

AFRICAN JOURNAL OF MEDICINE and medical sciences

VOLUME 43 NUMBER 3

SEPTEMBER 2014



**Editor-in-Chief
O. BAIYEWU**

**Assistant Editors -in-Chief
O. O. OLORUNSOGO
B. L. SALAKO**

ISSN 1116-4077

Prevalence and pattern of early childhood caries in Ibadan, Nigeria

OI Iyun¹, OO Denloye², OO Bankole² and BO Popoola²

Department of Child Oral Health, Dental Centre¹, University College Hospital and College of Medicine², University of Ibadan, Ibadan, Nigeria

Abstract

Background: Early childhood caries is a public health problem in a developing country such as Nigeria where there are limited resources to combat the situation.

Aim: The aim of the study is to determine the prevalence and pattern of early childhood caries (ECC) among nursery school children aged 3 to 5 years in Ibadan, Nigeria.

Methods: A cross sectional study was conducted on 540 nursery school children aged 3 to 5 years old in nursery schools within Ibadan. Oral examination was performed and *dmft* (decayed-missing-filled teeth) indices were recorded. Data was analyzed using SPSS 16.0 and descriptive statistics was applied. The level of significance was taken at p value < 0.05.

Results: The prevalence of early childhood caries was 23.5% with a total of 353 carious teeth seen in 127 children. The mean *dmft* was 0.65 ± 1.49 and the decayed (*d*) component constituted 100% of the *dmft* scores (all *dmft* was due to untreated caries). The second mandibular primary molars were the teeth most affected by caries, accounting for 35.4% of all decayed teeth. Severe ECC prevalence was 2.2%.

Conclusion: The high caries prevalence observed on the second mandibular primary molars reveals the rampant nature of this disease and the absence of any missing or filled tooth in the *dmft* indices shows poor dental awareness among the parents/guardians of the children.

Keywords: Early childhood caries, nursery school,

Résumé

Introduction : La carie d'enfance brusque est un problème de santé publique dans un pays en voie de développement tel que le Nigeria où il y a des ressources limité à combattre la situation.

Objective : Le but de cette étude est de déterminer la prévalence et le modèle de la carie d'enfance brusque (CEB) parmi les écoliers pépinière âgés de 3 à 5 ans à Ibadan, Nigeria.

Méthode : Une étude à cross-section était conduite sur 540 écoliers pépinière âgés de 3 à 5 ans à l'intérieur d'Ibadan. L'examen oral était exécuté et les indices *dmfr* (dent cariée-manquant-remplie) étaient recordées. Les données étaient analysées en utilisant SPSS 16.0 et la statistique descriptive était appliquée. Le niveau significatif était pris à la valeur $p < 0,05$.

Résultats : La prévalence de carie d'enfance brusque était 23,5% avec un total de 353 dents cariées dans 127 enfants. La *dmfr* moyenne était $0,65 \pm 1,49$ et le component cariée (*c*) constituait 100% des scores *dmfr* (tous *dmfr* étaient dus aux caries non traitées). Les deuxièmes molaires primaires mandibulaires étaient les dents les plus affectées par la carie dentaire, comptant pour 35,4% de tous dents cariées. La prévalence de CEB sévère était 2,2%.

Conclusion : La haute prévalence de carie observée sur les deuxièmes molaires primaires mandibulaires révèle que la nature rampante de cette maladie et l'absence de dent manquant ou remplie dans les indices de *dmfr* montre un manque d'information dentaire parmi les parents/tuteurs des enfants.

Mots clé: Brusque, enfance, carie, pépinière, école.

Introduction

Early childhood caries (ECC) was defined by the American Academy of Paediatric Dentistry (AAPD), as the presence of one or more decayed (noncavitated or cavitated lesions), missing (due to caries) or filled surfaces in any primary tooth in a child at 71 months of age or younger [1]. In children younger than 3 years of age, any sign of smooth surface caries is indicative of severe ECC (S-ECC). From age 3 years through 5 years, one or more cavitated, missing (due to caries) or filled smooth surfaces in primary maxillary anterior teeth or a decayed, missing or filled surface with a score of ≥ 4 (age 3 years), ≥ 5 (age 4 years), ≥ 6 (age 5 years) also constitute severe ECC (S-ECC)[1]. A workshop convened by the National Institutes of Health (NIH) in 1999, proposed that the term Early Childhood Caries (ECC) be used to describe dental caries in preschool children [2] and it is preferred to other synonyms used in the past for caries in children i.e. nursing bottle caries, baby bottle tooth decay, nursing bottle syndrome [3,4].

