

Effect of Restriction of School Time Snacking on Prevalence of Early Childhood Caries

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ABSTRACT

Background: Early Childhood Caries constitute a major public health concern in both developing and developed countries. Dietary sugar intake in the aetiology of ECC is pivotal and considered one of the most important risk factors and could come in form of unhealthy snacks.

Aim: To compare the prevalence of Early Childhood Caries in children attending schools with "No breacktime snacking" restrictions and those without. Also, this study assessed the relationship and severity of ECC between both groups.

Results: The study population consisted of 158 children between 3-5 years old, 89 males (56.3%) and 69 females (43.7%). A total of 81 (51.3%) study participants were from schools where snacking was allowed, while 77 (48.7%) were from schools with no school time snacking. The majority of the participants (75.9%) had good oral hygiene. A higher prevalence of caries was seen among 3-year-olds (19.5%) and in females (20.3%) although this was not statistically significant. The presence of dental caries was higher in schools where snacking was allowed (19.8%) (P=0.157). The severity of dental caries in this study population was 0 (0.0%) determined using the pufa index.

Conclusion: Although conclusive evidence supporting the restriction of school time snacking as a means to reduce ECC prevalence could not be inferred, this study provides insight into the complexity of ECC etiology and the need for multifaceted interventions addressing various risk factors including school time snacking, limitation of which may provide a way for reduction of caries development in preschool children.

Keywords: Early childhood caries, snacking, snacking restriction, prevalence, children.

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INTRODUCTION

Early childhood Caries (ECC) is a common condition affecting children. It constitutes a major public health concern in both developing and developed countries.¹ ECC is defined as the presence of one or more decayed (cavitated or non-cavitated), missing (due to caries), or filled tooth surfaces in any primary tooth in a preschool child between 6-71 months of age.² Although the prevalence of dental caries globally is said to be on the decline,³ ECC still remains a major concern with a mean caries prevalence for 2-, 3-, 4- and 5-year-olds being 36%, 43%, 55% and 63% respectively from a review of worldwide studies between 1998 and 2018.⁴ Various studies within Nigeria showed a wide variability in the prevalence of ECC, with values ranging from 4.7% to 23.5%.⁵⁻⁹ According to a study, the most prevalent age range for ECC is 3-4-year-olds, and boys are more commonly affected than girls.¹⁰

The aetiology of ECC is considered largely multifactorial as it requires several factors including susceptible tooth, bacteria, and refined carbohydrate diet over a period of time.¹¹ The role of dietary sugar intake in the aetiology of ECC is pivotal as it is considered perhaps the most important risk factor because, without it, the chain of causation is broken.¹² Dietary sugars make up a large portion of school-time lunchboxes of children, with about 52-80% containing high sugary foods like chips, sugar-sweetened drinks, and other types of refined carbohydrates from various studies around the world.^{13,14} Thus, high levels of sugars can be said to be associated with a higher prevalence of ECC in children consuming same.

Reducing the frequency of intake of dietary sugars has been considered an important strategy, not only in reducing the prevalence of ECC but also in improving the general health of the children.⁴ In recent years, some schools in Nigeria have adopted a "No break time snack policy" limiting food intake in schools to include healthy cooked meals packed by parents or provided by the school. This study aims to compare the prevalence of ECC in children attending schools which have adopted the "No breaktime snack" restrictions and those who have not. It also aims to assess the relationship and severity of ECC among children in these schools to improve the oral health and by extension the general health of children in Benin City, Nigeria.

METHODOLOGY

Study design: This study is a comparative cross-sectional study.

Study location: This study was carried out in private nursery and primary schools in Egor Local Government Area in Benin City, Edo State.

Study population: Children 3-5 years of age attending selected nursery and primary schools in the study location. Also, it was ensured that selected children have been registered in the selected schools for at least an academic session

Study duration: Six months.

Sample size determination: A convenient sample size was used, children 3-5 years of age who met the selection criteria and whose parents gave written informed consent to participate in the study were recruited.

Sample selection: A multi staged sampling method was employed for the study.

- a. Categorization of schools: Few schools in the state implement the 'no breaktime snack policy. Only one of such schools was in the study area, this school was selected and a similar school which did not implement this policy with similar demographics was also selected to serve as control for comparison of ECC between schools.
- b. Selection of participants: After the schools were selected and categorized, children who fell within the age range of the study population were selected by class till the sample size was reached. Only children whose parents gave written informed consent on the day of data collection were recruited to participate in the study

Inclusion criteria:

Children between 3-5years of age in selected nursery and primary schools for at least an academic session (this ensured that these children had been exposed to the no school time snack policy for at least a year).

