Reasons and Pattern of Tooth Extractions among 2-16 years old Dental Patients in Maiduguri: A Retrospective Study

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ABSTRACT

Objective: The study aimed to determine the reasons and pattern of tooth extractions among 2-16 years old dental out-patients in Maiduguri.

Methods: The study was cross-sectional and retrospective. The study population consisted of children aged 2-16 years who had at least one tooth extracted over a period of two years at Child Dental Health Department of University of Maiduguri Teaching Hospital. Ethical clearance was obtained from University of Maiduguri Teaching Hospital Ethical Committee. Record of patients seen from January 2018 to December 2019 were retrieved using a pro-forma. Information obtained included: patient's age, gender, indication for the extraction and tooth extracted.

Results: A total of 340 teeth from two hundred and forty-four children were included in the study. 169 teeth from males and 171 teeth from females. The mean age of subjects was 8.76 ± 2.785years. Dental caries and complications was the leading reason for extraction (50%), followed by orthodontic reason, 129 (37.9%) and then trauma, 16 (4.7%). More primary teeth (311) were extracted than their permanent counterpart (29). The mandibular right first primary molar tooth was the tooth mostly extracted.

Conclusion: The study revealed that there is need for improved oral health awareness and oral health promotion to prevent early tooth mortality.

Keywords: Extracted teeth, aetiology, pattern, North-East Nigeria

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INTRODUCTION

The overarching reason behind treatment of primary and permanent teeth is to preserve them from premature loss as they help in the development of dental arches, guiding normal occlusion and speech development. Healthy dentition allows for effective mastication, good aesthetics and optimum quality of life. The primary teeth guide eruption of permanent teeth therefore their premature loss adversely affects permanent teeth eruption which may be accompanied by tilting, drifting or non-eruption of adjacent or succedaneous teeth and resultant malocclusion.

Extractions in primary or permanent dentition could be necessitated by various reasons including dental caries along with its complications, trauma, periodontal disease orthodontic reasons etc. Extraction can also occur due to lack of resources to provide adequate restoration, and patient's informed choice[1].

Extraction of permanent teeth may lead to inefficient mastication, detraction from good aesthetics, malocclusion and defects in speech that often lead to psychological issues[2,3]. Correction of fully established adverse effects of extraction are usually difficult and are very costly[3] .

Efforts have been made over the years to determine the aetiology and pattern of tooth extraction in many countries. In Nigerian some sporadic and regionally conducted studies[4-7] have been done as attempts to determine the causes and pattern of teeth extraction among children with varied results. Most of the studies were done in the south west Nigeria[2,4,5] and are inadequate to be generalized for the whole country which is vast and diverse. Aetiology and pattern of tooth extraction varies from place to place and it is essential to determine the picture in populations for planning and execution of health services.

The North eastern geopolitical zone in Nigeria is an area with its own peculiarities and health challenges with Maiduguri metropolis being the major hub of activities in this zone. There is a need for information on the causes and pattern of teeth extraction among the children in Maiduguri, Borno State in order to make out strategies to reduce tooth mortality and plan oral health activities. Knowledge of aetiology and pattern of extraction in a community provides information about prevalence of dental diseases, access to dental care and attitudes towards mortality of teeth[3]. The study aimed to determine the reasons and pattern of tooth extractions among 2-16 years old dental patients in Maiduguri.

MATERIALS AND METHODS

The study was cross-sectional and retrospective. The study population consisted 244 children aged 2-16 years who had at least one tooth extracted over a period of two years at Child Dental Health Department of University of Maiduguri teaching hospital. Ethical clearance was obtained from the University of Maiduguri Teaching Hospital Ethical Committee. Record of patients seen from January 2018 to December 2019 were retrieved from patient records. Information retrieved included: Patient's age, gender, indication for the extraction and tooth extracted. The Extracted teeth were recorded with Federation Dentaire Internationale (FDI) nomenclature. The Data obtained were entered in a specially prepared form and also entered into the computer.