ECC is a serious public health problem and may begin soon after eruption of teeth [5]. It has a detrimental impact on the child. Infants and toddlers with caries have a greater probability to subsequent caries in both the primary and permanent dentitions and untreated caries is associated with early loss of primary dentition with subsequent disturbance of growth and maturation of the adult dentition [6]. Infants and children with ECC may be underweight because of associated pain and refusal to eat and thus may grow at a slower pace than those without ECC [7]. ECC prevalence varies from one population to another. Among 3 year-old children, prevalence has been reported to vary from 1% in Estonia [8], 8% in Finland [9] to 56% in Poland [10]. Higher prevalence rates ranging between 46% and 65% have also been reported for Chinese [11] Brazilian [12] and American 3 year olds [13]. Despite the marked decline in caries prevalence in developed countries over the past 30 years as reported in a review of various studies on dental caries, the present prevalence still remains unacceptably high in many developed countries [14].

It has been observed that a higher posterior caries pattern is more frequently seen in ECC than an anterior pattern, with the mandibular primary molars being most frequently affected [15, 16].

Generally, studies have shown that dental caries prevalence is low in Nigeria [17]. Previous studies in Nigeria suggest that prevalence of caries in young children ranges between 2.3% and 14.4% [17-23]. There has been a considerable amount of information about the prevalence of early childhood caries in many parts of the world. However in Nigeria, particularly in Ibadan, no baseline data is available. Hence the aim of this study was to determine the prevalence and pattern of early childhood caries among 3 to 5 year old nursery school children in Ibadan North local government area, Nigeria.

Materials and methods

A cross sectional study was conducted among 3 to 5 year old children from 8 nursery schools that were randomly selected in Ibadan North Local Government area. Ethical approval was obtained from the joint University of Ibadan/University College Hospital (UI/UCH) Ethical Review Committee. At each of the schools, informed consent forms were given to children within the age group intended to deliver to their parents/guardians for consent to participate in the study. All the children whose parents/guardians consented and returned the completed forms were examined for the presence of dental caries. Five hundred and forty children were examined for caries using World Health Organization

(WHO) standard method and criteria. Intra oral examination was carried out. Lesions were recorded as present when a carious cavity was clearly seen upon visual inspection of the child sitting upright. Caries experience was determined by the *dmft* score, which represents the total number of teeth that are decayed (*d*), missing due to caries (*m*), and filled (*f*). Intra-examiner reproducibility was determined by duplicate examination of 54 children (10% of total number of children examined) [24]. Documentation of oral examination was done.

All data generated were entered into a personal computer. Computer analysis was done using Statistical Package for Social Sciences (SPSS) version 16.0. The Kappa statistics for categorical variables was used to assess the level of agreement between the duplicate intra-oral examinations of 10% of the sample. A value greater than 0.75 is regarded as representing an excellent agreement, values between 0.4 and 0.75 as fair and values less than 0.4 as moderate [25]. The Kappa score for the re-examination of 10% of the entire sample was found to be 0.98, which represents an excellent agreement. Frequency distribution of variables was generated and measures of central tendency were calculated to summarize the numerical data. The Chi-square test was employed to assess the strength of association between early childhood caries and gender and age. Non parametric tests (Mann Whitney U and Kruskal Wallis) were employed to analyze variables that were not in normal distribution. The level of statistical significance was set at $p < 0.05$.

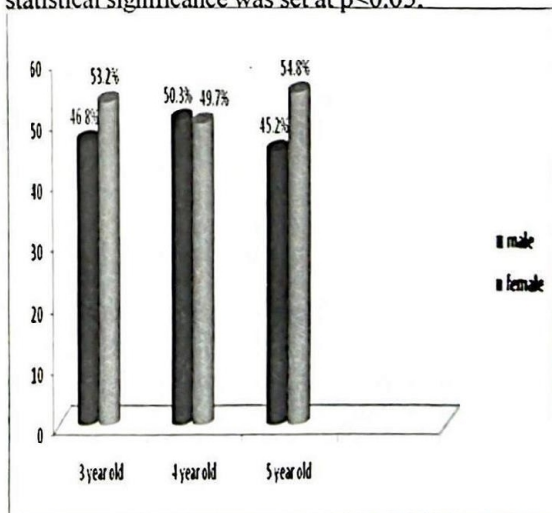


Fig.1: Age and gender distribution

Results

In this study, a total number of 540 children within the age range of 3 and 5 years were examined in 8 nursery schools visited. There were 257 (47.6%) boys and 283 (52.4%) girls. One hundred and ninety (35.2%) were 3 years old, 193 (35.7%) were 4 years

and 157 (29.1%) were 5 years old (Figure 1). The mean age was 3.94 ± 0.8 years.