Exclusion criteria:

This study excluded children whose parents did not give written informed consent to participate in the study.

Methodology: After sample selection and recruitment, study participants who met the selection criteria were examined using sterilized mouth mirrors and probes in their classrooms using the area with the most natural light for visibility. The children's oral hygiene was first assessed using a modification of the simplified debris index (D-IS) component of the Simplified Oral Hygiene Index(S-OHI) as described by Folayan and colleagues.¹⁵ Four labial surfaces and 2 lingual surfaces of the following index teeth 51, 55, 65, 71 75 and 85 were examined in each child and scored as described by the S-OHI.¹⁶

The teeth were then cleaned and dried using sterile gauze and assessed for caries.

Data collection: Study participants' age (in months) and gender were recorded as well as the category of the school (policy implementing or non-policy implementing). Findings on examination including oral hygiene were documented as good, fair or poor. Caries status was documented using the dmft (decayed, missing due to caries and filled due to caries) index according to the WHO recommendation.¹⁷ The caries severity was assessed using the pufa (pulpal exposure, ulceration, fistula and abscess) index. Children with poor oral hygiene or caries present were referred to the Paediatric Dentistry Clinic of the University of Benin Teaching Hospital for appropriate treatment by giving them referrals to meet the principal investigator who ensured that the study participants were attended to promptly with emphasis on improving oral hygiene.

Data analysis: The prevalence of early childhood caries was determined for both categories of schools; that is no breacktime snacking policy implementing and non-policy implementing schools. The oral hygiene status, caries status and caries severity for the different school categories was assessed. Associations between cofounding variables (age and sex), dependent variables (policy implementing and non-policy implementing) and independent variables (oral hygiene status, caries status and caries severity) were assessed using chi-square tests. Where associations exist, multiple logistic regression analysis was used to assess predictors of ECC in the study population. Statistical significance was set at $P < 0.05$ and 95% confidence interval.

Ethical consideration: Before commencement of study, ethical approval was sought from the Health Research and Ethics Committee of the University of Benin Teaching Hospital (ADM/E/22/A/VOL.VII/14831677). Approval was also sought from the Edo State Ministry of Education, Benin City, Nigeria and permission from the proprietors and head teachers of selected schools. Written informed consent was obtained from parents/caregivers of study participants by sending well and appropriately written consent forms to them via their class teachers a week to data collection. Only children whose parents/caregivers signed and submitted the informed consent forms were recruited for the study. Efforts were made to ensure confidentiality and adherence to ethical principles during fieldwork and throughout the research by removing all forms of identifiers.

RESULTS

Socio-demographic variables of study participants

The study population consisted of 158 children between 3-5 years of age. There were 41 (25.9%) 3-year-olds, 71(44.9%) 4-year-olds and 46 (29.1%) 5-year-olds. There were 89 males (56.3%) and 69 females (43.7%). A total of 81 (51.3%) study participants were from schools where snacking was allowed, while 77 (48.7%) were from schools with no school time snacking. The majority of the participants (75.9%) had good oral hygiene. [Table 1]

Table 1 shows the socio-demographic variable of study participants

Variables	Frequency	Percentage
Age		
3	41	25.9
4	71	44.9
5	46	29.1
Gender		
Male	89	56.3
Female	69	43.7
Oral hygiene		
Good	120	75.9
Fair	37	23.4
Poor	1	0.6
Frequency of snacking		
Snacking allowed	81	51.3
No snacking allowed	77	48.7
Presence of caries		
Caries present	25	15.8
Caries absent	133	84.2
Total	158	100.0

Association between socio-demographic variables, oral hygiene and presence of dental caries

This study showed a higher prevalence of caries among 3-year-olds (19.5%) as compared to 4-year-olds (15.5%) and 5-year-olds (13.0%). There was a higher prevalence of caries in females (20.3%) and lower in males (12.4%). The majority of females (79.7%) had good oral hygiene while 73.0% of males had good oral hygiene. No severe form of caries was seen as the pufa index score for all participants was 0 (0.0%)[Table 2]

Table 2 shows the association between socio-demographic variables, presence of caries and oral hygiene status

