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Dental caries; its sequelae and treatment among patients in a tertiary hospital in north–western Nigeria: A retrospective study

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Abstract

Background: Dental caries has been the most prevalent dental disease that affect human dentition. Lack of early visitation to the dentist and, awareness could lead to tooth mortality. This study aims to describe the pattern of dental caries, sequelae and, treatment among patients attending the dental clinic of Yariman Bakura Specialist Hospital Gusau (YBSH).
Materials and method: This is a 4year retrospective study conducted at YBSH Gusau. After obtaining ethical approval from the Hospital's Research and Ethics committee, patients' case notes from 18 years who were treated for dental caries and sequelae were retrieved. Demographic variables, presenting complaints, the number of carious teeth, frequency of teeth brushing, history of dental visitation, diagnosis and, the treatment offered were also recorded. Data recorded were analyzed using SPSS version 25.
Result: There were 100 (40.3%) males and 148 (59.7%) females in the age range of 18 –78 years with a mean±SD of 36.4±12.3years. Toothache in 159 (64.1%) was the main presenting complaint and, 168 (67.7%) of the study population visited a dentist for the first time. The majority 212 (85.5%) of the patients brush their teeth once daily. Permanent mandibular first molar 103 (41.5%) was the highest tooth affected by caries and apical periodontitis 66 (26.6%) constitute the majority of diagnoses. Dental extraction 171 (69.0) was the most treatment done.
Conclusion: Dental caries is a major public health problem that could lead to sequelae with life threatening consequences. Majority of those affected had not visited dentist before and could only afford tooth extraction as their preferred treatment option. Poor access to dental facilities and lack of awareness could have been the barrier to early presentation.

Keywords: Dental caries, sequelae, treatment, extraction

Introduction

Dental caries (tooth decay) is a biofilm-mediated, diet-modulated, multifactorial, communicable, dynamic disease resulting in net mineral loss of dental hard tissues which is determined by biological, behavioral, psychosocial, and environmental factors.[1] It is one of the most common diseases affecting the human population and is widely spreading across all communities though slowly progressing.[2] Dental caries is a chronic disease that has been regarded as infectious for the fact that it is initiated by microbial activity on the tooth surfaces.[3] The changes in the prevalence

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and severity of dental caries has been noticed in the past few decades.[4]

According to WHO, more than 5 billion people were estimated to have experienced dental caries.[5] In Nigeria, the caries experience varies from very low in rural areas to moderate in some urban communities with about 4-30% of Nigerians being affected.[6] Over 80% of carious teeth in Nigerians that occur in individuals aged below 21 years were pit and fissure lesions, and a vast majority of the carious teeth remained unrestored.[7]

Dental caries is an ecological disease in which diet, host and microbial flora interact with each other in a specific period in such a way that induces demineralization of the tooth structure with the resultant cavity.[2] If left untreated, caries will advance through the dentine, stimulating pulpitis and eventually pulp infection and necrosis; which subsequently lead to varieties of sequelae.[8] The sequelae of dental caries include pulpitis which could be acute or chronic, reversible or irreversible, apical periodontitis, periapical abscess and dentoalveolar abscess.[9] The latter could progress upward or downward to cause serious and life-threatening conditions, depending on the anatomical factors and, substantially the immune status of the patients.[10] However, if conservatively managed pulpal recovery could occur even in deep carious lesions. Root canal therapy stands as the recommended restorative intervention in teeth with irreversible pulp damage secondary to dental caries.[9,11] Tooth extraction may be an option in case of a hopeless tooth and a situation whereby the patient cannot afford root canal therapy or opted for it for any reason.

In our climes, where there are serious dental resource constraints in terms of dental equipment as well as manpower, patients tend to opt for teeth extraction rather than conservative options. This study aims to describe the pattern of clinical presentation of dental caries, its sequelae as well as the aspect of management. To the best of our knowledge, this is the first study of its kind from this axis and its findings may provide baseline data upon which further research could be carried out with the hope for improvement in the preventive aspect and, overall care for patients needing dental services.