One hundred and twenty seven children (23.5%) were found to have caries while 413 (76.5%) were caries free. Table 1 depicts the relationship between early childhood caries and demographic variables of the children. The older age groups (4 and 5 years) were observed to have a higher prevalence of ECC with the highest proportion of children with caries found among the 5 year olds. This was followed by the 4 year olds (51, 26.4%), then the 3 year olds (33, 17.4%). This association was found to be statistically significant ($p=0.04$) (Table 1). The prevalence of severe early childhood caries was found to be 2.2% in the entire 540 children.

The second mandibular primary molars were most affected by caries, accounting for 35.4% of all decayed teeth. This was followed by the second maxillary primary molars (26.1%), first mandibular primary molars (19%) and the maxillary primary incisors (10.8%) respectively. The primary canines were not involved in any of the subjects (Table 2). The mandibular teeth were more frequently affected than the maxillary ones.

It was observed that the 4 year olds had the highest mean *dmft* score of 0.82 ± 1.72 , followed by the 5 year olds (0.70 ± 1.54) and the 3 year olds (0.45 ± 1.13) (Table 3). When the mean *dmft* and age were subjected to Kruskal Wallis nonparametric test, statistical significance was also found ($p=0.049$)

Table 1: Relationship between Early Childhood Caries and Demographic variables.

Variable		ECC present N (%)	ECC absent N (%)	Total N	Chi Square	p- value
Age	3yrs	33(17.4%)	157(82.6%)	190	6.209	0.045
	4yrs	51(26.4%)	142(73.6%)	193		
	5yrs	43(27.4%)	114(72.6%)	157		
	Total	127	413	540		
Gender	Male	55(21.4%)	202(78.6%)	257	1.223	0.269
	Female	72(25.4%)	211(74.6%)	283		
	Total	127	413	540		

The proportion of females with caries (72, 25.4%) was observed to be higher than their male counterparts (55, 21.4%). This relationship was however not statistically significant ($p=0.27$). A total of 353 carious teeth were seen in the 127 children with ECC and mean *dmft* was 0.65 ± 1.5 . One or two decayed teeth were observed in 55.1% of the children, 3 or 4 decayed teeth seen in 31.5% and ≥ 5 decayed teeth were seen in 13.4%.

(Table 3). Table 4 illustrate the relationship between the mean *dmft* and gender.

Twelve children (9.4%) out of 127 with ECC had severe early childhood caries (S-ECC). Among the 3 year olds, two children had *dmft* greater than 4; among the 4 year olds, eight children had *dmft* greater than 5; among the 5 year olds, two children had *dmft* greater than 6.

Discussion

This study assessed the prevalence and pattern of early childhood caries in nursery school children in Ibadan. The prevalence in this study was found to be higher than those from findings in Ile-Ife [26] and Lagos [22] where 10.9% and 10.5% were reported respectively. The high prevalence observed in this study may probably be due to an increase in consumption of refined carbohydrates among the nursery school children examined. Akpata reported that there is an ongoing change in the diet in a developing country like Nigeria from the traditional diet to a more cariogenic Western diet [27].

It was observed in the course of this study that parents frequently provided their children with commercially prepared fruit juices to school because

Table 2: Frequency of dental caries according to tooth type

Tooth type	Frequency	%
Mandibular		
Primary incisors	4	1.1
Primary canines	0	0
First primary molars	67	19.0
Second primary molars	125	35.4
Maxillary		
Primary incisors	38	10.8
Primary canines	0	0
First primary molars	27	7.6
Second primary molars	92	26.1
Total	353	100

Table 3: Relationship between mean *dmft* and age

Age	Number N	Decayed <i>d</i>	Missing <i>m</i>	Filled <i>f</i>	Mean <i>Dmft</i>
3 years	190	85	-	-	0.45±1.13
4 years	193	158	-	-	0.82±1.72
5 years	157	110	-	-	0.70±1.54
Total	540	353			0.65±1.49

Kruskal Wallis test of statistics=6.051, $p=0.049$.

Table 4: Relationship between mean *dmft* and gender

Gender	Number N	Decayed <i>d</i>	Missing <i>m</i>	Filled <i>f</i>	Mean <i>dmft</i>
Male	257	156	-	-	0.61±1.49
Female	283	197	-	-	0.70±1.49
Total	540	353	-	-	0.65±1.49

Mann Whitney U test of statistics=1.09, $p=0.278$.

of the belief that they contain large quantities of vitamin C and water intake is subsequently reduced among these children. The high sugar content of fruit juices and their acidic pH are highly cariogenic. Higher figures than that observed in this study have been reported in 5 year old children in South Africa where 60% caries prevalence rate was found in black children and 66% rate was observed in "coloured" children [28].