Variable	Caries absent (%)	Caries present (%)	P value	Good oral hygiene (%)	Fair oral hygiene (%)	Poor oral hygiene (%)	P value
Age							
3	33(80.5)	8(19.5)		29(70.7)	11(26.8)	1(2.4)	
4	60(84.5)	11(15.5)		57(80.3)	14(19.7)	0(0)	
5	40(87.0)	6(13.0)	0.847	34(73.9)	12(26.1)	0(0)	0.411
Sex							
Male	78(87.6)	11(12.4)		65(73.0)	23(25.8)	1(1.1)	
Female	55(79.7)	14(20.3)	0.173	55(79.7)	14(20.3)	0(0)	0.469
Snacking							
Snacking allowed	65(80.2)	16(19.8)		60(74.1)	20(24.7)	1(1.2)	
No snacking allowed	68(88.3)	9(11.7)	0.157	60(77.9)	17(22.1)	0(0)	0.565

This study showed that the presence of dental caries was higher in schools where snacking was allowed (19.8%) and less in schools where no snacking was allowed (11.7%) however this was not statistically significant ($P=0.157$)

DISCUSSION

This comparative cross-sectional study was conducted to assess the effects of restriction of school time snacking on the prevalence of early childhood caries. It is one of the first studies to investigate this relationship in Nigeria. ECC is one of the most common oral diseases affecting pre-school children. Although its aetiology is said to be multifactorial, with poor dietary practice consisting of dietary sugar being a significant risk factor in the development of early childhood caries,¹⁸ there has been limited attempt to reduce sugar intake via snacking in pre-school children and to investigate its effect on ECC.¹⁹

The prevalence of ECC in this study was higher in females, which is against prevailing information in the literature, where prevalence was reported to be higher in boys.^{10,20,21} Among those with ECC, a higher prevalence was noted among the 3-year age group, followed by the 4-year age group. This is similar to a previous Nigerian study which reported the highest caries prevalence among 24–35-month-old children⁹ and concordance with reports showing that the most prevalent age for ECC is 3–4 years old.¹⁰ However, this appears to be in contrast with other literature where the prevalence of ECC was noted to increase with age.⁴ Majority of the participants had good oral hygiene; hence this study did not establish a link

between oral hygiene and ECC as has been done in other studies where prevalence of ECC was noted to increase with poor oral hygiene.^{5,22}

In a study where school-based intervention for prevention of ECC including restriction of snacking was done, it was noted that prohibition of snacking in schools was associated with a reduction of progression of lesion activity and development of new lesions following a 2-year follow-up period.¹⁹ A higher risk of developing Severe ECC was found in another study among children who consumed soft drinks, hand-shaken drinks, milk yoghurt and sweet snacks more than four times per week.²³ This is in contrast to a Nigerian study which found no statistical difference between snacking habit and Early childhood caries prevalence.²⁴ Also, parental limitation of snack consumption by children was associated independently with a lower prevalence of dental caries.²⁵ In a study among dental patients, it was concluded that in between meal snacking was the primary risk factor for dental decay thus a behaviour change aimed at reducing snacking habit was suggested for a reduction in prevalence of caries.²⁶

Although this study found no statistically significant association between the restriction of school time snacking and the prevalence of early childhood caries, the prevalence of early childhood caries was lower in school children who had a restriction in school time snacking, a finding which is in agreement with established literature. This lack of significant difference could be due to unrestricted consumption of sugary snacks at home other than during school

time, as well as during weekends. This study also found no severe form or consequence of dental caries in the study population as there was no pulpal involvement, or ulceration due to caries, fistula or abscess seen. This may be due to the small sample studied.

This study had a few limitations. First, the study is a cross-sectional study, hence a causal relationship between school time snacking and the prevalence of early childhood caries cannot be inferred. The sample population was small and not representative; only one school implementing no school time snacking policy was located within the area of study. Despite the limitations of the study, this study generated new insight and could form the basis for further study on the subject, and perhaps would influence policy formation in Nigeria to limit school time snacking in children and curb the menace of early childhood caries and even other illnesses with similar aetiology.

CONCLUSION

Although conclusive evidence supporting the restriction of school time snacking as a means to reduce ECC prevalence could not be inferred, this study provides insight into the complexity of ECC aetiology and the need for multifaceted interventions addressing various risk factors including school time snacking, limitation of which may provide a way for reduction of caries development in preschool children. There is a need for re-orientation of all stakeholders including parents/caregivers, school owners and teachers, and policymakers on the importance of dietary habits to the development of ECC.

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Conflict of interest

None declared

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