Pattern of Dental Extraction in Children in a Nigerian Tertiary Hospital

Abstract

Changes that occurred in the pattern of tooth extraction in the last 13 years among a population of children in Nigerian were studied. The result of this study was then compared to that of a past study done in the same institution 13 years earlier. Information on age, gender, and indication of tooth extraction was collected prospectively from 379 consecutive patients who visited the outpatient Pediatric Dental Clinic for the first time during the year 2002. Results showed tooth extraction due to caries decreased, while there was an increase in tooth extraction from an apparent increase in orthodontic treatment needs. Acute necrotizing ulcerative gingivitis (ANUG), a significant cause of tooth loss in the last decade, decreased significantly. The pattern of deciduous tooth loss also changed as more anterior teeth were lost for orthodontic reasons in this present study. The pattern of tooth loss in the permanent dentition remains very similar to that of the past study, though more premolars were lost in the present study. There appears to be an increasing need for tooth extractions in orthodontic treatment for this population of children. The focus of planned dental health care provisions, treatment policies, and training emphasis in child dental care may need to shift to addressing orthodontic needs.

Keywords: Tooth loss, children, orthodontics, dental caries


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Introduction

In the management of the child dental patient efforts are geared towards the preservation of both the 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. Tooth preservation is also very important so as to reduce the tendencies for extraction, which may cause unnecessary pain and dental fear.

The sequelae of tooth loss in the child may be particularly harmful, leading to drifting, tilting, and malpositioning of the adjacent and succedaneous tooth. When aesthetics is impaired as a result of tooth loss, further complications could arise such as psychological stress, disturbances in social interaction including peer group acceptance, and the development of negative self-esteem. The cost of correcting and managing these complications may further be a burden to the child and the parents.

Many studies have identified disease factors such as caries, periodontal disease, and trauma as major causes of tooth loss in children. However, there are also non-disease factors that are highly contributory to tooth mortality. These include ignorance, personal dental belief, socio-economic, and cultural factors. For example, in some parts of Africa teeth are deliberately removed for ritual and traditional purposes. Among Nigerian tribes, the practice of deciduous canine (usually the mandible) germinectomy is believed to guard against symptoms such as high fever, which may be associated with teething in children.

Despite the fact one of the main thrusts of the practice of pediatric dentistry is to preserve the teeth, there are always judicious reasons for tooth loss. This includes planned orthodontic treatment among others.

A number of studies have been conducted into the causes and pattern of tooth mortality in selected Nigerian populations. These studies include specific studies on the pattern of tooth extraction in pediatric dental clinics. These studies were, however, conducted over a decade ago. A lot of socio-economic changes have since taken place in the country among which is the increase in specialization and fields of medical practice in the country. In addition changes have occurred in the pattern of service provision for oral health care and in the oral hygiene status of the Nigerian population. These changes include the increased incorporation of oral health care services to the primary and secondary levels of health care delivery systems and the improvement in the knowledge, attitude, and practices of the general population in terms of nutrition, oral hygiene, and health care seeking behavior.

The present study, a follow-up study to one that was done in the same center 13 years ago, takes a look at changes that occurred in the pattern of tooth extraction in children in a tertiary referral centre over the period.

Methods and Materials

This study is a follow-up study to a previous one conducted at the Pediatric Clinic of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria 13 years ago. The clinic is located in a suburban area in the Southwestern geographical zone of Nigeria.

A convenient sample of 379 consecutive pediatric patients aged 0 to 16 years visiting the outpatient clinic for the first time during the year 2002 were recruited for the study. Unlike the old study, only patients who were attending the clinic for the first time were recruited for the study because the diagnosis and treatment plan for these patients are drawn up by consultants thereby increasing the reliability and validity of the diagnosis and treatment plan for each patient.

A comprehensive history was taken and clinical examination carried out on a dental chair under direct light illumination for each accompanied...
child. Where indicated, special investigations were planned to help make an accurate diagnosis and formulate a comprehensive treatment plan.

Information was recorded by one of the investigators in a specially prepared form and also in the patient’s case notes. Information recorded in the prepared form were the age and gender of the patient, diagnosis, and treatment received.

