ISSN: 1812–1217

Causes of Primary and Permanent Teeth Extraction in Children Aged 3–12 Years in Mosul City

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ABSTRACT

Aims: To establish the different reasons of primary and permanent teeth extraction and the most frequent tooth type extracted among children attending the pedodontic and preventive dentistry clinic at Collage of Dentistry ,Mosul University. **Materials and Methods:** Out of the 375 pediatric patients aged 3–12 years–old attending pedodontic and preventive dentistry clinic, 130 child patients were selected for this study. The teeth were examined carefully, the tooth that needed to be extracted was recorded to determine the cause of extraction for each tooth according to the criteria gathered and modified from the following researchers, Cahen et al; Kay and Blinkhorn and Cawson. **Results:** Statistical results showed highly significant difference at $p < 0.001$ between primary and permanent teeth and the cause of tooth extraction, as extraction due to caries was the main reason for primary tooth extraction while extraction for orthodontic treatment was the major cause for permanent tooth extraction. The first premolar recorded 43.6% this result showed highly significant difference at $p < 0.001$ compared with other permanent teeth to be extracted, while the first primary molar registered the higher value as an extracted primary tooth type (35.6%) with high significant difference at $p < 0.001$. **Conclusion:** Although caries and it is sequelae were the most common causes of premature loss of a primary tooth, an increasing need for tooth extraction for orthodontic treatment in this population of children was observed.

Key words: Extraction, orthodontic treatment, primary tooth, caries.

Mohammed AG. Causes of Primary and Permanent Teeth Extraction in Children Aged 3–12 Years in Mosul City. *Al–Rafidain Dent J*. 2008; 8(2): 24S–29S.
Received: 19/9/2007 ***Sent to Referees:*** 19/9/2007 ***Accepted for Publication:*** 10/12/2007

INTRODUCTION

In the management of the child dental patient, efforts are geared toward the preservation of both primary and permanent dentition; this is because the dentition is important for stimulating the development of the dental arches, maintaining normal occlusal relationship, and playing a role in speech development [(1)]. Loss of natural teeth in the child may be particularly harmful, leading to drifting, tilting, and malposition of the adjacent and succedaneous teeth, when esthetics is impaired as a result of tooth loss, further complications could arise such as psychological stress, disturbances in social interaction by development of negative self– esteem, the cost of correcting and managing these complications may further be a burden to the child and the parents [(2)].

There are many causes for the tooth to be extracted one of the most common causes is extraction due to periapical problems where a tooth is decayed to the extent that it can not be controlled and a satisfactory pulp treatment or root canal therapy can not be inserted, then an extraction of such tooth is necessary [(3)]. Tooth extraction is commonly a treatment consideration in the orthodontic management since the primary aims of orthodontic treatment in the mixed dentition are to correct dental arch irregularities, occlusal and jaw relation abnormalities and to eliminate functional interferences; these may be classified as *preventive* which means the elimination of factors that may lead to malocclusion or *interceptive* that implies to the corrective measures which may be necessary to prevent a potential irregularity from progressing into a more sever malocclusion [(4)].

Traumatic injuries can be considered as one of the common causes for a tooth to be extracted since traumatic injuries usually occur among young children im-

mediately after tooth eruption [5]. At 5 years of age 31– 40 % of boys and 16–30 % of girls would have suffered dental trauma, such injuries in the primary dentition may interfere with the normal development of the permanent dentition so they are usually managed by extraction [6]. The retained primary teeth (persistence teeth) are teeth that are did not shed at the normal shedding time and showed insufficient root resorption for normal shedding six months after the loss of the corresponding tooth in the same mouth and usually associated with double primary teeth, hypodontia affecting permanent successors, and subsequent to trauma or sever infection of primary teeth; so extraction of these teeth is indicated to allow proper space for permanent tooth to erupt if it is present [7]. Variations in the time of primary teeth exfoliation are frequently observed in the child patient, normal tooth mobility that causes child discomfort due to interference with the functional role of the adjacent and opposing teeth may indicate that the associated tooth is at the exfoliation time and can be extracted [8]. Other causes for tooth extraction are teeth that are affected by periodontal diseases, supernumerary teeth, and natal and neonatal teeth [9].

