

ORIGINAL ARTICLE

Dental caries and extractions of permanent teeth in Jos, Nigeria

G.A. Chukwu, O.A. Adeleke, I.S. Danfillo, E.C. Otoh

Regional Centre for Oral Health Research and Training Initiatives (RCORTI) for Africa, Jos, Nigeria.

Summary

Objective: To determine the effect of tooth morphology and positioning on the occurrence of dental caries in permanent teeth. **Design:** Retrospective study. **Method:** Data was extracted from the case notes of patients that underwent extraction at the Plateau State Dental Centre, Jos, Nigeria from January 2000 to December 2001, as a result of dental caries and its sequelae. **Result:** 12696 patients attended the clinic, with a total of 11546-teeth extracted. 6145 (53.2%) permanent teeth were extracted due to caries and its sequelae within the period under review. The upper anteriors accounted for 3.2%, pre-molars 7.7% and molars 29.8% while lower anteriors accounted for 0.4%, pre-molars 3.3% and molars 55.6%. The upper anteriors were eight times more vulnerable to caries attack compared to their corresponding lower anteriors. The upper right (43.3%) and left (36.9%) first premolars were four times prone to losses due to caries compared to their corresponding lower right (11.5%) and left (8.3%) first premolars. Similar pattern was observed for the upper and lower second premolar ($P = 0.001$). The lower right (31.3%) and left (31.3%) first molar were about two times more susceptible to caries than their corresponding upper right (18.2%) and left (19.2%) first molar. The same trend holds for the second and third molars ($P = 0.000$). **Conclusion:** The result of this study revealed that the upper premolars were more susceptible to dental caries than the corresponding lower teeth. The study also revealed that the molars were most susceptible to dental caries and would benefit from the use of prophylactic pits and fissure sealants.

Key words: Tooth morphology, extraction, fissure sealant, caries

INTRODUCTION

Earlier studies on the causes of tooth morbidity and mortality among Nigerians and other African countries concluded that tooth loss was mainly due to periodontal diseases and dental caries, though dental caries was indeed to a lesser extent¹.

Recent studies have shown that the incidence of caries occurrence is on the increase in many developing African countries as refined sugar, sweet and fruit drinks have become more readily available². A National survey of dental caries status and treatment need in Nigeria reported a mean DMFT value of 0.7 1.3 and 2.5 for Nigerians aged 12, 15 and 35-45 years respectively.³ A more recent study reported a DMFT value of 2.00, 1.75, 1.45 and 1.00 in the children aged 12,

Correspondence: Dr. G. A. Chukwu

Regional Center for Oral Health Research and Training Initiatives (RCORTI) For Africa, (In collaboration with World Health Organization), No. 3 CBN Road, P.M.B. 2067, Plateau State, Jos, Nigeria. Tel: 234 73 463859, Fax: 234 73 462901, Email: gabrielo@email.com

13, 14 and 15 years respectively in South-South geopolitical zone and a corresponding value of 2.38, 4.43, 3.19 and 2.57 respectively in the North Central geopolitical zone.⁴ Though the overall mean DMFT for North Central geopolitical zone ranges between 2.57 and 3.43 among the 12-15 years, it was reported that some children had a mean DMFT as high as 11-16 in the area.⁴ Though these reports showed a low dental caries prevalence in Nigeria, the disease still constitute a major public health problem because of the size of the population and the low treatment ratio reported in all age groups.³ Though the incidence and severity of dental caries have been reported in Africans recently, the incidence of caries among the various tooth types vary considerably. The morphology, time of eruption and positioning of the tooth in the oral cavity confers an inherent disadvantage/advantage to the various methods employed in the control of plaque and hence tooth decay/losses. A related study conducted in Ile-Ife Nigeria¹ showed that the first molars accounted for 41.6% of all extractions due to caries, while the second molar accounted for 28.4%, third molar 14.5%, anterior teeth put together 3.8% and the premolars 11.8%.

