

PREDICTORS OF DENTAL CARIES AMONG ADULTS AND ADOLESCENTS IN A DENTAL CLINIC IN NORTH-EASTERN NIGERIA

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ABSTRACT

Background: Dental caries constitute a public health burden globally. They occur when the balance between their protective factors and risk factors is disturbed. The aim of the study was to determine the predictors of dental caries among adults and adolescents in a dental clinic in north-eastern Nigeria.

Materials and Methods: A case-control study design was used, with cases drawn from the dental clinic, and controls from the general out-patient unit of the same hospital. Systematic random sampling was used to select both cases and controls. Those selected from the dental clinic underwent a thorough oral examination, using the specific caries index and were included into the study if they had any of a decayed, missing, or filled tooth. Those selected from the out-patient clinic were examined in a similar manner, and were included into the study as controls, once they did not have a decayed, missing, or filled tooth. A structured questionnaire was used to collect information on respondents' socio-demographic characteristics and oral care habits. Chi-square test was used to compare the socio-demographic characteristics of the groups and to test the association between dental caries and oral care habits. Multivariate logistic regression was used to determine the predictors of dental caries.

Result: A total of 124 respondents were recruited into this study, comprising of 59 respondents with dental caries (cases), and 65 without dental caries (controls). Their ages ranged from 15 to 63 years. Daily teeth cleaning (OR=0.33, 95% CI: 0.11-0.97; $p=0.044$), and teeth cleaning after every meal (OR=0.28, 95% CI: 0.10-0.78; $p=0.015$), were associated with lower odds of having dental caries. Tooth ache was the major reason for visiting the dentist, among both cases (78.6%) and controls (68.6%).

Conclusion: The study emphasizes the very important role of oral hygiene in preventing dental caries. The study also suggests that with very frequent teeth cleaning, refined sugars may not pose additional risks of developing dental caries.

Keywords: Dental caries, predictors, teeth cleaning

1.0 Introduction

Dental caries is a major public health problem globally, and the most prevalent preventable condition (World Health Organisation (WHO), 2017). Almost all adults worldwide have dental cavities (WHO, 2012). In a rural community in Nigeria, 35.5% of secondary school students had dental caries, with a mean decayed, missing, and filled teeth (DMFT) of 0.85 ± 1.50 (Okoye et al., 2011). Among adult patients above the age of 18 years presenting to the dental centre of a tertiary dental institution in Port Harcourt, 22.6% had a diagnosis of dental caries (Omitola and Arigbede, 2012). Dental caries occur when the balance between its protective and risk factors is disturbed (Peneva, 2007). Socio-demographic factors like female gender (Namal et al., 2008; Singh et al., 2014), increasing age (Patro et al., 2008; Orji, 2015; Kahar et al., 2016; Maqsood et al., 2017) and low income (Costa et al., 2013), as well as behavioural factors such as frequent consumption of refined sugar, inadequate or lack of exposure to fluoride in toothpaste and drinking water, poor personal oral hygiene care (Tarvonen et al., 2017; (Chopra et al., 2015) and tobacco smoking (Patro et al., 2008), increase the risk of dental caries. By contrast, good oral hygiene and having good knowledge are protective factors (Tafere et al., 2018).

Even though a high prevalence has been reported among adults, studies on dental caries in Nigeria have focused more on children (Denloye et al., 2005; Abiola et al., 2009; Okoye et al., 2011; Folayan et al., 2015; Eigbobo et al., 2015; Onyejaka et al., 2016). Systematic assessment of risk factors would guide the development of oral health promotion activities and other intervention programmes (Petersen, 2005). The aim of this study was to determine the risk factors and protective factors for dental caries among adolescents and adults attending the Dental clinic of the State Specialist Hospital, Damaturu, Nigeria.

2.0 Materials and Methods

The study locations were the Oral diagnosis Clinic of the Department of Dentistry and that of Family Medicine of the State Specialist Hospital, a secondary-level health centre located in Damaturu, the Yobe State capital. A case-control study design was used in this study, with cases drawn from the Dental Clinic while controls were drawn from the General Medical Out-patient Clinic of the same hospital. Only patients resident in Damaturu (internally-displaced persons inclusive) were recruited. Patients below the age of twelve, and severely-ill patients needing emergency care, were excluded. Cases were selected using systematic random sampling, from the list of dental patients, after they had undergone a thorough oral examination, using the specific caries index (Acharya, 2006). They were classified as cases if they had any of either a decayed, missing, or filled tooth. Controls on the other hand were drawn from the General Out-Patients' Clinic through a similar technique, and were determined as controls if they failed to fulfil any of the criteria of having any of either a decayed, missing, or filled tooth. Face-to-face interviews using a structured questionnaire, was used to collect data from the respondents. This consisted of three sections: socio-demographic characteristics, oral care habits, and the oral examination section.

