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Original Article

Pattern and Severity of Dental Caries among Adults in an Urban Population in Northwest Nigeria

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Abstract

Background: Dental caries is one of the most prevalent oral diseases affecting children and adult populations worldwide. The distribution and severity of dental caries vary in different parts of the world and within the same region or country. However, few studies have focused on the burden of caries among Nigerian adults. Therefore, this study aimed to determine the severity and pattern of dental caries among the adult population in the Kano metropolis.

Methodology: This was a cross-sectional study in which adults were interviewed using an interviewer-administered semi-structured questionnaire. Examiners used the criteria set by the World Health Organization (WHO) for assessing Decayed, Missing, and Filled Teeth (DMFT). Field examinations were carried out under artificial light with a wooden spatula, dental mirror, and a Community Periodontal Index of Treatment Needs (CPITN) probe.

Results: Respondents' mean (±standard deviation (SD) age was 41.2 (±12.78) years. The mean DMFT for the population was 3.58 (±3.53). One-in-three respondents (33.3%) had very low DMFT while one in five (20.0%) had very high DMFT. Severe dental caries as indicated by very high DMFT were more prevalent among women (22.2%), respondents with informal education (61.5%), and those who had a family history of dental caries (28.4%).

Conclusion: The severity of dental caries among the adult population in the Kano metropolis was low. Interventions should be focused on women, those with informal education and positive family history.

Keywords: Severity; Pattern; Dental Caries.

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Quick Response Code:

Introduction

Dental caries is one of the most prevalent oral diseases affecting children and adult populations worldwide.[1] Globally, the prevalence of dental caries in most industrialised countries ranges from 60-90% among school children.[2] Its prevalence among adults has also been reported to be high among different populations around the world.[2],[3],[4]In 2015, the number of people with untreated caries in permanent teeth, deciduous, and total tooth loss was 2.5 billion, 573 million, and 276 million, respectively, worldwide.[3],[4]Pain and complications of dental caries affect patients' quality of life and have a high economic impact on both individuals and society, thus making the disease an important public health problem.[3]

The distribution and severity of dental caries vary in different parts of the world and within the same region or country.[5] In 2018 among 12-year-olds the severity of dental caries was high in America with a Decayed, Missing, and Filled Teeth (DMFT) index of 3.0. The corresponding figures were 2.6 and 1.7 in Europe and Africa, respectively.[2],[5],[6] Among adults the severity and prevalence are increasing due to longer retention of teeth in the mouth into older ages.[6] It has also been suggested to be due to a lack of caries prevention programs for adults.[7]In many developed countries the DMFT for adults was high though there is a decline in the severity of caries, while the reverse is the case in developing countries.[8],[9] Studies revealed that in developing countries the prevalence of dental caries is now on the increase.[3]This is due to increased consumption of sugars and inadequate exposure to fluorides,[3]as well as access to oral care services.

The majority of epidemiological studies on caries in Nigeria focused on children and adolescents, with very few reported among Nigerian adults. The few reported prevalence figures among different adult populations in Nigeria range from 22 – 85%. [9-14]Kano metropolis is a commercially dynamic city and one of Nigeria's largest cities with the highest population in Northern Nigeria. The oral health care system in Northwest Nigeria is in transitional and developmental stages. Kano metropolis has few dental care providers, ranging from primary to tertiary hospitals, which offer oral health care delivery. There is little or no information about the severity and pattern of dental caries among its adult population. Assessment of dental caries among the adult age groups is imperative because data obtained can serve as a source of important information for planning services in dental care and supplement the analysis of global trends of dental caries among the adult population. This study, therefore, aimed to determine the severity and pattern of dental caries among the adult population in Kano metropolis.

Methodology

The study protocol was approved by the Kano State Ministry of Health (MOH/Off/797/TI/1237). Written informed consent was obtained from each subject who participated in the study and all relevant ethical principles of the World Medical Association of Helsinki (version 2013 Brazil) were adhered to.

Study design

This was a cross-sectional study carried out among the adult population of Kano Metropolis, Nigeria. The report of this study followed the STROBE guidelines for observational studies.[15]

Participants

The study consisted of adults above 18 years old residents in Kano Metropolis. Using the reported prevalence of caries among adults in a previous study,[9] the minimum sample size was calculated to be 168 at a confidence level of 95% (1 - α). Participants were selected through a multistage sampling involving several stages from Local Government Areas (LGAs) to the wards, and households. Kano Municipal and Tarauni LGAs were randomly selected at the first stage from the list of 8 LGAs that constitutes Kano Metropolis. Four political wards, two from each of the two LGAs were randomly selected by lots. Then, a quarter of the settlements in each ward were randomly selected using house numbers obtained from the LGAs' offices. The proportion of adults that constituted the sample from the selected households was distributed according to the number of houses in each of the four sampled wards. One consenting, eligible

adult was recruited from each household. Where there was more than one eligible adult, a lot was drawn to pick one adult. This continued until the selected settlements were sampled and the required size achieved.