The present study is aimed at identifying the tooth type most prone to caries and thus, to loss due to caries. The result will facilitate the development of an approach in treatments relevant to the problem and assist in addressing the oral health needs of the society¹, thus minimizing tooth loss.

MATERIAL AND METHOD

Jos is the capital of Plateau State, which lies in the North Central geopolitical zone of Nigeria and has an estimated population of 853,445 as at 1998⁵. The population is a conglomerate of various tribes of Nigeria with Berom, Jarawa and Angas as the

major ethnic group. The State Government has only one dental centre, which is complemented by one mission owned and few private dental clinics. Plateau State Government dental centre, by virtue of its location receives the majority of the patients.

Data was extracted, retrospectively, from case notes of patients who had extraction of permanent teeth for the management of dental caries and its sequelae, over the two year period January 2000 to December 2001. Other information like patients' biodata relevant to this study was also recorded. Approval for the study was obtained from Plateau State Hospitals Management Board. Data was analyzed using SPSS version 8 statistical package. Significance level was set at $P = 0.05$.

RESULT

Frequency Distribution of Tooth Loss due to Caries According to Tooth Type

A total of 1269 patients attended the clinic, 8741 patients under went extraction, 11546 teeth were extracted altogether and 6145 permanent teeth were extracted due to caries and its sequelae within the two years under review (Tables 1 and 2).

Table 1. Frequency distribution of tooth loss due to caries according to tooth type

Tooth Type	Number	%
Upper Anteriors	194	3.2
Upper Premolars	475	7.7
Upper Molars	1833	29.8
Lower Anteriors	22	0.4
Lower Premolars	202	3.3
Lower Molars	3419	55.6
Total	6145	100.0

Table 2. Frequency distribution of tooth loss due to caries according to tooth type.

Tooth Type	Number	%
Upper Anteriors	194	3.2
Upper Right Premolars	251	4.1
Upper Right Molars	891	14.5
Upper Left Premolars	224	3.6
Upper Left Molars	942	15.3
Lower Anteriors	22	0.4
Lower Left Premolar	95	1.5
Lower Left Molars	1753	28.5
Lower Right Premolars	107	1.7
Lower Right Molars	1666	27.1
Total	6145	100.0

Table 3. Sextant distribution of pre-molar extraction due to caries

TOOTH TYPE	SEXTANTS				TOTAL
	UPPER RIGHT	UPPER LEFT	LOWER LEFT	LOWER RIGHT	
1 st premolar	94 (43.3%)	80 (36.9%)	25 (11.5%)	18 (8.3%)	217 (100%)
2 nd premolar	157 (34.1%)	144 (31.3%)	82 (17.8%)	77 (16.7%)	460 (100%)
TOTAL	251 (37.1%)	224 (33.1%)	107 (15.8%)	95 (14.0%)	677 (100%)

X = 15.937

df = 3

P = 0.001

Table 4. Sextant distribution of molar extractions due to caries

TOOTH TYPE	SEXTANTS				TOTAL
	UPPER RIGHT	UPPER LEFT	LOWER RIGHT	LOWER LEFT	
1 st molar	444 (16.6%)	464 (17.4%)	883(33.0%)	883(33.0%)	2674(100%)
2 nd molar	189 (11.9%)	216 (13.6%)	573 (36.0%)	612 (38.5%)	1590(100%)
3 rd molar	258 (26.1%)	262 (26.5%)	210 (21.3%)	258 (26.1%)	988(100%)
TOTAL	891(17.0%)	942(17.9%)	1666(31.7%)	1753(33.4%)	5252(100%)

