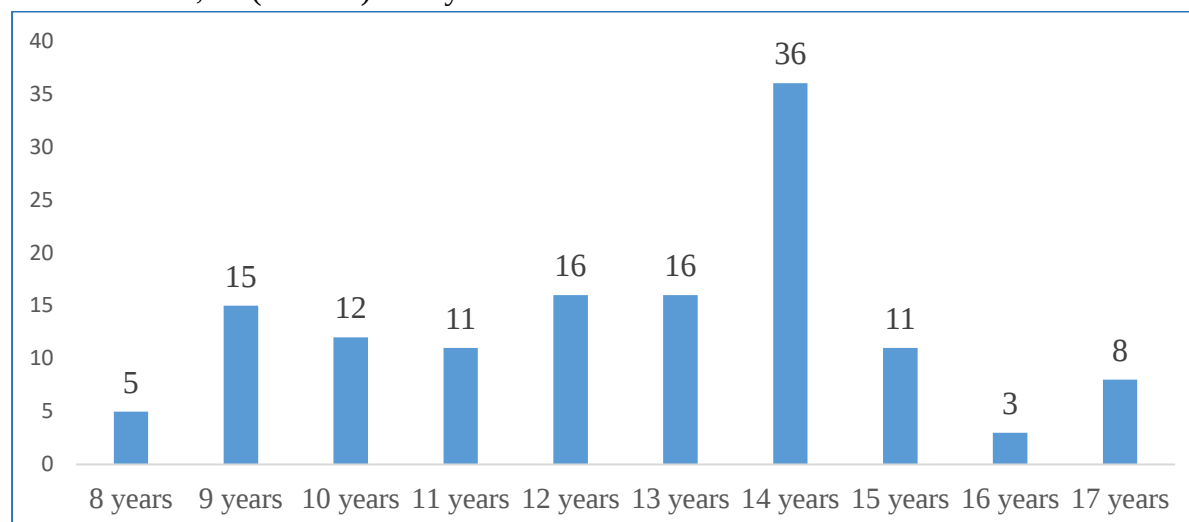


Fig. 2 – Age distribution of children who require extraction of FPM (n=133 patients)

Mean age of children with FPM proposed for extraction was 12.87 ± 2.39 years.

1.80 extracted teeth/patient. The percentage of extracted FPMs was double in mandible than in maxilla (66.66% versus 33.33%).

The total number of FPMs to be extracted was 240, with mean number of

Most patients had 1 or 2 FPMs proposed for extraction (table I).

Table I. Distribution of patients according to the number of FPM proposed for extraction

Number of FPM to be extracted	boys		girls		total	
	n	%	n	%	n	%
1	31	23.30	36	27.06	67	50.37
2	18	13.53	21	15.78	39	29.32
3	5	3.75	8	6.01	13	9.77
4	5	3.75	9	6.76	14	10.52
total	59	44.36	74	55.63	133	100

Statistically non-significant differences were found between the mean age of children and the number of FPM to be extracted ($p = 0.762$) (table II).

Table II. The mean age of the children according to the number of FPMs to be extracted

Number of FPM extracted	Number of patients	Mean age (years)
1	67	12.66 ± 2.37
2	39	13 ± 2.43
3	13	13.34 ± 2.09
4	14	13.04 ± 2.39

Extraction of FPMs was required more frequently in children with special needs (37.83%) than in healthy children (10.52%). The mean number of FPMs to be extracted was higher in special needs children than in healthy ones – 2.03 versus 1.74, but differences were non-statistically significant ($p=0.168$).

Patients from rural areas had more frequently FPM proposed for extraction than those from urban areas (16.66% versus

11.07%). The mean number of FPM to be extracted was also higher in children from rural areas (1.80 ± 0.91 versus 1.78 ± 1.01), but the differences were non-statistically significant.

Mean values of caries experience indices in children who require extraction of FPM was statistically significant higher than in children without this situation (table III).

Table III. Caries experience indices in children who require or not extraction of FPM

	DMFT		DMFS	
	range	mean	range	mean
Children who require extraction of FPM	1-22	6.50±3.99	0-18	15.96±10.72
Children who do not require extraction of FPM	5-71	2.80±2.71	0-30	3.91±4.29
p	0.000		0.000	

Caries with poor prognosis was the main reason for extraction in most cases – 96.24%. Severe form of MIH was the reason for 3.76% of cases. From 138 children with MIH, 33 (23.91%) required extraction of FPM due to post-eruptive breakdown or caries occurred on MIH

lesions. This percentage was statistically significant higher than in patients without MIH syndrome (10.71%) ($p=0.000$).

DISCUSSION

The loss of first permanent molars is the most frequently noticed because these

teeth are the most likely to decay and to have developmental defects [10].