Data collection

Examiners interviewed adults that consented to participate in the study using an interviewer-administered semi-structured questionnaire. Eight trained and calibrated examiners grouped into four teams of two examiners per team carried out the interview and oral examination. Each team comprised a male and a female. This was to allow for cultural sensitivity as some men do not allow males to interview their spouses. All examiners are fluent in the Hausa language. Training and calibration of the examiners were done by a standard evaluator over a period of a month prior to the commencement of the study. Each examiner carried out independent duplicate examinations on twenty individuals for the final calibration exercise. The intra- and inter-examiner reproducibility after the training ranged from 0.92 to 1.00 and 0.82 to 0.91, respectively. Examiners used the criteria set by the World Health Organization (WHO) for assessing decayed, missing, and filled teeth (DMFT).[16] Field examinations were carried out under artificial light with a wooden spatula, dental mirror, and a Community Periodontal Index of Treatment Needs (CPITN) probe. These were used for intraoral examination and dental caries assessment. Caries diagnosis did not involve probing the carious lesions, drying the tooth, or the use of X-rays.

Data were coded, entered into an Excel (Windows 10, Microsoft Inc. USA) spreadsheet, and cleaned. This was exported to the SPSS software for Windows version 23. (IBM Corp, Armonk NY, USA). The socio-demographic variables of respondents were calculated and presented using mean, frequencies, and percentages for quantitative variables. Dental caries was the dependent variable while socio-demographic data were the independent variable.

Results

A total of 186 people were approached and 171 agreed to participate in the study, which gave a response rate of 91.9%. The sociodemographic characteristics of the participants are presented in Table 1. The age of the respondents ranged from 18 to 65 years with a mean (±SD) age of 41.2 (±12.78) years. The majority of the participants were of the Hausa/Fulani (94.7%) ethnicity. Most of the respondents (72.5%) were married and almost a third (30.4%) had tertiary education while only 1.2% had no formal education. The majority (91.8%) had a family history of dental caries.

The severity (DMFT) of dental caries ranged from very low to very high as shown in Table 2. A third of the population had very low DMFT (33.3%) while about a fifth (19.9%) had very high DMFT. The mean DMFT for the population was 3.58 (±3.53). Decayed teeth (D) accounted for 72.1% of the overall DMFT, while missing (M) and filled (F) teeth made up 153 (25%) and 18(2.9%), respectively.

Comparatively, the pattern of dental caries showed a higher proportion of very high DMFT among females (22.2%), married respondents (29.3%), participants with informal education (61.5%), who were employed (23.3%), and those with a family history of dental caries (28.4%) as presented in Table 3.

Table 1: Socio-demographic characteristics of respondents

Socio-demographic Characteristics		Frequency n = 171 n (%)
Age Group (years)	18-44	95 (55.6)
	45-65	76(44.4)
	Total	171 (100)
	Mean (±SD)	41.2(±12.78)
Ethnicity	Hausa/Fulani	162 (94.7)
	Others	9 (5.3)
Religion	Islam	140 (81.9)
	Christianity	31 (18.1)
Sex	Male	90 (52.6)
	Female	81 (47.4)
Marital Status	Single	30 (17.5)
	Married	124 (72.5)
	Divorced/Separated	17 (10.0)
Level of Education	None	2 (1.2)
	Quranic only	37 (21.6)
	Primary	23 (13.5)
	Secondary	57 (33.3)
	Tertiary	52 (30.4)
Occupation	Unemployed	25 (14.6)
	Farmer	10 (5.9)
	Civil servant	32 (18.7)
	Traders	52 (30.4)
	Others	52 (30.4)
Family history of dental problem	Yes	157 (91.8)
	No	14 (8.2)

Table 2: Distribution of the grades of caries severity among the participants

DMFT Severity	Frequency n =171	Proportion (%)
Very low (0 – 1.1)	57	33.3
Low (1.2 -2.6)	58	33.9
Moderate (2.7 – 4.4)	12	7.0
High (4.5 -6.5)	10	5.9
Very high (> 6.5)	34	19.9

Table 3: Pattern of caries severity among the participants by their sociodemographic variables