When the treatment received entailed having an extraction done, the number and type of tooth extracted were recorded.

Children with maxillofacial injuries and oral neoplastic lesions were excluded from the study. Also, children who came to the clinic unaccompanied by parents/guardian and from whom informed consent to participate in the study could not be obtained were excluded from the study. In addition an audit of the changes in the practice and service delivery at the center and in the regional hospital served was done.

Analysis was done using the SPSS for Windows Version 6. Descriptive and comparative statistics were used.

Results
Of the 185 patients in the study, 170 patients of the 379 consecutive patients recruited during the study period, 149 (39.31%) had carious teeth. Sixty-three (42.28%) patients with carious lesions had extractions during the study period along with 81 other children who had teeth extracted for other reasons. The ages of patients that had teeth extracted ranged from 1 to 16 years. The model age for tooth extraction was 6 years, mean (±SD) been 8.9 years ± 3.4 years. A total of 238 teeth were extracted.

There was a slightly higher proportion of males who lost their teeth. The difference was not statistically significant (1.3:1; x²=3.5; df=1; p=0.061) (Table 1).

Tooth loss was highest during the mixed dentition state. Significantly more anterior teeth were lost than posterior teeth (Tables 2 and 3).

Caries was the main reason for tooth extraction in this population of patients. Most of the teeth extracted were deciduous teeth (Table 4).

One hundred and ninety (79.8%) deciduous teeth were extracted; 108 (56.8%) were in the mandible and 82 (43.2%) were in the maxilla. Forty-eight permanent teeth were extracted; 32 (66.7%) were in the mandible and 16 (33.3%) were in the maxilla (Table 5).

Figures 1 and 2 show the jaw distribution of extracted deciduous teeth. More anterior and less posterior teeth were lost in the mandible and maxilla in comparison with the past study.

Figures 3 and 4 show the jaw distribution of extracted permanent teeth. In both jaws more premolars were lost in this study compared to the past study. Also, less central incisors were lost in this present study in comparison to the past study.

Table 6 shows the distribution of children according to number of teeth extracted. Of the 51 children that had multiple extractions, 22 were due to caries, 13 due to orthodontic reasons, 19 due to retained teeth, 2 due to trauma, and 1 each due to a dentigerous cyst or natal teeth. Seven of these children had more than one reason for multiple teeth extractions.

An audit of dental services in the region the clinic serves showed significant changes. There are now two additional tertiary referral centers in the region, though no specialized child dental care service is provided at these centers. Also, oral

| Table 1. Distribution of patients who undertook extraction by age and gender. |
|------------------------------|-----------------|-----------------|-----------------|
| **Age**          | **Male** | **Female** | **Total** |
| 0 – 5 years     | 14       | 5        | 19         |
| 6 – 10 years    | 52       | 49       | 101        |
| 11 – 16 years   | 15       | 9        | 25         |
| Total           | 81       | 63       | 144        |

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Table 2. Age distribution of patients in relation to type of tooth extraction.

<table>
<thead>
<tr>
<th>Age</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>14</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>22</td>
</tr>
<tr>
<td>6-12</td>
<td>44</td>
<td>37</td>
<td>27</td>
<td>22</td>
<td>19</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>173</td>
</tr>
<tr>
<td>13-16</td>
<td>1</td>
<td>1</td>
<td>9</td>
<td>2</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>20</td>
<td>4</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>40</td>
<td>38</td>
<td>26</td>
<td>23</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>34</td>
<td>4</td>
<td>-</td>
<td>238</td>
</tr>
</tbody>
</table>

A = Primary central incisor  
B = Primary lateral incisor  
C = Primary canine  
D = Primary first molar  
E = Primary second molar  
1 = Permanent central incisor  
2 = Permanent lateral incisor  
3 = Permanent canine  
4 = Permanent first premolar  
5 = Permanent second premolar  
6 = Permanent first molar  
7 = Permanent second molar

Table 3. Age distribution of patients in relation to causes of tooth extraction.