Data was analyzed using Statistical Package for Social Sciences (SPSS Inc. Chicago Illinois, USA) statistical software version 16. Descriptive and comparative statistics of teeth loss and the type of tooth removed among age groups were subjected to statistical analysis. The level of significance was set at $P \leq 0.05$.

RESULTS

A total of 340 teeth from two hundred and forty four children were involved in the study. One hundred and sixty nine (169) teeth from males and 171 teeth from females (table 1). The ages of the children ranged from 2-16 years with the mean age being 8.76 ± 2.785. Table 2 shows the indications for extraction and the nature of teeth extracted. A total of 340 teeth were extracted for different reasons during the study period giving an average tooth loss of 1.39 per patient. Dental caries and complications accounted for the majority (50%) of the extracted teeth, orthodontic reason accounted for 129 (37.9%) and trauma 16 (4.7%). More primary teeth (311) were extracted than their permanent counterpart (29). Dental caries was the most common cause of tooth loss in both primary and permanent dentition while Orthodontic reason was the second major cause of extraction in both primary and permanent teeth. Trauma is the next after orthodontic reasons. The other indications are as shown in the table 3

The lower jaw (64.1%) had more teeth extracted than the upper jaw (35.9 %). Less anterior teeth were extracted in the permanent teeth than the posterior teeth. The primary teeth also exhibited more extractions at the posterior regions that the anteriors.

The extracted primary teeth were related to the age groups in Table 4 and 5. In the age group 2-5 years the most extracted deciduous teeth were the primary upper right central incisor. In the age group 6-10, the teeth lower right primary first and second molars (84, 85) and lower left primary first molar and lateral incisors (74, 72) were the teeth that had most extraction done. In the age group 11-16 the tooth that accounted for most extraction is lower left primary second molar 75 while the age group 6-10 (mixed dentition) had the highest number of extractions done in comparison with other age-groups. The mandibular right first deciduous molar tooth had most extractions in which thirty one were extracted for various reasons followed by the lower left second deciduous molars with twenty eight extractions.

The result from this study showed that there was a significant difference between the indication for extraction in the primary and permanent teeth with p value of 0.002 at $p \leq 0.05$ confidence interval. There is also a significant difference in the reasons of extraction in the maxilla and the mandible with p value of 0.00 at $p \leq 0.05$ confidence interval.

The study revealed that there was a significant difference in the type of teeth extracted in the primary dentition and the permanent dentition with p value of 0.00 at $p \leq 0.05$ confidence interval. Equally the study revealed that there is a significant difference in the type of tooth extracted in the maxilla and the mandible with p value of 0.000 at $p \leq 0.05$ confidence interval. Significant difference was seen between the teeth extracted and the age group patient belong to as represented with a p value of 0.000 at $p \leq 0.05$ confidence interval

Table 1: Frequency distribution of Gender and Jaw of extraction

Gender	Maxilla n(%)	Mandible n(%)	Total n(%)
Male	58(17.1)	111(32.6)	169 (49.7)
Female	64 (18.8)	107(31.5)	171(50.3)
Total	122(35.9%)	218(64.1)	340(100.0)