The prevalence of severe ECC was found to be 2.2% in the entire sample studied and 9.4% among those with caries. These figures are lower than those from a previous study conducted in Lagos [22] where a prevalence of 4.8% was observed among 390 children and a prevalence of 46.3% seen among the caries group. This difference could be attributed to the observed cosmopolitan nature of the city of Lagos and increase in consumption of cariogenic Western diet among the children in Lagos [22]. A similarity in the proportion of severe ECC within the group of children with ECC was found in the study conducted in Australia [15] which also reported a prevalence of 9.4%.

The mean *dmft* seen among the subjects with ECC was found to be slightly higher than the mean *dmft* (0.3) reported in an earlier study [26], but similar to figures reported for urban Nigerian children population ranging from 0.6 to 1.3[29].

The study showed that majority of the children studied had not received oral health care. This is evident in the *dmft* index in which 100% was recorded for the *d* – component, indicating that all

the decayed teeth were untreated. This is similar to earlier reports from Nigeria [17, 22] and other African countries [30, 31]. Low dental awareness, poor utilization of available dental facilities and limited access to oral health services in Nigeria may be responsible for this.

In similarity to a previous study [16], the mandibular primary molars were most affected by caries. A higher posterior caries pattern (21.4%) than an anterior pattern (12.3%) affecting incisors and/ canines was seen in a study by Hallet *et al* [15]. In contrast to this, Tsubochi *et al* [32] reported that maxillary incisors were the teeth most affected. The prevalence of anterior caries pattern observed in our study (10.8%) is notably high and in addition to inappropriate feeding practices, lack of parental supervision while brushing, and request for sugar based medication are factors that have been associated with the anterior caries pattern [32].

Early Childhood Caries was observed to increase with age in our study as a greater proportion of children with caries were found in the older age group. This observation is similar to another report [8]. A possible explanation is the longer exposure time of erupted teeth to cariogenic oral environment and higher frequency of consumption of refined carbohydrate in the older children.

There was a marginal difference in the mean *dmft* scores between males and females. It was observed however that a greater proportion of females had caries. This finding is in accordance with

previous studies on caries in Nigeria [18] and may be attributed to increased snacking habits observed more in females.

Conclusion

The prevalence of early childhood caries was observed to be high relative to other studies conducted in Nigeria among young children. It was also observed that all the caries diagnosed were untreated. It is recommended therefore that oral health promotion and awareness programmes should be carried out among parents/guardians of children emphasizing the need for routine dental examination and early presentation of dental problems to the dentist.

