

Dental Treatment Needs among Children and Adolescents Residing in an Ugandan Orphanage

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Background: Previous studies focused on the dental caries status of East African children and not on their overall dental needs. Urban children consume more sugar-rich foods.

Objectives: To assess overall dental treatment needs of children living in an orphanage in Uganda. **Study design:** Teeth were diagnosed as needing treatment by obvious frank carious lesions (WHO criteria), temporary fillings, staining, or very deep pit and/or fissures possibly requiring sealants. Calculus or crowding in the mandibular anterior region and evidence of tooth fractures were recorded, as were signs of wear on the mandibular molars and canines and the maxillary incisors. **Results:** Most of the primary teeth (64%) required no dental treatment, but almost all (98%) of the permanent teeth did. A mean (\pm standard deviation) of 4.81 ± 1.92 permanent teeth required treatment. The mean number of missing teeth was 0.47. Thirty-one children (20.2%) had crowding, 52 (34%) had calculus, and 49 (32%) had signs of attrition on primary and permanent molar teeth (45 enamel only and 4 enamel and dentin).

Conclusions: Most of the primary teeth required no dental treatment, while the vast majority of permanent teeth did, possibly in association with high sugar cane consumption and poor brushing habits among older children.

Key words: Dental health, children, orphanage.

INTRODUCTION

There has been a constant increase in the prevalence and severity of dental caries in many countries around the globe. Higher dental caries scores (expressed as the DMFT index: Decayed Missing Filled Teeth) in urban areas compared to rural areas are often reported from developing countries, including those on the African continent, and pose a major problem for health authorities. These high DMFT scores are mostly reported among urban children,^{1,2} and may be attributed to their higher consumption of sugar-rich foods.^{3,4} In addition, both dental caries occurrence and frequency of sugar consumption were highest among children of less-well-educated mothers.⁵

Oral diseases were identified among the common diseases that interfere with schoolwork due to the fact that they tend to cause pain and discomfort, subsequently leading to absenteeism and poor performance.⁴ These effects on the level of performance of children in classrooms are recognized as problems of public health and socioeconomic concern.⁶

The urban/rural variation in dental caries occurrence and sugar intake among secondary school students is present in Uganda as well.⁷ A cross-sectional survey among 1146 adolescents aged between 13 and 19 years who were attending rural and urban schools revealed that a total of 80% of the students had a DMFT score >0 . The mean DMFT, DT, and MT scores for the sample were 2.9, 2.5, and 0.5. The mean frequency sugar consumption score

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was 2.6 times per day, and sugar consumption was higher among females and among students of highly educated parents compared to their counterparts in the low consumption groups.⁷

In another Ugandan study,⁸ dental caries (a DMFT score ≥ 1) was recorded in 40% of the children and 62.5% of the adults, and the overall mean DMFT score was 0.9 and 3.4, respectively. Dental caries was significantly more severe among female children compared to males ($P < 0.05$), whereas there was no significant gender difference among adults.⁸ Its occurrence was significantly higher in urban districts compared to rural districts in all age groups, with the decayed (D) component being the major contributor.

Another study that aimed to assess factors associated with dental caries among 18- to 62-year-olds in rural communities in Uganda found that the prevalence of dental caries (DMFT score > 0) was 57.3% and that the mean DMFT score was 2.3.⁹ The M component contributed 61% of those DMFT scores. The older participants were four times more likely to present with dental caries, and those who consumed snacks high in sugar content were 11 times more likely to develop dental caries compared to their counterparts. The participants who cleaned their teeth and those who visited dentists were less likely to have developed dental caries compared to their counterparts.

Laloo *et al.*'s study assessed the dental caries status of 5- to 7-year-old children in Tanzania, Uganda and Mozambique and demonstrated that 39% of the children were caries-free.¹⁰ Nalweyiso *et al.*'s work described normative dental treatment needs of 5- to 7- and 12-year-olds in a rural subcounty of Uganda: those authors found that 50.8% of the primary teeth of the 5- to 7-year-olds were caries free, with a mean DMFT score of 1.47, while 65.8% of the permanent teeth of the 12-year-olds were caries free, with a mean DMFT score of 0.64.¹¹

Previous studies focused specifically on the dental caries status of children in East Africa. The aim of the present study was to identify and assess the overall dental treatment requirements (including the need for pit and fissure sealants) of children and adolescents living in the Children's Home in the Bussi Island, Lake Victoria in Uganda.

MATERIALS AND METHOD

The study was approved by the Research Ethics Committee of Tel Aviv University. It has not been independently reviewed and approved by an ethics committee or institutional review board based in Uganda, in addition to the approval in Tel Aviv. Written informed consent was obtained from the director of the orphanage who was the legal guardian of the children, and the children and adolescents who agreed to take part in the study were enrolled.