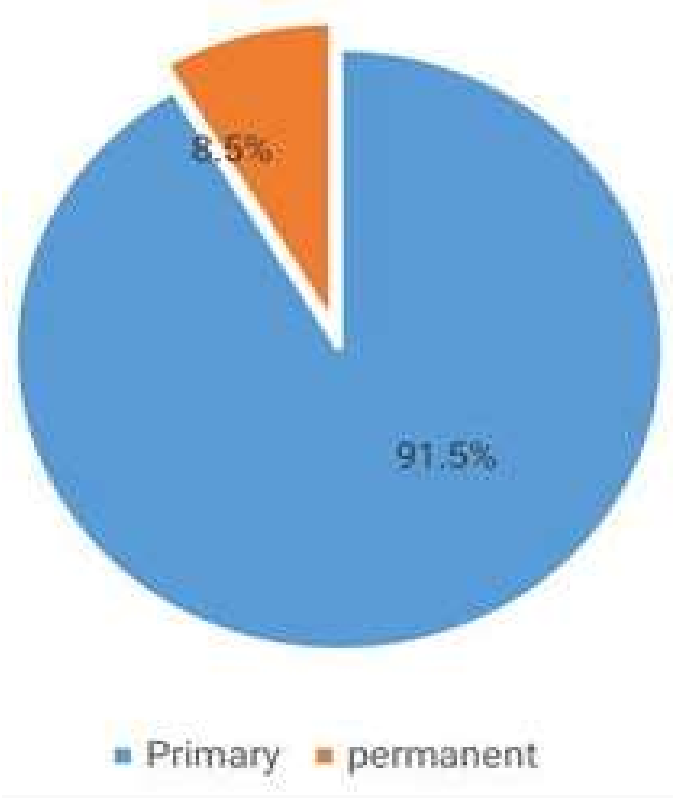

Figure 1: Type of Dentition extracted (primary/ permanent) in percentages

Table 2: Frequency distribution of Reason for extraction

Reasons for Extraction	Frequency (n)	Percent (%)
caries and complications	170	50.0
Trauma	16	4.7
orthodontic reasons	129	37.9
failed restoration	10	2.9
Supernumerary	1	0.3
periodontal lesion	3	0.9
retained tooth/root	10	3.0
Others	1	0.3

Table 3 Frequency distribution of reason for extraction and type of dentition

Reasons for extraction	Type of dentition		Total	P-value
	Primary	Permanent		
Caries and complications	149	21	170	0.002
Trauma	14	2	16	
Orthodontic	126	3	129	
failed restoration	9	1	10	
Supernumerary	0	1	1	
periodontal lesion	2	1	3	
retained tooth/root	10	0	10	

Others	1	0	1
Total	311	29	340

Table 4: Primary teeth extracted and age ranges (maxillary)

Extracted teeth (primary)	2-5years	6-10years	11-16years	Total	P-value
51	6	16	1	23	0.000
52	1	5	1	7	
53	0	3	3	6	
54	1	11	1	13	
55	0	10	3	13	
61	3	9	0	12	
62	1	4	0	5	
63	0	2	0	2	
64	1	11	3	15	
65	0	12	7	19	

Table 5 Primary teeth extracted and age ranges (mandibular)

Extracted teeth (primary)	2-5	6-10	11-16	Total	P-value
71	3	15	0	18	0.000
72	0	17	3	20	
73	0	5	1	6	
74	2	21	4	27	
75	3	14	11	28	
81	5	11	0	16	
82	2	13	2	17	
83	0	4	1	5	
84	4	24	3	31	
85	4	15	7	26	

Table 6: Permanent maxillary extracted teeth and age ranges

Extracted permanent maxillary teeth	2-5years	6-10years	11-16years	Total extractions	P-value
14	0	0	1	1	0.001
16	0	0	3	3	
22	0	0	1	1	
26	0	0	3	3	

Table 7: Permanent mandibular extracted teeth and age ranges

Extracted permanent mandibular teeth	2-5years	6-10years	11-16years	Total extractions	P-value
33	0	0	1	1	0.000
34	0	0	1	1	
36	0	1	7	8	
37	0	0	1	1	
41	1	0	0	1	
46	0	2	8	10	

Table 8: Distribution of reasons for extraction and the Arch of extraction

Reasons for extraction	Maxilla(n)	Mandible(n)	Total (n)	P-value
Caries and complications	64	106	170	0.000
Trauma	14	2	16	
Orthodontic	34	95	129	
Failed restoration	2	8	10	
Supernumerary	1	0	1	

Periodontal lesion	2	1	3
Retained tooth/root	5	5	10
Others	0	1	1
Total	122	218	340

DISCUSSION

The different age groups considered in this study are 2-5 years, 6-10years and 11-16years with each group having some peculiarities to them. In the age group 2-5 years children mostly have primary dentition. This study revealed that the most extracted teeth were the primary incisors in both the upper and lower jaws followed by the lower primary molars. The reason for extraction of the primary incisors in this age group were probably due to severe trauma. This could be because they are yet to perfect how to walk well and their unsteady steps predispose them to trauma[7]. This age group leads into the mixed dentition stage where the permanent incisors will succeed the primary ones. The primary incisors may sometimes be retained or permanent erupting lingually leading to crowding especially in early tooth-erupters and prompting the extraction of the primary incisors most times. This age group is also the time the children start going to nursery schools and they do take lots of refined sugar based snacks and drinks that predispose them to development of early childhood caries that do involve the upper incisors and the primary molars. Late presentation of patients or untreated carious teeth leading to complications mostly result in extraction of the incisors and primary molar teeth.

