Nature and Pattern of Primary Teeth Extractions in a Tertiary Care Hospital Setting in South India

Abstract

Background: Many studies have been carried out on the prevalence of dental diseases in children although not much information is available regarding its outcome among Indian children. Aim: The aim of the present study was to analyze the type of primary tooth extracted and the reasons for the extraction among children attending a tertiary care hospital in the Southern part of India. Materials and Methods: The dental records of pediatric patients who had visited the dental clinic of a tertiary care hospital located in Tamil Nadu, South India from December 2013 to November 2016 were reviewed. Patients who underwent extraction of at least one primary tooth under local or general anesthesia were included in the study. Results: A total of 943 primary teeth were extracted from 447 patients over 3 years. The most commonly extracted tooth type was the first primary molar followed by the primary central incisor. Grouping by age, the most frequently extracted tooth type between 2 and 5 years was the primary central incisor, the first primary molar among the 6–9-year-old and the second primary molar among 10–15-year-old. The majority of primary teeth extractions were performed in the age group of 6–9 years. No significant gender differences were noted. The most common reason for extraction of primary teeth in children was dental caries. Conclusions: This study demonstrates a high prevalence of untimely primary teeth extractions in young children and dental caries continues to be the leading cause. It clearly reflects on the lack of infant oral health care, the inadequacy of awareness and underutilization of oral health services among children in India.

Keywords: Extraction, primary teeth, reason, tooth type

Introduction

The oral disease continues to be a major public health burden across the world despite the efforts being made to improve oral health. Interestingly, a recent report suggests that the number of tooth extractions carried out in children are alarmingly on the rise. Premature tooth loss, a common problem, is defined as “the loss of a deciduous tooth before the time of its natural exfoliation.”[1] Evidence suggests that dental diseases such as caries and periodontal diseases and trauma remain the primary cause for the early loss of teeth among all age groups.[2–4] With the loss of teeth, the quality of life and nutritional intake of a person is often affected, thus tooth loss may be considered a good indicator of the oral health status of an individual or community. It is therefore important to understand the various causative factors for tooth loss and develop strategies to prevent it.

In developing countries including India where access to oral health services is limited, diseased teeth are most often left untreated or extracted.[2] Extraction of primary teeth is one of the most frequent procedures performed in pediatric dental clinics. Dental caries, periodontal disease, trauma, and orthodontic considerations are some of the common reasons for primary tooth extraction.[3] While a number of studies have investigated the rates and reasons for extraction of permanent teeth,[5–8] there are only a few which have focused on primary teeth.[3,8–11] Mukhopadhyay and Roy investigated the reasons for primary tooth mortality in a population in Eastern India,[12] however there are no similar studies from other regions of India.

The aim of this study was to investigate the frequency of the primary tooth type extracted and the reasons for extraction of primary teeth in children.

Materials and Methods

This hospital-based retrospective study was carried out by reviewing the dental
records of pediatric patients who had visited the Christian Medical College Hospital, Vellore between December 2013 and November 2016. The electronic dental records and data of those patients who underwent extraction of primary tooth/teeth were collected. Children between the ages of 1–15 years who had undergone an extraction of any primary tooth either under local anesthesia or general anesthesia were included in the study while those with incomplete dental records were excluded from the study. The study was conducted after obtaining approval from the Institutional Review Board.

The following patient data were recorded as follows: hospital record number, place and date of birth, gender, medical history, age at which extraction was done, radiographic/dental diagnosis and type of the primary tooth extracted, age and date of extraction, and the indication for extraction. Based on the Kay and Blinkhorn classification, reasons for tooth extraction were categorized into caries (primary and secondary caries plus all sequelae including periapical abscess and failed pulpotomy), orthodontic (tooth removed to prevent or correct malocclusion), trauma (tooth extracted as a direct result of acute trauma), loss (tooth extracted because of its mobility; time for exfoliation), periodontal disease (loss of function, periodontal abscess, and pain), general medical reasons (prophylactic extraction), economic reasons (the tooth could have been saved, but the patient found treatment too expensive), over-retention (prolonged retention of primary teeth), patient/parent request (the tooth could have been repaired, but the patient/parent insisted on extraction), and other reasons (tooth extracted for reasons not encompassed by any of the above categories. The reason for the extraction was recorded however).