This study aimed to 1.determine the most common causes of primary and permanent teeth extraction among children attending the pedodontic and preventive dentistry clinic at Collage of Dentistry / Mosul University, 2. evaluate the most frequent tooth type extracted among the primary and permanent dentition. 3. assess the most commonly extracted tooth type in relation to the cause of extraction among primary and permanent dentition.

MATERIALS AND METHODS

Out of the 375 pediatric patients attending pedodontic and preventive dentistry Clinic at Collage of Dentistry, Mosul University, 130 consecutive pediatric patients were recruited for this study. The age of the children included in this study ranged between 3 to 12 years. Each patient was examined, a comprehensive history was taken and clinical examination was carried out by the investigator on a dental chair under direct light illumination using the diagnostic instruments. Children with maxillofacial injuries and oral neoplastic lesions were excluded from the study, children who came to the clinic unaccompanied by their parents and cases with incomplete documentation were also excluded from the study. When the treatment received entailed having an extraction done, the number and the type of the tooth extracted were recorded using a case sheet prepared for this purpose and the cause of extraction was determined for each tooth according to the criteria gathered and modified by a number of researchers [10,11,12]:

1- Deep carious lesion, badly destroyed tooth structure, periapical involvement, drainage fistula or pathological mobility, these are listed under periapical problems.
2- If there is indication for orthodontic treatment need extraction of any tooth, this decision is made by the orthodontist, then the extraction is done due to orthodontic treatment.
3- If the patient came with a history of trauma and the type of this trauma would be treated by extraction, the extraction carried out due to traumatic reason.
4- Primary tooth with no signs of mobility, and on radiographic examination there is no normal root resorption and the root of permanent tooth is about 3/4 of it's length, this gives the indication to extract the primary tooth as a retained primary tooth.
5- If there is mobility in the primary tooth associated with pain, discomfort and interfering with eating, then extraction would occur due to shedding time keeping in mind the age of the child.
6- Pulp treatment for primary teeth (pulptomy, or pulpectomy) and for the permanent teeth (root canal treatment) associated with continuous pain, fistula, or periapical abscess; this is considered as failure pulp treatment.
7- Supernumerary teeth, impacted teeth, natal and neonatal teeth should be extracted and confirmed using radiographic examination.
8- Teeth affected by periodontitis when associated with grade III mobility and

pocket formation > 5 mm, the treatment needed is extraction of involved teeth, which is considered as periodontal cause.

The statistical analysis was carried out using SPSS program (Version 10) loaded on Pentium IV computer to examine the effect and relationship between different variables. Results were considered significant when $p < 0.05$, 0.01 and highly significant when $p < 0.001$.

RESULTS

Statistical analysis recorded a significant difference at $p < 0.05$ between males and females, where males recorded higher level (56%) than females (44%) as presented in Table (1). Table (2) shows that the number of patients treated by extraction of one or more of their teeth were 130 patients which were less than the total number of the examined sample 225.

Table (1): Distribution of the sample.

	Gender	Number of patients	%	X^2	P – value
Pedodontic patients	**Male**	185	59.7	11.61	< 0.001
	Female	125	40.3		
	Total	310	100		
Preventive ptients	**Male**	25	38.5	3.46	> 0.05
	Female	40	61.5		
	Total	65	100		
Total	**Male**	210	56.0	5.4	< 0.05
	Female	165	44.0		
	Total	375	100.0		

X^2 = Chi Square factor; df = 1. Significant difference at $p < 0.01$; No significant difference at $p > 0.05$.

Table (2): The number and percentage of the patients treated by extraction of one or more of their teeth.