The data obtained was analysed using Statistical Package for Social Sciences (SPSS) version 22. Weekly frequency of teeth cleaning was categorised as seven days a week or less than

seven days a week. Daily frequency of teeth cleaning was categorised as less than twice daily or twice and above. Duration of brushing was categorised as: less than two minutes, two to five minutes, or more than five minutes. Duration of brush use before changing was categorised as either three months or less, or above three months. The categorical data were analyzed descriptively using frequency and percentage, while chi-squared test was used to test their association with having dental caries. Variables that showed significant association with having dental caries in bivariate analysis were further analyzed using multivariate logistic regression, to determine the predictors of having dental caries.

Ethical clearance as well as permission to conduct the research were obtained from the Ethic Review Committee of the State Specialist Hospital Damaturu, Nigeria. Informed verbal consent was also obtained from the individual respondents, after taking them through the respondent information section at the cover page of the questionnaire.

3.0 Result

3.1 Socio-demographic characteristics of respondents

Table 1: Socio-demographic Characteristics of Respondents

Socio-demographic factor	Group		χ^2	df	p
	Control Freq. (%) n = 65	Case Freq. (%) n = 59			
Gender			0.482	1	0.488
Male	29 (44.6)	30 (50.8)			
Female	36 (55.4)	29 (49.2)			
Total	65 (100.0)	59 (100.0)			
Ethnicity			2.047	3	0.563
Kanuri	17 (26.2)	18 (30.5)			
Fulani	20 (30.8)	13 (22.0)			
Hausa	9 (13.8)	6 (10.2)			
Others	19 (29.2)	22 (37.3)			
Total	65 (100.0)	59 (100.0)			
Marital status			0.813	1	0.367
Single	26 (40.0)	19 (32.2)			
Married	39 (60.0)	40 (67.8)			
Total	65 (100.0)	59 (100.0)			
Place of residence			1.076	1	0.300
Permanent resident	51 (85.0)	52 (91.2)			
Internally Displaced Person	9 (15.0)	5 (8.8)			
Total	65 (100.0)	59 (100.0)			
Level of education			-	-	0.242*
None	1 (1.5)	6 (10.2)			
Primary	3 (4.6)	4 (6.8)			
Secondary	18 (27.7)	11 (18.6)			
Tertiary	28 (43.1)	26 (44.1)			
Quranic	15 (23.1)	12 (20.3)			
Total	65 (100.0)	59 (100.0)			
Occupation			0.482	1	0.488
Unemployed	29 (44.6)	30 (50.8)			

Employed	36 (55.4)	29 (49.2)
Total	65 (100.0)	59 (100.0)

Note: (°) – Fisher's exact test

A total of 124 respondents were recruited into the study, comprising of 59 respondents with dental caries (cases), and 65 without dental caries (controls). Their ages ranged from 15 to 63 years. As presented in Table 1, cases and controls did not differ in their socio-demographic characteristics.

3.2 Respondents' oral care behaviour

Table 2: Respondents' oral care behaviour

Behavioural Factors	Group		χ^2	df	p
	Control Freq. (%)	Case Freq. (%)			
Weekly teeth cleaning			0.469	1	0.469
Less than 7 days	14 (21.5)	16 (27.1)			
7 days a week	51 (78.5)	43 (72.9)			
Daily teeth cleaning			1.789	1	0.181
Less than twice	19 (29.2)	24 (40.7)			
At least twice	46 (70.8)	35 (59.3)			
What you clean your teeth with			0.988	2	0.610
Tooth brush and tooth paste	55 (84.6)	46 (78.0)			
Chewing stick	8 (12.3)	11 (18.6)			
Others	2 (3.1)	2 (3.4)			
Duration of teeth cleaning			1.941	2	0.379
Less than 2 minutes	8 (12.3)	4 (6.9)			
2-5 minutes	51 (78.5)	51 (87.9)			
Above 5 minutes	6 (9.2)	3 (5.2)			
Changing tooth brush			2.624	1	0.105
After every 3 months or less	6 (10.5)	11 (22.0)			
Over three months	51 (89.5)	39 (78.0)			
Clean your tongue also			0.450	1	0.502
Yes	45 (75.0)	41 (69.5)			
No	15 (25.0)	18 (30.5)			
Cleaning teeth after every meal			11.285	1	0.001*
Yes	37 (60.7)	17 (29.8)			
No	24 (39.3)	40 (70.2)			
Mouth rinsing after refined sugars			1.598	1	0.206
Yes	18 (39.1)	26 (52.0)			
No	28 (60.9)	24 (48.0)			
Taking sweet refined sugars			0.034	1	0.0854
Yes	14 (36.8)	15 (34.9)			
No	24 (63.2)	28 (65.1)			
Previous visit to a dentist			5.718	1	0.017*
Yes	26 (42.6)	38 (64.4)			
No	35 (57.4)	21 (35.6)			