The rate of FPMs proposed for extraction in patients aged between 8 and 17 years old noticed in this study was high – 12.40%. This value is higher than the percentage of Romanian children and adolescents with missing FPMs found by Răducanu et al. in a study published in 2009 on a sample of 849 patients aged 5-17 years old from the same university clinic - 5.2% [9]. The studies showed that the frequency of FPM extraction raised with age. Thus, Casanova-Rosado et al. (2005) reported that the prevalence of lost FPMs was 2.1% in a sample of 1644 Mexican children aged 6-13 years old [11]. In a study conducted on 1204 panoramic radiographs of Turkish patients aged 7-17 years, Ozmen (2019) found that 8% of these patients had at least one FPM extracted [7]. Another study performed by Halicioglu et al. on 2925 panoramic radiographs of older Turkish patients aged between 13 and 20 years old reported a higher percent- 32.2% [12].

In this study, the rate of FPMs to be extracted in females was higher than in males. This result is consistent with those obtained by other researchers [7, 13]. On the contrary, a study conducted by Karthikeson et al. in India on a sample of 89000 children aged 7-17 years old reported a higher percentage of missing FPMs in males (64.47% versus 35.53%) [14].

The most favorable time for the extraction of a FPM is considered the commencement of calcification of the bifurcation of the second permanent molars (SPMs), particularly in the lower arch [3, 8, 15]. Extraction of the compromised FPM

when the SPM is developing (at a chronological age of eight to ten years) appears to cause less disruption to the occlusion [3, 16]. The success rate for spontaneous space closure is higher in the maxilla compared to the mandible [10]. Late extraction of FPM, during or after the eruption of the SPMs, will result in an unsatisfactory space closure and poor occlusal contacts [3, 8].

In our study the mean age for extraction of the FPMs was 12.87 ± 2.39 years old, which is higher than the recommended age for extraction. A similar result was obtained by Albadri et al. (2007) in a study regarding the pattern of FPM extraction in three dental hospitals from UK. They noticed that extraction of FPM was performed at a mean age of 11 years old and they suggested that there is a possible delay in referral by general dental practitioners, which might be related to the lack of national guidelines on the treatment of FPMs [15]. In 2014 a paper about National clinical guidelines for the extraction of FPMs in children was published in UK [16], revised in 2023 [3]. In our country there is no guidelines on this subject.

In our study, there were non-significant differences between the mean age of children and the number of FPM to be extracted. Albadri et al. (2007) noticed that children who had four FPMs extracted were younger (mean age = 10 years old) than those who had one or two FPMs extracted (mean age = 12 years old). They considered that the differences in the number of teeth extracted could be explained by the controversy and lack of evidence with regard to treatment planning for extraction of FPMs [15].

Many studies reported that the rate of missing FPMs in mandible is higher than in maxilla [7, 12, 13]. Thus, in a study on a sample of 945 Turkish patients aged between 13 and 20 years old with at least one FPM extraction, Halicioglu et al. founded that there were statistically significant more cases of lower FPMs extracted (784 patients, 1,066 teeth) than upper FPMs extracted (441 patients, 549 teeth) ($p < 0.001$) [12]. In this study, there were also more mandibular FPMs to be extracted than maxillary ones (66.66% versus 33.33%). Ozmen (2019) noted several factors for explaining the higher frequency of lower FPM loss: early eruption of mandibular teeth, more food debris remain in the lower jaw or different anatomical structures of teeth [7].

The main reason for extraction of FPM was gross caries lesions with pulp necrosis in most cases (96.24%), followed by the presence of MIH lesions (3.76%). This result is consistent to the those obtained by other researchers. Thus, the study conducted by Albadri et al. (2007) in U.K. showed that the main reason for the FPM extraction was dental caries with a poor prognosis in 89% of cases, followed by MIH (11%) [15]. In contrast, a study performed in 2020 in India by

Karthikeson et al. reported that that pulp inflammation was the most common reason for extraction (34.21%), followed by presence of root stumps (25%) [14].

In our study, the rate of FPMs proposed for extraction was statistically significant higher in children with MIH. It is considered that for the severely affected molars, extraction might be a good alternative to avoid the burden of repeated restorative treatments [16]. The rationale for extracting FPMs seriously affected by MIH is both caries prevention for the rest of the dentition and the poor long-term prognosis for these teeth [17].

CONCLUSIONS

- 1) There was a high rate of Romanian children and adolescents who required FPM extraction. This result emphasizes the need for early application of prevention and treatment methods.
- 2) The children who required extraction of FPMs were older than the recommended age for achieving spontaneous space closure. National guidelines on the treatment and extraction of FPMs are needed.

Conflict of interests

The authors declare that they have no conflict of interests.

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