The age group 6-10 years had the highest number of extractions done in comparison with other age-groups. Here children are in the mixed dentition stage and this follows immediately after the primary dentition making the patterns and habits acquired to persist and the teeth most extracted are similar. The primary incisors in both upper and lower jaws were similarly the most extracted followed by the primary molars. The lower right primary first and second molars (84, 85) and lower left primary first molar and lateral incisors (74, 72) were the teeth that had most extractions done. The increase in the number of teeth extracted in this age group maybe as a result of presence of prolonged retention of some primary teeth, and presence of untreated carious teeth. The lower primary molars, which are the last to be exfoliated among primary teeth and the first permanent molars being the first among the permanent teeth tend to have longer tenures in the mouth and are likely to be affected by dental caries which could progress to cavitation and other sequelae and eventually get extracted.

In the age group 11-16 the lower primary molars had most extractions followed by the primary incisors. The permanent molars were also extracted here but less frequently. There were a number of extractions done due to orthodontic reasons in order to prevent or reduce severity of malocclusion. This might be as a result of some retained primary teeth that had to be extracted. The extraction of the teeth could also be due to dental caries.

The number of females 171 (50.3%) in the study was a little more than the males 169 (49.7%) as seen in Table 1. This result is in line with studies[7, 8] that reported having more females than males. The preponderance of females in paediatric extraction audits have been attributed to parents and guardian caring so much for the female gender that they usually take them for care more often. The female gender tends to be accustomed to consumption of refined sugar based food and beverages more frequently[8] making them having more carious teeth that may often need to be extracted.

The lower jaw (64.1%) had more teeth extracted than the upper jaw (35.9 %) and this was mostly as a result of dental caries and its complications. There is a significant difference in the type of tooth extracted in the maxilla and the mandible with p value of 0.000 at $p \leq 0.05$. The teeth most associated with extractions are in the lower jaws and are posterior teeth, the primary and the permanent molars. The reason for this could be associated with the location of the teeth in posterior region which might sometime not be easily accessible for cleaning. Also, presence of pits and fissures in posterior teeth serve as stagnation areas for plaque and food debris that make them susceptible to caries.

Some reasons for extraction have been suggested by previous researchers such as caries and its complications, trauma necessitating tooth removal, and orthodontic reasons to prevent or correct malocclusion.[4,8] Other reasons may include periodontal disease, failed restoration,

supernumerary tooth and retained roots[6]. Children often require teeth removal due to any of the aforementioned reasons and thus present to dental clinics. The children between the ages of 2-16 years old form the majority of children seen at paediatric dental clinics for various treatments including extractions. Discovery of the reasons and pattern of extraction of the primary or permanent teeth among children could help in planning preventive programmes and better management of cases in the clinics.

Studies[4, 8] in the past have suggested caries and periodontal disease as the main reasons for extraction of teeth in children and adults however this picture has changed over time. Based on the result of this study some variation can be noticed in the pattern of extraction in our community. Majority of the children who had extraction done in this study was due to dental caries and its complications as it accounted for half of all the extracted teeth. This is in conformity with what has been reported in previous Nigerian studies[2, 5]. Dental caries has been noted to be on an increasing trend in developing countries due to increased consumption of cariogenic diets along with poor oral health awareness and lack of adequate access to oral healthcare services[9]. It has been noted that refined sugars are now more affordable and accessible to most children even if their parents are not wealthy as the cariogenic substances are now being made locally[2]. The habit of taking lots of sugar based diets along with poor attitudes and poor oral hygiene has been linked to incidence of carious lesion in populations [2]. In spite of efforts towards increasing oral health awareness, many people are still ignorant of their oral health and individuals with caries do still patronize quacks or present late to clinic when restorative treatment might not be feasible[8]. This makes extraction due to caries to still be most common reason for tooth mortality. The teeth mostly extracted due to carious lesion are the lower molars in both the primary and permanent dentition. This may be attributed to some factors which include location, anatomical features of molars and their duration of stay in the mouth. Lower molars are located to the back which is prone to debris stagnation and there might be challenge of access for cleansing. Their occlusal surfaces morphology also features pits and fissure that could encourage stagnation of food debris thereby making make them prone to dental caries. The lower primary molars being the last to be exfoliated among primary teeth and the first permanent molars being the first among the permanent teeth to erupt do stay long enough in mouth for dental caries activities. Furthermore. gravity encourages food debris accumulation in the lower jaw more. Each of these factors could individually or collectively be responsible for having lower molar teeth extracted.