X² = 204.036

df = 6

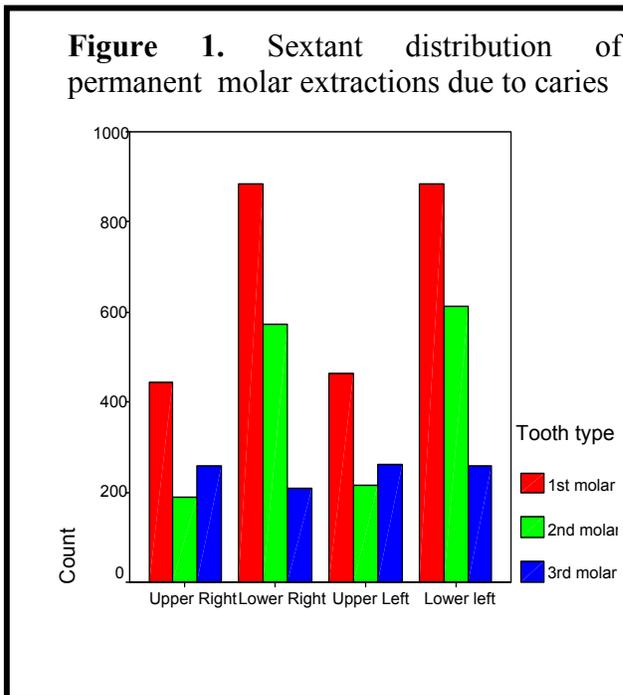
P = 0.000

The upper anteriors accounted for 194 (3.2%), upper pre-molars 475 (7.7%) and upper molars 1833 (29.8%). The lower anteriors accounted for 22 (0.4%), lower pre-molars 202 (3.3%) and lower molars 3419 (55.6%). It was observed that tooth

loss due to caries tends to increase anterior-posteriorly in both arches. The table also shows that the upper anterior (3.2%) is eight times more vulnerable to caries attack when compared to their corresponding lower anteriors (0.4%).

Inter-jaw distribution of pre-molar and molar tooth losses due to caries.

Ninety four (43.3%) upper right and 80 (36.9%) upper left first premolar was extracted due to caries as against their corresponding lower right (11.5%) and left (8.3%) first premolar (Table 3). The same pattern was observed for the second upper and lower premolars. The rate of losses due to caries is significantly higher in the upper than in the lower premolars ($p = 0.001$). The trend in the molars were opposite to what was observed in the premolars. Eight hundred and eighty three (33.0%) lower right and 33.0% lower left first molar were lost due to caries as against their corresponding upper right 16.6% and upper left 17.4%. The same trend was observed for the second and third molars (Table 4, Figure 1).



The study further revealed that the upper second molar was the least vulnerable to caries attack of all the molars. The lower molar losses, due to caries, were significantly higher than for the upper molars ($p = 0.000$).

DISCUSSION

The vulnerability of a tooth to caries and tooth mortality was the focus of interest in this study. Previously reported studies have shown that dental caries is the foremost reason for tooth extraction in Nigeria and other African countries^{1,2,6} and the rest of the world.^{7,8,9,10} This high prevalence may be due to transition from the customary fibrous African diet to western diet.^{2,6} In this study, it was observed that the maxillary anteriors (3.2%) were more susceptible to caries attack when compared to 0.4% of mandibular anteriors. A related study reported that 31.9% of maxillary centrals were extracted due to caries compared to 12.9% of mandibular centrals.¹¹ Another study reported that the least frequently extracted tooth type due to caries were the lower anteriors⁷. The reason for this may be due to the close proximity of the submandibular and sublingual salivary glands duct to the lower anterior teeth, as their secretions help to buffer and cleanse the products of bacterial plaque.

The upper pre-molars accounted for 70.2% of all pre-molars extracted due to caries, compared to 29.8% of lower pre-molars. It has similarly been reported that maxillary second pre-molars were more commonly extracted in Singapore as a result of caries and its sequelae.¹¹ The reasons for the difference in the rate of extraction due to caries and its sequelae may partly rest on the morphological differences, as the upper pre-molars have well defined palatal cusps and therefore deeper pits and fissures. It may also be as a result of poor saliva distribution in and around the upper pre-molar region as the buffer and cleansing action of the saliva may be reduced in this areas.