Materials and method

This is a 4 years cross-sectional retrospective study conducted at Yariman Bakura Specialist Hospital Gusau, Zamfara state, Nigeria. It is currently the only specialist Hospital with an adequately equipped dental clinic strategically located in the capital city of the state. Zamfara state is located in the northwestern part of Nigeria that is bounded to the north by the Republic of the Niger, to the south by Kaduna State, to the east by Katsina State, and to the west by the states of Sokoto, Kebbi and, Niger. It has a land mass of 31,418 square kilometers with a population of about 3.1 million people, largely rural with farming as a major occupation (National population commission 2006). After obtaining ethical approval from the Hospital Research and Ethics committee, the clinical records of patients who presented and were treated on account of dental caries and its sequelae, from 18th of February, 2017 to 14th of February, 2021 were retrieved. Patients with a complete record of the information required and who are from 18 years and above were included. Demographic variables including age, gender, level of education, location, occupation and, marital status of the patients were recorded. Patient's presenting complaints, history of dental visitation, frequency of teeth brushing, the specific tooth/ teeth for which the complaint was laid, number of carious teeth on examination in each patient, diagnosis related to the complaint and, the treatment offered were also recorded. Data recorded were analyzed using SPSS version 25 (IBM Corp., Armonk, NY, USA).

Results

A total of 301 case records of patients were retrieved, out of which only 248 (82.4%) case notes were used and, the remaining 53 (17.6%) had incomplete records needed for the study, hence not included. There were 100 (40.3%) males and 148 (59.7%) females in the age range of 18 –78 years with a mean±SD of 36.4±12.3years. The ages of the patients were categorized into three; ≤30 years, 31–60 years and, >60 years. Table 1 shows the demographic characteristics of the study population. Toothache in 159 (64.1%) was the main presenting complaint of the patients in this study as depicted in table 3. Records on patients' history of dental visitation revealed that 168 (67.7%) of the

Table 1: Demographic characteristics of the study population

Sociodemographic	Frequency (%)
Gender	
Male	100(40.3.1)
Female	148(59.7)
Total	248(100)
Agegroup	
≤30	94(37.9)
31-60	146(58.9)
>60	8(3.2)
Total	248(100)
Level of Education	
Primary	18(7.3)
Secondary	76 (30.6)
Tertiary	94(37.9)
Others/Nil	60(24.2)
Total	248(100)
Occupation	
Farming	17(6.9)
Civil servant	64(25.8)
Business	29(11.7)
Student	98(395)
Others	40(16.1)
Total	248(100)
Patient's location	
Rural	52(21.0)
Urban	196(79.0)
Total	248(100)

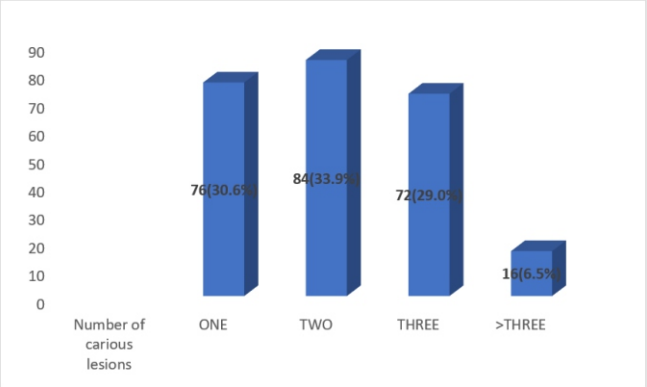

Figure 1: Number of carious teeth in addition to the patient main presenting complaint recorded from each patient

study population visited a dentist for the first time in their lifetime and, only 80 (32.3%) had a history of previous dental visitation (table 2). More female patients visited a dentist for the first time as compared to their male counterparts and the difference was statistically significant (table 2). The majority 212 (85.5%) of the patients brush their teeth once daily, 24 (9.7%) brush their teeth twice daily and, only 12 (4.8%) had no history of teeth brushing and the difference was not statistically significant across gender (table 2). Permanent mandibular first molar 103 (41.5%) was the highest tooth affected by caries in this study which was followed by permanent maxillary first molar 45 (18.1%) and, lower incisors and canines were found not to be involved (table 3). This study revealed one carious tooth in 76 (30.6%), two carious teeth in 84