**Statistical analysis**

The data were entered into EPiData 3.1 and statistical analysis was performed using SPSS version 16.0 IBM (Bangalore, India). Mean and standard deviation (SD) were employed to describe continuous variables, such as age and number of teeth extracted while frequency distributions were obtained for categorical data. The Chi-square test was used to assess the significance of associations for categorical variables. The value of $P < 0.05$ was considered to be statistically significant.

**Results**

The study sample included a total of 447 patients of which 225 (50.3%) were male. The age of the patients ranged from 2 to 15 years with a mean of 8.2 years [Figure 1]. Almost half of the patients belonged to the Southern part of India (49.6%), 33.3% from the Eastern part of India and the remaining from the other parts of the country. In the study group, 28% had some underlying medical condition.

Four hundred and twenty-four patients (94.9%) underwent tooth extraction under local anesthesia, whereas 23 patients (5.1%) were treated under general anesthesia. Among those who underwent extraction under general anesthesia, the majority were children with special care needs. A total of 943 primary teeth were extracted from the study sample, and about half of the patients (50.6%) had more than two extractions. The mean number of teeth extracted was 2.11 (SD = 1.95) per patient.

The percentage distribution of tooth type extracted by age group is provided in Table 1. There was a statistically significant difference in the extraction of tooth type among the age groups ($P = 0.000$). The maxillary primary incisor was the most frequently removed tooth type among the 2–5 years age group, whereas the primary molar was the most commonly extracted in both 6–9 years and 10–15 years. The least frequently extracted tooth type was the primary canine. Among the teeth extracted, 35.8% were anterior, and 61.2% were posterior teeth; nearly 55.6% were maxillary teeth, whereas 44.4% were mandibular teeth. There was no significant difference in the extraction patterns between males and females ($P = 0.78$).

Dental caries (59%) was the single most common reason for extraction, followed by over retention (24.4%) and...
mobility (12%) [Table 2]. The primary reasons for early extractions in the younger age group were dental caries and trauma [Figure 2]. The percentage distribution of reasons for primary teeth extraction by tooth type is provided in Table 3.

**Discussion**

Dental diseases continue to be a major public health burden across the world despite the various preventive measures that have been initiated. Tooth loss in a selected region or population gives us an insight into the prevalent attitudes toward oral health as well as the availability and accessibility of oral health services. It is essential to understand the causative and contributory factors to plan and develop effective strategies to reduce tooth loss.\[7\]

Dental records of patients aged between 2 and 15 years over 3 years period were analyzed in the present retrospective study. Statistically significant differences were noted in the primary tooth type extracted according to age, though no difference by gender was noted. A similar observation was reported by Alsheneifi and Hughes, presumably due to the difference in the chronology of dental development.\[3\]

The most common tooth type extracted in the present study was the first primary molar, similar to the findings of Alsheneifi and Hughes and Ahamed et al.\[1,10\] This may be postulated to be due to the colonization of mutans streptococci on the pits and fissures and concave proximal surface of the molars than on the smooth surfaces.\[13\]

This study found a higher percentage of extraction of primary first molars (33.1%) as compared to primary second molars (28.1%), similar to findings reported by Ahamed et al. and Alamoudi.\[10,11\] This could be due to the chronological age difference between these two teeth types; in addition the success rate of pulp therapy for the primary first molar is generally considered to be low while the second primary molar is often preferentially preserved to maintain space.\[11\]

The most commonly extracted tooth type in the 2–5 years’ age group was the maxillary central incisors. Similar findings were also reported by Alsheneifi and Hughes and Mukhopadhyay and Roy and could be attributed to early childhood caries and trauma.\[3,12\] Regardless of the tooth type, dental caries was the predominant reason for extraction. This finding is similar to that described in another study from India\[12\] as well as elsewhere.\[3,13,14\]

Prolonged breast feeding, increased intake of sugars, delay in initiation of tooth brushing were the common risk factors noted among children with dental caries. Sixty percent of the study samples were distant patients, and the majority of the children with dental caries were previously treated with antibiotics elsewhere and without definitive dental treatment. This may be due to the fear and lack of experience among general dentists in treating the children or nonavailability of a pediatric dentist. Most of the carious lesions were extensive and could not be treated by pulp therapy and negative behavior of the child; although, a few extractions were done due to acute infection and failed pulp therapy. No extraction of carious teeth were done due to financial constraints or lack of time.