The research has been conducted in full accordance with the World Medical Association Declaration of Helsinki. A voluntary mission of medical and dental staff spent three weeks (during September 2013) in the Children's Home. The dental student who participated in that mission and prospectively retrieved data for the current study was trained in identifying carious teeth. He first performed the clinical examination twice on 20 children (not included in this study) under similar conditions to those present in this study. In addition to detecting dental caries, he took special note of teeth which needed any dental treatment, including fissure sealants, as well as signs of calculus, crowding, erosion and attrition.

Sample

A total of 155 residents were living in the orphanage during the study period, and all but 2 consented to participate in the study. The age range of the participants was 5-17 years (mean age 12.17 \pm 2.64). There were 63 boys and 90 girls. The residents are served two meals a day (lunch and dinner) consisting of beans, local vegetables, bananas, pineapples and sugar cane. All the residents are provided drinking water, and some buy sweetened beverages in the neighborhood. There is no exact information about water fluoride levels in Bussi Island, although fluoride concentration in groundwater has been found to be optimal or high in many parts of Uganda.¹² A health clinic on the island provides general medical care, including dental extractions, by a general practitioner. No regular dental treatment is provided to the orphanage residents.

Clinical examination

The dental student provided instructions on oral and dental health care to all the children. Each resident received a toothbrush and a tube of toothpaste, and the dental examination was carried out after the participants brushed their teeth. Oral and dental examinations were carried out using disposable dental mirrors and sterile cotton rolls under natural sunlight or flashlight.

A tooth was considered present in the mouth when any part of it was visible or could be palpated with the handle of the mirror without unduly displacing soft tissue.⁶ Teeth were diagnosed as needing treatment or not on the basis of the identification of obvious frank carious lesions according to the WHO criteria,^{13,14} as well as on the presence of a temporary filling, stained or very deep pits and/or fissures which may have needed fissure sealants. No dental explorers were used since it was not possible to sterilize tools, and caries or treatment needs were determined only by sight. If a carious lesion was suspected, it was recorded as being present. Shallow pits and fissures were not scored as needing treatment.

Missing teeth were also recorded. To calculate the dental health status for the purposes of the current study, a missing tooth was added to the number of teeth needing treatment only if it had been extracted due to caries (by self-report). The presence of calculus and crowding in the mandibular anterior region, as well as evidence of tooth fractures were recorded in a yes/no manner.

The signs of wear on the mandibular molars and canines and on the maxillary incisors were recorded using the following criteria: 0 = no signs, 1 = light (enamel only), 2 = moderate (enamel and dentin), 3 = severe (loss of substantial tooth material).¹⁵

Statistical analysis

Data were analyzed utilizing a statistical package for the social sciences (SPSS) 15.0 software (SPSS Inc., Chicago, IL, USA). The *t*-test was used for comparing the scores of the dental treatment needs. The Mann-Whitney test was used for assessing the association between the non-parametric parameters.

RESULTS

No restoration was found in any of the examined participants. Table 1 shows the number of participants who needed dental treatment in their primary and permanent teeth and those who did not. All participants (153) had permanent teeth, while 50 of them had primary teeth as well. The majority of primary teeth (64%) did not need any dental treatment, in contrast to the vast majority of

the permanent teeth that did (98%). Table 2 summarizes the mean number of primary and permanent teeth which needed dental treatment among the study children. A mean (\pm standard deviation) of 0.3 ± 1.02 primary teeth needed treatment compared to a mean of 4.81 ± 1.92 permanent teeth. There was no gender difference for any of these variables.

The mean number of primary teeth that needed treatment was 2.61 ± 1.71 , and the mean number of permanent teeth that needed treatment was 4.81 ± 1.92 . Although there was a higher mean number of any teeth that needed treatment for the boys compared to the girls (5.08 ± 2.05 , and 4.63 ± 1.95 , respectively), the difference did not reach a level of significance. Table 3 lists the total mean number of teeth which needed treatment together with the missing teeth (5.58 ± 2.19). Subtracting the mean number of teeth which needed treatment from the total mean number of teeth which needed treatment together with the missing teeth revealed that the mean number of missing teeth was 0.47.

The findings regarding crowding and calculus in the mandibular anterior region and evidence of tooth fractures are given in Table 4. Thirty-one (20.2%) participants had crowding and 52 (34%) had calculus. No association was found between crowding and calculus in the mandibular anterior region. Only 11 participants (7.2%) had tooth fractures. There was no gender difference for any of these variables.

Table 1. The number of participants which needed and did not need dental treatment in their primary and permanent teeth.