This study showed that the second reason for extraction in Maiduguri was orthodontics due to malocclusion and this accounted for 37.9% of the extraction done. This finding is in agreement with what was reported by Esan et al [2] but contrasted with findings of Odusanya[4] that reported periodontal disease as the second most frequent reason for extraction among children in Nigeria. Teeth are often required to be removed to prevent or correct malocclusion and such extraction ranked second. This is probably due to several factors among which are increase in number of dental clinicians with postgraduate training and increase in number of specialists in child dental care in the study centre. The location of the hospital could also be contributory as it is located within the city centre with close proximity to the university quarters, hospital staff quarters and the government reservation quarters where largely educated people with better oral health enlightenment reside.

Trauma ranked third (4.7%) as a reason for extraction among Nigerian children in this study. Trauma has been reported to be among the major reasons for tooth loss among Nigerian children in south west Nigeria[2, 4]. Previous study on tooth extraction in North East Nigeria[2] reported trauma to be the second major cause of tooth loss among children after caries in both primary and permanent dentition. The suggestion was that trauma was on increase due to the use of motorcycle which had been implicated in several road traffic accidents[2]. Tricycle has replaced motorcycles, banned for insecurity reasons but tricycles too are involved in road traffic accidents leading to trauma to teeth and orofacial structures. The teeth mostly susceptible to trauma are the upper incisors both in the primary and permanent dentition especially due to increased proclination and / or incompetent lips. Severely traumatized and unrestorable anterior teeth may require extraction.

More primary teeth (311) were extracted than their permanent counterpart (29) in this study and this is usually the pattern in most studies[5, 7] The reason for this may be due to large number of retained primary teeth usually extracted for orthodontic reasons to prevent or reduce effect of malocclusion. It might also be as a result of poor attitude to caring for affected primary teeth by parents and guardians with assumption that they may not need to bother much

about primary teeth as they may soon be shed off. They thereby present only when complications arise. In this study less anterior teeth were extracted in the permanent teeth than the posterior teeth. Similar report has been made in most studies[7, 8]. Proper architecture and arrangement of teeth allow them to be self-cleansing. More posterior teeth extraction could have been influence by their location, morphology and gravity as previously described for lower molars. Gravity encourages food debris accumulation more around mandibular than maxillary molar teeth[8]

Permanent anterior teeth are very important for aesthetics and are usually not extracted. Patients and Clinicians will rather make efforts to restore the teeth as much as possible. The primary teeth also exhibited more extractions at the posterior regions that the anteriors. This picture is similar to the findings of Folayan et al.[5] however Esan et al[2] in their study reported more tooth loss at the anterior region and attributed this to be probably due to trauma. Children are mostly playful and are often involved with trauma to anterior teeth necessitating extraction of the teeth.

CONCLUSION

In this study, dental caries was the most common indication for tooth extraction in both primary and permanent dentition. This was followed by orthodontic reasons and then trauma. In the primary dentition, the mandibular right first primary molar had most extraction whereas in the permanent dentition the lower right first permanent molar was most frequently extracted. These extractions were mostly in the right quadrant of the lower jaw. There is need for oral health awareness on improved utilization of oral health services and oral health promotion to prevent early tooth loss

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Conflict of Interest

None declared

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