Dental extraction due to over-retention was more common than extractions secondary to mobility, unlike the findings reported by Alsheneifi and Hughes and Mukhopadhyay and

**Table 2: Reasons for extraction of primary teeth (n=943)**

| Reasons         | n (%)   |
|-----------------|---------|
| Caries          | 557 (59.1) |
| Orthodontic     | 3 (0.3)  |
| Trauma          | 13 (1.4) |
| Mobility        | 113 (12.0) |
| Over retention  | 230 (24.4) |
| Others          | 27 (2.9)  |

**Table 3: Distribution of reasons for primary teeth extraction (%) by tooth type**

| Reasons         | Central incisors (%) | Lateral incisors (%) | Canine (%) | First molars (%) | Second molars (%) |
|-----------------|----------------------|----------------------|------------|------------------|-------------------|
|                 | U                    | L                    | U          | L                | U                 | L                |
| Caries          | 44.4                 | 11.6                 | 45.7       | 6.4              | 17.1              | 28.6             | 81.8             | 86               | 68.2             | 73               |
| Orthodontic     | 0                    | 0                    | 0          | 0                | 2.9               | 7.1              | 0                | 0                | 0                | 0                |
| Trauma          | 0                    | 0                    | 0          | 0                | 0                 | 0                | 0                | 0                | 0                | 0                |
| Mobility        | 10.3                 | 0                    | 1.4        | 0.0              | 0                 | 0                | 0                | 0                | 0                | 0                |
| Over retained   | 18.8                 | 29                   | 12.9       | 12.8             | 25.7              | 25               | 6.4              | 7                | 6.8              | 7.5              |
| Others          | 24.8                 | 56.5                 | 37.1       | 76.6             | 45.7              | 32.2             | 10               | 4.2              | 22.7             | 16.5             |

U=Upper, L=Lower

**Figure 2: Distribution of reason for extraction by age group**
Roy.  The number of orthodontic extractions done was significantly lesser than the other studies. This highlights the inadequate knowledge and awareness in the community and underutilization of dental health services among the pediatric population. A significant number of patients from the Eastern part of India clearly shows a definite lack of dental services in this region.

Maxillary central incisors were the most common tooth type extracted due to trauma among 2–5 years age group. Flores had reported that the greatest incidence of trauma to the primary dentition occurs at 2–3 years of age when the child is learning to walk and developing coordination.  

The study had the following limitations. Given the tertiary care setting, the study sample comprised of children from diverse geographic regions of the country and did not represent a particular population or a specific area. The sample included children from urban and rural areas and all socioeconomic groups. Thus, our findings may reflect a range of geographical and racial factors, variations in cultural beliefs, attitudes toward dental health and availability of oral health services. The majority of the extractions carried out were on teeth that were symptomatic at the time of presentation, and this may have influenced the findings. The findings of this study should be interpreted with care as this was a hospital-based study.

This study provides an insight into primary tooth mortality among Indian children in all age groups. The high prevalence of premature loss of primary teeth reflects on the inadequacy of awareness regarding the importance of primary teeth among parents. There is a need to initiate infant oral health programs, effective school and community dental programs throughout India.

**Conclusions**

This study clearly indicates a lack of oral health awareness among parents and inadequacy of early preventive oral health services for children in India. The early loss of primary teeth in children in India was significantly high which could affect the overall well-being of a child. The most frequently extracted primary tooth type was the first primary molars and dental caries as the leading cause.

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**Conflicts of interest**

There are no conflicts of interest.

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