References

1. American Academy of Paediatric Dentistry. Policy on Early Childhood Caries (ECC). *Paediatr Dent* 2005-2006; 27: 31-33.
2. Drury TF, Horowitz AM, Ismail AL, *et al.* Diagnosing and reporting early childhood caries for research purposes. *J Public Health Dent* 1999; 59: 192-197.
3. Winter G.B. Hamilton M.C and James P.M.C. Role of a comforter as an aetiological factor in rampant caries of the deciduous dentition. *Arch Dis Child* 1966;41: 207-212.
4. Milnes A. R. Description and epidemiology of nursing caries. *J Public Health Dent* 1996;56: 38-50.
5. American Academy of Paediatric Dentistry. Policy on Early Childhood Caries: unique challenges and treatment options. 2002-2003; 24-25.
6. Bethesda MD. Proceedings: Conference on Early Childhood Caries, *Community Dent Oral Epidemiol Suppl.* 1998;26(1): 5-119.
7. Ramos-Gomez FJ, Weinstraub JA, Gansky SA, *et al.* Bacterial, behavioral and environmental factors associated with early childhood caries. *J Clin Paediatr Dent* 2002;26: 165-173.
8. Olak J, Mandar R, Karjalainen S, *et al.* Dental health and oral mutans streptococci in 2-4-year-old Estonian children. *Int J Paediatr Dent* 2007;17: 92-97.
9. Karjalainen S, Söderling E, Sewón L, *et al.* A prospective study on sucrose consumption, visible plaque and caries in children from 3 to 6 years of age. *Community Dent Oral Epidemiol* 2001;29: 136-142.
10. Szatko F, Wierzbička M, Dybizbanska E, *et al.* Oral health of Polish three year-olds and mothers' oral health related knowledge. *Community Dent Health* 2004;21: 175-180.
11. Li Y, Wang W, Caufield PW, *et al.* The fidelity of mutans streptococci transmission and caries status correlation with breast-feeding experience among Chinese families. *Caries Res* 2000; 34: 123-132.
12. Rodrigues CS and Sheiham A. The relationship between dietary guidelines, sugar intake and caries in primary teeth in low income Brazilian 3 year olds: a longitudinal study. *Int J Paediatr Dent* 2000;10: 47-55.
13. Milgrom P, Riedy CA, Weinstein P, *et al.* Dental caries and its relationship to bacterial infection, hypoplasia, diet, and oral hygiene in 6 to 36 month old children. *Community Dent Oral Epidemiol* 2000;28: 295-306.
14. Petersen PE. The World Oral Health Report. Improvement of oral health in Africa in the 21st century – the role of the WHO Global Oral Health Programme. *Af J Oral Health* 2004; 1: 2-16.
15. Hallett KB and O'Rourke PK. Pattern and severity of early childhood caries. *Community Dent Oral Epidemiol* 2006; 34: 25-35.
16. Sayegh A, Dini EL, Holt RD, *et al.* Caries prevalence and patterns and their relationship to social class, infant feeding and oral hygiene in 4-5 year old children in Amman, Jordan. *Community Dent Health* 2002; 19: 144-151.
17. Adenubi JO. Dental Health Status of 4 and 5 year old children in Lagos private schools. *Nig Dent J* 1980;1: 28-38.
18. Noah M.O. The Prevalence and distribution dental caries and state of oral cleanliness in 5 year old Ibadan Private School children. *Nig Dent J.* 1984;5: 44-51.
19. Noah M.O. Rampant Caries Prevalence and the role of oral cleanliness in its aetiology in the deciduous dentition of 4 and 5 year old Ibadan children attending Private schools. *Odonto-Stomatologie Tropicale* 1988;11: 61-65.
20. Sote E.O. Attendance pattern and presenting oral health problems of children at the Lagos University Teaching Hospital, Lagos, Nigeria. *Nig Qt. J. Hosp. Med.* 1996;6:80-84.
21. Sote E.O. Nursing caries in Nigerian children-an overview. *Nig Postgrad Med J* 1998; 5: 192-195.
22. Sowole C.A and Sote E.O. Early Childhood Caries: Experience in Nigerian Children at Lagos. *Nig Postgrad Med J* 2007; 14 (4): 314-318.
23. Sofola OO, Jeboda SO and Shaba OP. Dental status in primary school children aged 4-16 years in South West Nigeria. *Odonto-Stomatologie Tropicale* 2004;108: 19-22.

24. Saravanan S, Kalyani C, Vijayarani MP, *et al.* Prevalence of dental fluorosis among primary school children in rural areas of Chidambaram Taluk, Cuddalore District, Tamil Nadu, India. *Indian J Community Med* 2008;33(3): 146-150.
25. Kirkwood BR and Sterne JAC. *Essential Medical Statistics*, 2nd edition, Blackwell Publishing Limited, Masschusetts, USA,2003; 420,433-437.
26. Adekoya-Sofowora C, Nasir WO, Taiwo M, *et al.* Caries experience in the primary dentition of nursery school children in Ile-Ife, Nigeria. *Afr J Oral Health* 2006;2(1, 2): 19-25.
27. Akpata ES. Oral health in Nigeria. *Int Dent J* 2004;54: 361-366.
28. Toi CS, Cleaton-Jones PE and Daya NP. Mutans streptococci and other caries-associated acidogenic bacteria in five-year-old children in South Africa. *Oral Microbiol Immunol* 1999; 14: 238-243.
29. Noah M.O. Caries experience and oral cleanliness in the deciduous dentitions of Ibadan children from different social groups *J Int Ass Dent Child* 1984b;15: 43-49.
30. Ali YA, Chandrance HJ, Khan A, *et al.* Prevalence of dental caries in nursery school children of Akola city. *J Indian Soc Paedod Prev. Dent* 1998; 16: 21-25.
31. Kiwanuka SN, Astram AN and Trovik TA. Dental caries experience relationship to social and behavioural factors among 3 to 5-year-old children in Uganda. *Int J Paediatr Dent* 2004;14: 336-346.
32. Tsubochi J, Higashi T, Shimono T, *et al.* A study of baby bottle tooth decay and risk factors for 18 month old infants in rural Japan. *J Dent Child* 1994; 61: 293-298.