Table 2: Distribution of frequency of teeth brushing, history of dental visitation and, treatment giving as it relates to gender of the patients

	Male	Female	Total	Test statistics
Frequency of brushing				
No brushing	3	9	12	
Brushes once daily	97	115	212	$\chi 2 = 19.987$ df=
Brushes twice daily	0	24	24	p-value= 0.000
Total	100	148	248	
History of dental consulta				
First Visit	59	109	168	$\chi 2 = 5.860$ df=1
History of a dental visit	41	39	80	p-value= 0.011
Total	100	148	248	
Treatment				
Simple restoration	14	25	39	
RCT + Restoration	2	36	38	$\chi 2 = 25.860$ df=
Extraction	84	87	171	p-value= 0.000
Total	100	148	248	

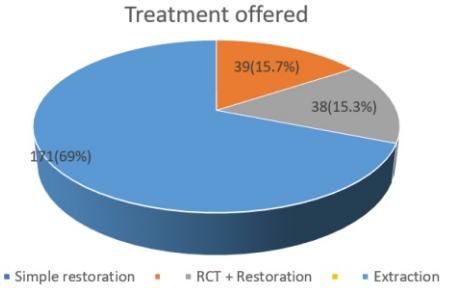

Figure 2: Distribution of the treatment modalities among the study population

Table 3: Distribution of presenting complaints, specific teeth involved and, diagnosis among the study population

Variable	Frequency n (%)
Presenting complain	
Toothache	159(64.1)
Discoloration	42(16.9)
Hole	12(4.8)
Food lodgment	9(3.6)
Swelling	7(2.8)
Swelling +pain	19(7.7)
Total	248(100)
Specific tooth involved in the presenting complain	
Maxillary incisors	1(0.4)
Mandible incisors	0(0)
Maxillary canine	0(0)
Mandibular canine	0(0)
Maxillary first premolar	8(3.2)
Maxillary second premolar	2(0.8)
Mandibular first premolar	4(1.6)
Mandibular second premolar	3(1.2)
Maxillary first molar	48(19.4)
Maxillary second molar	24(9.7)
Maxillary third molar	23(9.3)
Mandibular first molar	97(39.1)
Mandibular second molar	30(12.1)
Mandibular third molar	8(3.2)
Total	248(100)
Diagnosis concerning the presenting complain	
Dental caries	25(10.1)
Reversible pulpitis	15(6.0)
Irreversible pulpitis	52(21.0)
Apical periodontitis	66(26.6)
Periapical abscess	35(14.1)
Dentoalveolar abscess	30(12.1)
Others	25(10.1)
Total	248(100)

(33.9%), three carious teeth in 72 (29%) and, more than three carious teeth in 16 (6.5%) of the patients (figure 1). Concerning the patients' main presenting complaint, apical periodontitis 66 (26.6%) constitute the majority of diagnoses, followed by irreversible pulpitis 52 (21.0%), dento-alveolar abscess 30 (12.1%) and, the least was reversible pulpitis 15 (6.0%) (table 3). Other clinical diagnoses include; retained root, pulp polyp and, grossly carious teeth constituting 25%. Dental extraction 171 (69.0%) was the most treatment done, followed by simple restorations (such as composite and glass ionomer) 39 (15.7%) and, root canal therapy (RCT) 38 (15.3%) (figure 2). No statistically significant difference between males and females as it relates to the treatment offered to the patients in this study (table 2).