<table>
<thead>
<tr>
<th>Age</th>
<th>Caries</th>
<th>Malocclusion</th>
<th>Retained deciduous</th>
<th>Dentigerous cyst</th>
<th>Trauma</th>
<th>Failed pulpotomy</th>
<th>Natal tooth</th>
<th>ANUG</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>22</td>
</tr>
<tr>
<td>6-12</td>
<td>45</td>
<td>64</td>
<td>52</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>173</td>
</tr>
<tr>
<td>13-16</td>
<td>27</td>
<td>7</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>77</td>
<td>64</td>
<td>2</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>238</td>
</tr>
<tr>
<td>(%)</td>
<td>(33.7)</td>
<td>(32.3)</td>
<td>(28.8)</td>
<td>(0.8)</td>
<td>(5.0)</td>
<td>(0.4)</td>
<td>(0.8)</td>
<td>(8.6)</td>
<td>(100.0)</td>
</tr>
<tr>
<td>Past study 17</td>
<td>508</td>
<td>19</td>
<td>121</td>
<td>-</td>
<td>73</td>
<td>-</td>
<td>-</td>
<td>140</td>
<td>872</td>
</tr>
<tr>
<td>(%)</td>
<td>(58.2)</td>
<td>(2.2)</td>
<td>(13.9)</td>
<td>(0.0)</td>
<td>(8.4)</td>
<td>(0.0)</td>
<td>(0.0)</td>
<td>(16.0)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

Table 4. Causes and nature of tooth extracted.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Deciduous teeth Number (%)</th>
<th>Permanent teeth Number (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caries</td>
<td>38</td>
<td>40</td>
<td>78</td>
</tr>
<tr>
<td>Malocclusion</td>
<td>32</td>
<td>45</td>
<td>77</td>
</tr>
<tr>
<td>Retained deciduous</td>
<td>64</td>
<td>-</td>
<td>64</td>
</tr>
<tr>
<td>Trauma</td>
<td>6</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ANUG</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Dentigerous cyst</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Natal tooth</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Failed pulpotomy</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>92</td>
<td>238</td>
</tr>
</tbody>
</table>

Table 5. Distribution of tooth extracted by arch and tooth type.

<table>
<thead>
<tr>
<th>Arch</th>
<th>Permanent teeth</th>
<th>Deciduous teeth</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandible</td>
<td>32 (13.4%)</td>
<td>108 (45.4%)</td>
<td>140 (58.8%)</td>
</tr>
<tr>
<td>Maxilla</td>
<td>16 (6.7%)</td>
<td>82 (34.5%)</td>
<td>98 (41.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>48 (20.1%)</td>
<td>190 (79.9%)</td>
<td>238 (100%)</td>
</tr>
</tbody>
</table>
**Figure 1:** Mortality distribution of mandibular deciduous teeth.

**Figure 2:** Mortality distribution of maxillary deciduous teeth.

**Figure 3:** Mortality distribution of permanent mandibular teeth.

**Figure 4:** Mortality distribution of permanent maxillary teeth.
health care services had been incorporated into the primary and secondary health care services in the medical institutions within the region. In terms of personnel, there were an increasing number of specialists manning the dental clinics in this region. In the institution where the study was conducted, there were now two qualified pedodontists and an orthodontist providing services at the center. There were no specialized personnel manning the clinic when the last study was conducted.

Discussion
Reports often conclude that tooth mortality is a reflection of the pattern of oral health diseases in the community. However, this may not be absolutely true as tooth mortality equally depends on a number of non-disease factors one of which is the types of services available for oral health care. Cultural and professional values also affect the practice of oral health care, especially in relation to tooth extraction.

The results of the present study reinforces this issue. With the increase in professionalism at the center, the quality of tooth management has improved. This equality translates to a decrease in tooth extraction. The previous study reported 50.8% of tooth extractions were due to caries. This follow-up study noted only 33.2% of tooth extractions were due to caries, which points to a decreasing incidence of tooth mortality from caries. This finding may, however, be due to a number of other reasons. The health seeking behavior of the general population had been noted to have improved and, thus, more patients may be presenting earlier to the dental clinics for the management of carious lesions. On the other hand, patients who visit the clinic may only be those who need more specialized management with possibly more extractions of carious teeth being done in the primary and secondary health care centers. The present study cannot provide a definite reason for this observation as the scope of the data collected for this study cannot possibly be used to evaluate the reason for this observation. Subsequent studies could possibly investigate this.