Teeth	No treatment needed	Treatment needed
Primary (50 children), <i>n</i>	32 (64%)	18 (36%)
Permanent (153 children), <i>n</i>	2 (1.3%)	151 (98.7%)

Table 2. Number of primary and permanent teeth which needed treatment by gender

Gender	Primary teeth	Perma- nent teeth	Primary and perma- nent teeth
	Mean \pm SD	Mean \pm SD	Mean \pm SD
Boys (<i>n</i> = 63)	0.31 ± 1.02	5.08 ± 2.05	5.39 ± 2.11
Girls (<i>n</i> = 90)	0.30 ± 1.02	4.63 ± 1.95	4.93 ± 1.79
Total	0.30 ± 1.02	4.81 ± 1.92	5.11 ± 2.08

Table 3. Mean number of teeth which needed treatment or were missing, by gender

Gender	Mean \pm SD
Boys (<i>n</i> = 63)	5.87 ± 2.45
Girls (<i>n</i> = 90)	5.37 ± 1.98
Total (<i>n</i> = 153)	5.58 ± 2.19

Table 4. Number of teeth with crowding, calculus, and/or fractures, by gender

Variable	Boys	Girls	Total
Crowding, <i>n</i>	17 (11.1%)	14 (9%)	31 (20.2%)
Calculus, <i>n</i>	28 (18.3%)	24 (15.7%)	52 (34.0%)
Fractures, <i>n</i>	5 (3.3%)	6 (3.9%)	11 (7.2%)

Twenty-four teeth (15.7%) demonstrated signs of erosion. No association between erosion and caries was found. Signs of attrition on molar teeth (primary and permanent) were found in 49 children (32%), 45 on enamel only and 4 on both enamel and dentin.

DISCUSSION

The findings in our study show that the majority of children and adolescents residing in the Children’s Home in Bussi Island, Uganda with primary teeth (64%) did not need any dental treatment for their primary teeth in contrast to the vast majority of the participants with permanent teeth who needed treatment for their permanent teeth (98%). This high rate of caries-free primary teeth is in accordance with previous studies.^{4,8} The mean number of primary teeth needing treatment was 2.61 ± 1.71 . The relatively low scores for primary teeth are in accordance with previous studies which showed the mean DMFT to range between 0.15 to 2.7.^{4,6,11}

In contrast to the findings on primary teeth, only 2 children did not need any dental treatment on their permanent teeth (1.3%). The mean number of permanent teeth which needed treatment was 4.81 ± 1.92 . The findings in our study demonstrated much higher scores than previously reported for Uganda, which ranged from 0.64 to 1.5.^{4,6,8,11} However, it should be borne in mind that those studies looked at dental caries and we report the overall need for dental treatment, including pit and fissure sealants on deep or stained fissures.

The difference in treatment requirements for primary and permanent teeth may be explained by a number of causes:

- a. The extensive consumption of sugar cane over time and less brushing among the older participants.
- b. The greater vulnerability of permanent teeth compared to the primary teeth.¹⁶
- c. A combination of a and b.
- d. The high attrition rate of the primary dentition which flattened the occlusal surface and the pits and fissures, thus sparing them the need for treatment.

The permanent teeth of the boys had a higher mean number of teeth that needed treatment compared to those of the girls (5.08 ± 2.05 and 4.63 ± 1.95 , respectively, $P=NS$). This gender trend is in agreement with previous studies on caries status.

There were much fewer eroded teeth (15.7%) than what had been previously reported in a group of French 14-year-olds (39%).¹⁷ The low prevalence in our study may be attributed to the more limited consumption of soda drinks among the participants. We did not measure the presence of fluorosis and, as noted previously, the exact levels of fluoride in the drinking water of Bussi Island are not available. Since all residents of the Children’s Home used the same water and had similar eating habits, the participants in our study could be considered a homogenic group.

Crowding and calculus in the mandibular anterior region were found among 31 (20%) and 52 (34%) children, respectively, with no significant gender difference. There was no association between the 2 conditions.

Only 11 participants (7%) had tooth fractures. This prevalence is considerably lower than the 14.5% reported among a group of Indian 7- to 8-year-olds¹⁸ and the 27.3% among a group of Brazilian

children¹⁹, but higher than the 4.4% reported in a group of Turkish adolescents.²⁰

Several limitations of this study bear mention. The participants were all residents of one geographical location. In addition, we did not differentiate between the various types of required interventions (restorative treatment, extraction, endodontic treatment or pit and fissure sealants), but rather reported treatment needs as a whole.

CONCLUSIONS

In conclusion, the majority of the studied Ugandan children with primary teeth (64%) did not need any dental treatment in contrast to the vast majority of children and adolescents with permanent teeth who did (98%). The treatment needs for the permanent teeth of our participants was much higher than those for the primary teeth (4.81 and 0.30, respectively).

Why this paper is important to paediatric dentists

- This study addresses all the dental needs of a group of Ugandan children and adolescents, not just the caries status.
- Ugandan and health authorities of countries with comparable populations will be able to plan prevention/intervention programs for their dental care.

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