In this study it was observed that the mandibular molars accounted for 65.1% of

all molar extraction due to caries, compared to 34.9% of maxillary molars. In the Singapore study, 63.7% mandibular first molars were extracted due to caries as against 44.7% of maxillary first molars¹¹. The reason may largely be due to morphological differences since, the mandibular molars have more extensive pits and fissures present in them while the fissures of maxillary molars are limited by the presence of oblique ridge. The direct secretions from the parotid gland duct, which is buccal to the maxillary teeth, may also assist in reducing the pH around the maxillary molars. In this study the first molar accounted for 50.9% of all molar extractions due to caries irrespective of quadrant. A related study in Ile- Ife reported 41.6%¹ and West Indies 45.3%⁷. It may be argued that the time of eruption may largely be responsible; at age six, the child may not have imbibed the various methods of maintaining good oral health, and also lacks the dexterity necessary in the use of both toothbrush and chewing sticks. A related study in Glamorgan noted that more decayed or filled occlusal surface were present in the second molars and pre-molars of those quadrants and arch, which have lost their first molar¹². They extrapolated from the result of the study that whatever aetiological factors were operating to place the child in high-risk group early in life continues to operate in the early teenage years¹². It was observed that the maxillary second molar was the least extracted due to caries. The reason may be due to the opening of the Stenson's duct (parotid gland duct), which helps to buffer and cleanse bacterial plaque products.

CONCLUSION

The morphology, time of eruption and position of each tooth type confers an inherent advantage/disadvantage to the various methods employed in plaque

control and to naturally occurring defense factors. The result of this study showed that teeth with deep pits and fissure like the maxillary premolars and molars are most susceptible to dental caries and would benefit from the use of prophylactic pits and fissure sealants.

ACKNOWLEDGEMENTS

This work was supported by a research grant from the Regional Centre for Oral Health Research and Training Initiatives (RCORTI) for Africa in Collaborative with WHO. Our thanks go to the entire staff of Plateau State Government Dental Centre for their assistance during the period of data collection.

REFERENCES

1. Odusanya S.A. Tooth loss among Nigerians: causes and pattern of mortality. *Int. J. Oral Maxillofacial Surg* 1987;16: 184- 189.
2. Noar J, Portnoy S. Dental status of children in a Primary and Secondary school in rural Zambia. *Int. Dental Journal*: 1991;41,142-148.
3. A.O. Adegbembo, M.A.I.El-Nadeef and A. Adeyinka. National survey of dental caries status and treatment needs in Nigeria. *Int. dental Journal* (1995) 45,35-44
4. E.S. Akpata. Fluoride, dental Fluorosis and caries experience in Nigeria. Project report (RCORTI Lib) June 2003 94-95
5. National population commission, Abuja: Nigeria 1991.
6. Kaimenyi J.T. Sachdeva P, Patel S. Causes of tooth mortality at the dental unit of Kenyatta National Hospital, Nairobi, Kenya. *Tropical Dent. Journal*: 1985: 17-20
7. Vignarajah S. Various reasons for permanent tooth extractions in a Caribbean population Antigua. *Int. Dental Journal* 1993: 43, 207-212.

8. Johansen S.B, Johansen J. R. A survey of causes of permanent tooth extraction in South Australia. *Aust. Dent. J.* 1976; 22: 238-42.
9. Cahen P.M, Frank R. M, Turlot C. A survey of the reasons for dental extractions in France. *J Dent. Res* 1985; 64: 1087-93.
10. Klock K.S, Haugejorden O. Primary reasons for extraction of permanent teeth in Norway, changes from 1968 to 1988. *Community Dent Oral Epidemiol* 1991; 19: 336-41.
11. Ong G, Yeo J, Bhole S. A survey of reason for extraction of permanentteeth in Singapore. *Community Dent. Oral Epidemiol* 1996; 24: 124-127
12. Oliver S.J, Dummer P.M.H. Oliver R.G, R. Hicks, A. Kingdon. The relationship between loss of first permanent molar teeth and prevalence of caries and restoration in adjacent teeth: a study of 15-16 year old children. *J. Dent.* 1988; 16: 155- 159.