Note: (*) – significant $p < 0.05$

Table 2 presents the distribution of oral care behaviours of both groups. Most of the respondents in both groups cleaned their teeth every day of the week, and did so at least twice

a day. Brushing with tooth brush and fluoridated tooth paste was the main teeth cleaning method used by the respondents. Majority only changed their tooth brushes after using them for over three months. Both groups were similar in terms of their frequency of teeth cleaning and what they used for cleaning their teeth. Patients with dental caries were less likely to clean their teeth after every meal, and were more likely to have previously visited a dentist. Tooth ache was the major reason for visiting the dentist, among both cases (78.6%) and controls (68.6%).

3.3 Predictors of dental caries

Table 3: Predictors of dental caries

Factors	B	SE	Wald	df	p	Adjusted OR	95% CI
Cleaning teeth after every meal							
Yes	1					1	
No	-1.268	0.522	5.907	1	0.015*	0.28	0.10-0.78
Daily teeth cleaning							
Less than twice	1						
At least twice	-1.123	0.557	4.055	1	0.044*	0.33	0.11-0.97
Changing tooth brush							
After every 3 months or less	1						
Over three months	0.244	0.703	0.120	1	0.729	1.28	0.32-5.07
Mouth rinsing after refined sugars							
No	1						
Yes	-0.403	0.504	0.638	1	0.424	0.67	0.25-1.80

Note: (*) – significant $p < 0.05$

Results of multivariate logistic regression are shown in Table 3. The model fit, as Hosmer and Lemeshow test was not significant ($p=0.393$). The Nagelkerke R square also showed that 20% of dental caries can be explained by the model. Teeth cleaning at least twice a day was protective against dental caries.

4.0 Discussion

The similarity in socio-demographic characteristics of the cases and controls, adequately allows for evaluation of the other factors, as both groups are comparable. Daily teeth cleaning as well as teeth cleaning after meals are seen to be important protective factors against dental caries. A study among elementary school students in Taiwan revealed that the prevalence of dental caries as well as high indices decayed, extracted, and filled teeth in primary dentition (deft); decayed missing and filled teeth in permanent dentition (DMFT) was likely related to low use of oral health care product as well as mouth cleaning after meal (Cheng et al., 2014).

In this study, previous visit to a dentist was significantly associated with dental caries in bivariate but not multivariate analysis. Since dental pain was the major factor that prompted their visit to a dentist, it can be inferred that a previous dental caries was the most likely reason for their previous visits, reflecting a generally poor dental care habit among the respondents. This appears to be a widespread trend, as a previous study among middle-aged persons in China had revealed a higher DMFT score among those who had previously visited a dentist (Xu et al., 2014). Pain was also the chief complaint among children in their first dental visit in Chennai (Meer et al., 2008).

In contrast to previous findings (Chopra et al., 2015; Tarvonen et al., 2017), this study revealed no additional risks of dental caries with refined sugar consumption and those without caries consumed more refined sugars than those with caries. The higher frequency of teeth cleaning among them could have been the deterrent factor against caries, despite their high intake of refined sugars.

The Nagelkerke R square shows that many important factors had been left out in this study, as the model could not explain four fifths of dental caries. Another limitation of this study was the inability to ascertain the temporal relationship between the studied variables. It is recommended for future studies to incorporate more variables. Interventions to improve oral hygiene practices should also be studied.

5.0 Conclusion and recommendation

Daily teeth cleaning and teeth cleaning after meals were the most important protective factors against dental caries in this study. The study also suggests that with very frequent teeth cleaning, refined sugars may not pose additional risks of developing dental caries. Further qualitative studies should be conducted to explore local practices that could potentially increase the risk of dental caries among the study population. It is also recommended to develop and implement interventions to improve teeth cleaning among them.

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Declaration

The authors declare that there is no conflict of interest.

Authors' contribution

Author 1: conceived study, literature search and writing of manuscript.

Author 2: conceived study, literature search, data analysis, and writing of manuscript.

Author 3: writing and review of manuscript.

Author 4: writing and review of manuscript.

Author 5: writing and review of manuscript.

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