Other studies had reported caries as the main cause of tooth loss in Nigerian children. This still remains a major contributory factor to tooth loss in the present study. Caries continues to be a significant contributor to the number of teeth extracted because patients wait too long before reporting to the clinic for management. The specific reasons why these patients delay in reporting to clinics for treatment needs to be studied and understood so as to reverse this trend in addition to ongoing efforts to reduce the incidence of caries in the population.

This study also found a change in the causes of tooth extractions. Unlike past studies that showed periodontal disease as a second major cause of tooth loss in Nigerian children, the present study showed it took a low fifth place. Acute necrotizing ulcerative gingivitis (ANUG) was reported commonly in suburban communities like Ile-Ife where poverty and lack of knowledge prevailed. Its etiology has been related to the synergistic relationship between nutrition and the presence of the measles virus. An improvement was recorded in the national nutritional status of Nigerian children. This may be a reason for the low prevalence of ANUG in this population.
studied. Studies show the increase in knowledge of Nigerian mothers in rural areas has resulted in auspicious and judicious use of income to maximize the possible desirable benefits. The introduction of the baby friendly initiative and promotion of exclusive breastfeeding for the first 4-6 months of life of the child may have improved the nutritional health status of children and reduced the tendency for malnutrition. This, in turn, may have reflected in the decrease in the number of ANUG cases recorded in this centre over time.

A change in oral health seeking behavior was also possibly noted in this study. Thirteen years ago malocclusion accounted for only 2.2% of tooth mortality. However, in this present study malocclusion accounted for 31.9% of tooth mortality. It was noted in an earlier study by Otuyemi and Ndukwe that extraction for orthodontic reasons was low because of the low level of orthodontic practice in the country. The observations of this study in comparison to the previous study could be due to (1) the increase in the number of specialists involved in child dental care over the noted study period and (2) an improvement in the access of oral health care providers to materials and equipment that enhanced practice. Another important factor may be an increase in the knowledge and an improved attitude of the general populace to dental care. Esan showed that knowledge and practice of oral health care by the children within this same community could be rated as good. This was considerably different from what was observed a decade ago. Although this study did not try to assess the effect of the knowledge, attitude, and practices of these children on the pattern of tooth loss, this may be one of the multiple factors that does play a role in tooth mortality.

Trauma still remains a relatively important cause of tooth loss over the last 13 years. Otuyemi and Ndukwe tried to deduce the possible reasons for this: patients do not present themselves early for treatment. They wait until the condition has deteriorated and is no longer amenable to treatment. The reasons for trauma to dental hard tissue in Nigerian children has long been established. There is a need to design appropriate intervention programs that would help prevent further morbidity and mortality of teeth arising from trauma in this group of children.

Unlike in the past study, this present study recorded more anterior teeth extractions. Most of the deciduous teeth were lost in the mixed dentition stage as a result of malocclusion or the presence of a retained deciduous tooth. Also, like in the past study, the posterior teeth were most often lost in the permanent dentition. But, there were more premolars lost in the permanent dentition in this present study than in the past study. This is probably due to the increasing indication for tooth extraction from orthodontic treatment needs in both dentitions. In view of these observations emphasis for training and public enlightenment should be on the need for caries prevention and management in the deciduous and permanent dentition stage, while the focus would be on orthodontic management of the child during the mixed dentition stage.

Conclusion
In all the tendency for tooth extraction to occur in the dental clinic due to caries appears to be less than that reported in previous studies. Also, the pattern of tooth mortality in suburban Nigeria appears to be changing with decreasing tooth mortality arising from periodontal diseases and caries and increasing indication for tooth extraction arising from orthodontic treatment needs. The focus of planned dental health care provisions, treatment policies, and training emphasis in child dental care in this suburban area may, thus, need to shift towards orthodontics, which would address the treatment needs in addition to the need for caries prevention and treatment.
References

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