	Number of patients	%	Number of extracted teeth	%
Patients treated by pedodontic students	70	53.8	152	67.6
Patients treated by preventive students	60	46.2	73	32.4
Total	130	100.0	225	100.0

Results also revealed that the age group 7–9 years demonstrated a large percentage of patients attending the clinic (30.7%) followed by the age group 10–12 years, when compared with the age group 3–6 years that showed the smallest percentage as presented in Table (3).

Table (3): Distribution of age group of patients with extraction treatment.

Age	Gender	Patients treated by pedodontic students		Patients treated by preventive students		Total	
		No.	%	No.	%	No.	%
3 – 6	**Male**	9	12.9	2	3.3	11	8.5
	Female	5	7.1	6	10.0	11	8.5
7 – 9	**Male**	25	35.7	15	25.0	40	30.7
	Female	18	25.7	22	36.7	40	30.7
10 – 12	**Male**	5	7.1	6	10.0	11	8.5
	Female	8	11.4	9	15.0	17	13.1
Total		70	100.0	60	100.0	130	100.0

The most frequent cause of extraction among primary teeth was the periapical problems (60.7%) then followed by the time for shedding (12.3%), while the less frequent cause was due to trauma (3%) which is shown in Table (4) and Figure (1).

Table (4): Distribution of primary tooth extracted by causes and tooth type.

Causes	Tooth type											
	Central incisor	%	Lateral Incisor	%	Canine	%	1st molar	%	2nd molar	%	Total	%
Periapical problem	20	74.1	11	47.8	6	37.5	38	65.5	24	61.5	99	60.7
Orthodo–ntic treatment	1	3.7	3	13.0	7	43.7	4	6.9	2	5.1	17	10.4
Retained primary tooth	0	0	5	21.8	3	18.8	0	0	6	15.4	14	8.6
Failed pulp treatment	0	0	0	0	0	0	5	8.6	3	7.7	8	5.0
Trauma	3	11.1	2	8.7	0	0	0	0	0	0	5	3.0
Shedding time	3	11.1	2	8.7	0	0	11	19.0	4	10.3	20	12.3
Total	27	100	23	100	16	100	58	100	39	100	163	100
X^2	48.4		11.9		25.0		110.4		76.1		223.2	
P – value	<0.001		NS		<0.001		<0.001		<0.001		<0.001	