Variables	Pattern of Dental Caries					
	Very low DMFT (0-1.1) n (%)	Low DMFT (1.2-2.6) n (%)	Moderate DMFT (2.7-4.4) n (%)	High DMFT (4.5-6.5) n (%)	Very High DMFT (> 6.5) n (%)	Total n=171(100)
Age (years)						
18-44	38 (40.0)	38 (40.0)	9 (9.5)	9(9.5)	1(1.0)	
45 – 65	19 (25.0)	20 (26.3)	3 (3.9)	1(1.4)	33 (43.4)	171(100)
Sex						
Male	33 (36.7)	26 (28.9)	10 (11.1)	5 (5.6)	16 (17.7)	
Female	24 (29.6)	32 (39.5)	2 (2.5)	5 (6.2)	18 (22.2)	171(100)
Ethnicity						
Hausa/Fulani	53 (32.7)	53 (32.7)	12 (7.4)	10 (6.2)	34 (21.0)	
Others	4 (44.4)	5 (55.6)	0 (0.0)	0 (0.0)	0 (0.0)	171(100)
Religion						
Islam	46 (32.9)	38 (27.1)	12 (8.6)	10 (7.1)	34 (24.3)	
Christianity	11 (35.5)	20 (64.5)	0 (0.0)	0 (0.0)	0 (0.0)	171(100)
Marital status						
Single	13 (43.3)	12 (40.0)	5 (16.7)	0 (0.0)	0 (0.0)	
Married	28 (22.6)	45 (36.3)	7 (5.7)	10 (8.1)	34 (27.3)	
Divorced	16 (94.1)	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	171(100)
Education						
Formal	44 (33.3)	56 (42.4)	12 (9.1)	10 (7.6)	10 (7.6)	
Informal	12 (30.8)	2 (5.1)	1 (2.6)	0 (0.0)	24 (61.5)	171(100)
Occupation						
Unemployed	14 (56.0)	9 (36.0)	1 (4.0)	1 (4.0)	0 (0.0)	
Employed	35 (24.0)	49 (33.6)	11 (7.5)	17 (11.6)	34 (23.3)	171(100)
Family history of dental caries						
Yes	19 (21.6)	22 (25.0)	10 (11.4)	12 (13.6)	25 (28.4)	
No	32 (38.6)	20 (24.1)	5 (6.0)	9 (10.8)	17 (20.5)	171(100)

Discussion

The severity of dental caries was determined by the DMFT index among an adult population with dental caries. The index remains the most widely used epidemiological tool for caries experience. It is however instructive to know that the index could be made more useful in assessing caries by looking at the individual components. The decayed teeth component (D) contributed the most (72%) to the DMFT. The F-component of DMFT in this study was very low (2.9%). This may be an indication of low awareness of restorative treatment options in the dental clinic, as many patients tend to seek dental care at a very late stage particularly after they have exhausted non-conventional dental treatment or when the pain is unbearable. At this stage, the options left will be the relatively expensive treatment modalities such as root canal therapy which many may not be able to afford, eventually many resorts to extraction due to lack of financial capacity. This finding of high (D) and low (F) components, as similarly reported,[17] also supports the reason for poor utilization of dental services.

This study found that the severity of dental caries among the adult population in the Kano metropolis as measured by DMFT was 3.58 (±3.53). This is similar to the DMFT of 3.57 reported for adults in the southern part of the country.[9] However, the value is lower than DMFT for adults in other African countries.

For instance, a DMFT of 4.67 was reported in Tanzania[18]while Uganda and Burkina Faso reported mean DMFTs of 4.71 and 6.3, respectively.[19]In addition, it was also lower than the value reported among the adult population in Asian countries such as China.[20]Furthermore, this value is lower than DMFTs recorded from repeated cross-sectional studies on caries among adults in different European countries which include Norway, Netherlands, Italy, Belgium, Germany, and Portugal.[21]

Considering the DMFT score from the few available African studies [18],[19] and the present study, it shows that although the prevalence and severity of dental caries have declined substantially because of widespread use of fluorides, preventive oral healthcare programs, changes in living conditions and lifestyles in the industrialized countries, they still have higher caries severity compared to the developing countries.[21],[22] Based on the WHO classification of severity of dental caries [23] among respondent cases, this study found that one-third of participants had very low DMFT (0 – 1.1), while one-fifth had very high DMFT (≥ 6.6). This is slightly higher than what a study [14] reported in Ibadan, Southwest Nigeria, in which a quarter (25.3%) of the respondents had very low DMFT. This was supported by the findings from a study carried out in Ethiopia which reported that there is a likelihood of a rise in the prevalence of dental caries in developing countries.[24] The severity of dental caries in this study implies that a fifth of the population had very high values that correspond to a range of DMFT among the European population.[21]

The pattern of dental caries in this study was based on the severity of dental caries in relation to different socio-demographic factors and types of teeth affected. Based on socio-demographic factors the pattern showed that very high DMFT was seen among the 45-65-year-old, female, and married respondents. Also, most respondents with informal education had very high DMFT unlike those with formal education in which a third (33.3%) had very low DMFT. About a fifth of the employed respondents (23.3%) had very high DMFT compared to unemployed respondents. Those with a family history of dental caries (28.4%) had a higher proportion of very high DMFT than those without a family history. These findings are corroborated by a study conducted in Ibadan which reported that adults with lower education had a higher proportion of decayed teeth and dental caries experience compared to those with lower education.[14] In addition, these results are similar to that of the study carried out in Brazil [25] which identified adult respondents with informal education, low income, and unemployed with very high DMFT. This could be due to the fact that respondents with low or informal educational status due to ignorance tend to patronize traditional dentists or quacks more, which results in no improvement in their oral health or at times worsen their oral health status. Therefore, more dental caries remains untreated while the unemployed respondents may not be able to afford the bill for standard treatment in the dental clinic.

Conclusion

The study found that the severity of dental caries among the adult population in the Kano metropolis was low. The distribution pattern of the caries severity based on socio-demographic characteristics showed it to be most severe among older adults, females, and married individuals.

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