df = 6**;** X^2 = Chi Square factor. Highly significant difference at P < 0.001

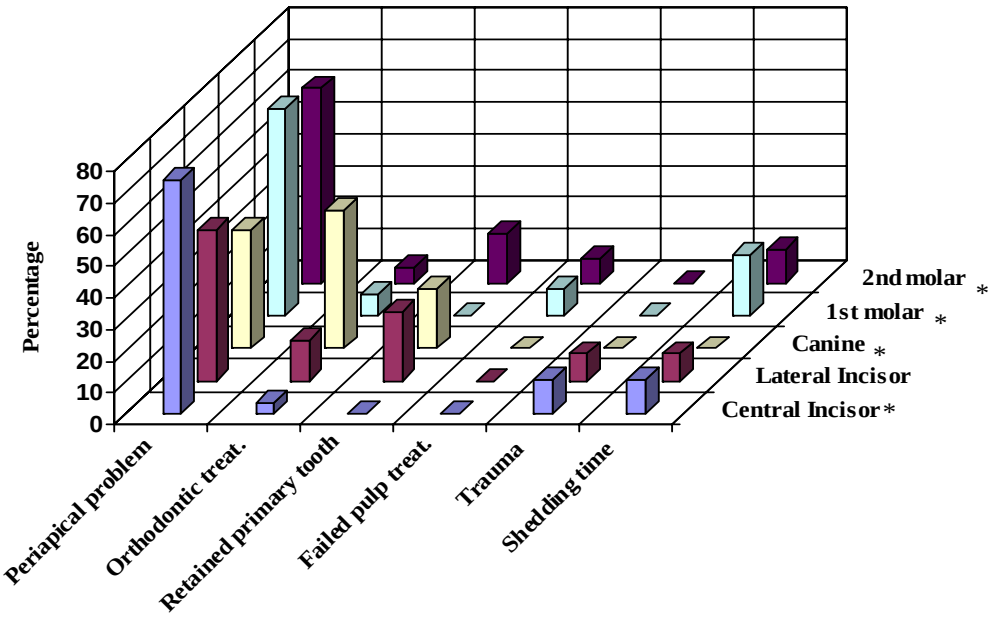

Figure (1): Distribution of primary tooth extracted by causes and tooth type. *****Significant difference among causes at P < 0.001.

For permanent teeth results proved that orthodontic treatment had the greatest value (59.8%) followed by the periapical problems (20.9) and the smallest value was extraction due to trauma (4.8), as can be seen in Table (5) and Figure (2).

Table(5): Distribution of permanent tooth extracted by causes and tooth type.

Causes	Tooth type															
	Central Incisor	%	Lateral Incisor	%	Canine	%	1st pre-molar	%	2nd premo-lar	%	1st mo-lar	%	2nd mo-lar	%	Total	%
Periapical problem	4	40	1	50	0	0	0	0	0	0	6	54.5	2	100	13	20.9
Orthodon–tic treat-ment	0	0	0	0	0	0	27	100	10	100	0	0	0	0	37	59.8
Failed pulp treat-ment	3	30	1	50	0	0	0	0	0	0	5	45.5	0	0	9	14.5
Trauma	3	30	0	0	0	0	0	0	0	0	0	0	0	0	3	4.8
Total	10	100	2	100	0	0	27	100	10	100	11	100	2	100	62	100
X^2	3.6		2		0		81		30.0		11.2		6.0		43.0	
P – value	NS		NS		0		<0.001		< 0.001		< 0.05		NS		< 0.001	

df=3**;** X^2 = Chi Square factor. Significant difference at P < 0.05 or <0.001.

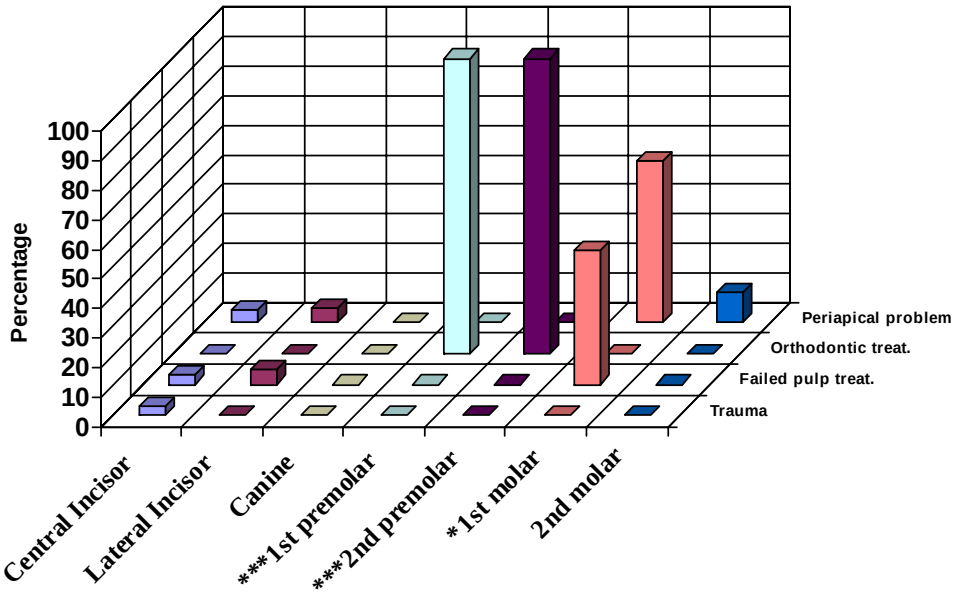

Figure (2): Distribution of permanent tooth extracted by causes and tooth type.
*****Significant difference at $p < 0.05$ and at *** $p < 0.001$.

Statistical results recorded a highly significant difference at $p < 0.001$ between the cause and the type of extracted tooth, as extraction of primary teeth due to periapical problem was 60.7% when compared with that for permanent teeth (21.9%), regarding extraction due to orthodontic treatment, also a highly significant difference at $p < 0.001$ was found between the primary teeth (10.4%) and the permanent teeth (59.7%), which is demonstrated in Table (6).

Table (6): Number and percentage of causes and type of extracted tooth.

Causes	primary tooth	%	permanent tooth	%	Total	%	P – value
Periapical problem	99	60.7	13	21.0	112	49.8	< 0.001
Orthodontic treatment	17	10.4	37	59.7	54	24.0	< 0.001
Retained primary tooth	14	8.6	–	–	14	6.2	
Failed pulp treatment	8	4.9	9	14.5	17	7.6	< 0.05
Trauma	5	3.1	3	4.8	8	3.6	NS
Shedding time of primary tooth	20	12.3	–	–	20	8.8	
Total	163	100.0	62	100.0	225	100.0	

df=1; Significant difference at P < 0.05 or < 0.001.

DISCUSSION

The larger presentation of males than females to the dental clinic for treatment as shown in Table (1) may indicates that boys are more cooperative than girls. The number of patients treated by extraction was less than the total number of the examined sample as presented in Table (2) this was in agreement with Boley [13] who indicated an increase in the number of children attending for dental care and prophylaxis treatment more than children attending for extraction treatment. The age groups 7–9 and 10–12 years occupied the larger percentage of total patients attending the dental clinic as revealed in Table (3), this come in accordance with the results reported by Linden [14]. This finding may be due to more cooperation of the child in these age groups, also the shedding time of the primary teeth occurs between 7–12 years which leads to a greater attendance rate, with the fact that the age group 8–10 years is the ideal age for serial extraction as an orthodontic treatment [15]. The most frequent cause of extraction among primary teeth was the periapical problems as shown in Table (4) and Figure (1). A deep carious lesion was the potential cause that leads to either destruction and fracture of tooth structure and the end result will be a retained root or the carious lesion may continue through the pulp to reach the periapical area and the end result will be periapical tissue diseases. Therefore, caries is considered the major cause of extraction in this study and this is in agreement with the findings reported by other researchers [16,17].

Extraction due to orthodontic treatment occupied the higher value in permanent teeth extraction as demonstrated in Table (5) and Figure (2). This finding is in agreement with Barclay [18]. The high rate of orthodontic attendance may indicate an increase in the number of specialists involved in the child dental care, an increase in the dental health education and an improved attitude of the general public to dental care. Extraction due to periapical problems recorded a highly significant difference between primary and permanent teeth as presented in Table (6) and this is in agreement with the findings of Otuyemi and Ndukwe [19]. The differences found between primary and permanent dentition is related to the age of the patients involved in this research (3–12 years), which had a direct effect on the results making the primary teeth extraction more than permanent teeth because the whole life span of primary teeth will pass through this period including the time of their exfoliation either by normal shedding or by extraction, and including all problems related to primary teeth that require extraction treatment as retained root and deep carious lesion associated with periapical problems; all these factors will increases the incidence of extraction of primary teeth, while the permanent teeth are still newly erupted and need to be preserved for many years (except for the first permanent molars and central incisors which erupt at younger age).

CONCLUSIONS

It's important to understand how tooth loss occurs and take steps to prevent it through education, early diagnosis and regular dental care. In this study the number of patients treated by extraction was less than the total number of patients attended for dental care and restoration or prophylaxis treatment. Dental caries and it is sequelae were the main cause of primary tooth extraction, where as orthodontic purpose was the main cause for permanent tooth extraction. Primary teeth extraction possessed higher value than permanent teeth extraction value with the maximum age group being at 7–9 years.

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