Discussion

This study explored the pattern of dental caries, its sequelae and treatment and, females were found to be more commonly affected than males. This finding is in tandem with many previous studies in the literature.[12,13] Early eruption of teeth more and, frequent snacking in females were suggested. However, the higher female predilection in this study could be related to the environment in which the study was carried out, in which a larger number of females than males are seen attending various units in our hospital for consultation. Generally, dental caries can occur at any age in both permanent and deciduous teeth, but it was found to be more prevalent in children within the age range of 5–15 years and most studies in the literature are concentrated on this age range.[12,13,14,15,16] This study however, concentrated on the clinical presentation and sequelae of dental caries in permanent teeth visa vis the treatment in the adult population. The sequelae of dental caries were found more common in permanent teeth especially, in the adult population.[17]

Worldwide data revealed dental caries to be more prevalent in urban as compared to rural areas.[18] Similarly in Nigeria, the caries experience varies from very low in rural areas to moderate in some urban communities.[7] We made a similar observation in this study. Both dental caries and their sequelae are more common in individuals from the rural environment likely due to poor access to oral health

at both the community and clinical levels.

This study demonstrated toothache as the main presenting complaint of the patients. Similar to the study conducted by Taiwo et al.[19] from a closer environment. Omitola and Arigbede also made similar observations.[20] Pathologies resulting from untreated dental caries could lead to excruciating pain which sometimes may not respond well to analgesics.[21,22] Dental caries occurs in stages and is a slowly progressive process.4 Majority of our patients don't present early especially when no symptoms present. The recognition of dental caries at early stages requires dentists either at the clinical or community level. Lack of access to dental services, poor dental preventive care and the economic burden of dental care on patients could be the reasons for late presentation.

The mandibular first molar was the commonest tooth affected by dental caries and its sequelae in this study followed by the maxillary first molar. Several studies reported mandibular molars as the most commonly affected teeth by dental caries.[19,23,24] The tendency for food and dental plague accumulation around molar teeth might be the reason for their susceptibility to dental caries as suggested by Taiwo et al.[24]

Data from this study on the history of teeth brushing revealed that the majority (85.5%) of the patients brush their teeth once daily and, the difference in this practice was not statistically significant across gender. The practice of once daily teeth brushing has a significant effect on influencing plaque formation. Studies have shown that the rate and severity of dental caries are more in patients who brush their teeth once daily as opposed to those who brush twice daily.[25,26] When you brush twice a day, the dental plaque can be removed earlier before it hardens on the teeth surface. A dental plaque that is still soft, can be easily brushed and flossed away contrary to when it hardens, it remains in place until it is scraped away mechanically by the professional. Records on patients' history of dental visitation revealed that 67.7% of the study population visited a dentist for the first time in their lifetime. This may likely be due to the exclusive location of dental centers in urban areas in the region of the study, where patients (mostly farmers and herdsmen) have to travel from rural areas to seek dental care. Wide spreading, recently evolving insecurity challenges fulminating into fear and anxiety to travel may also have contributed to the lack of patients visiting the dentists regularly.

The treatment of dental caries and its sequelae depends on the extent of involvement.[7] Initially caries presents as a painless white spot caused by the decalcification of enamel which may be reversible.[27] It subsequently led to cavitation which further advance to involve the dental pulp.[19] Simple caries without pulpal involvement or with reversible pulpitis can be addressed by simple restoration with composite or glass ionomer restorative materials. Other sequelae of dental caries including; irreversible pulpitis, apical periodontitis, periapical abscess, the dentoalveolar abscess can be managed by root canal therapy or extraction which are largely driven by the patient. These sequelae if left untreated could result in more serious and dangerous conditions such as Ludwig's angina, cervicofacial necrotizing fasciitis, orbital cellulitis and, cavernous sinus thrombosis.[19,22,28] Apical periodontitis was the major sequelae of dental caries recorded from this study. This is in tandem with studies by Enyanechi et al.[23] Taiwo et al.[24] Sotunde et al.[29] and Umanah et al.[30] contrarily found irreversible pulpitis as the commonest presenting sequelae of dental caries. The late presentation of patients and poor access to oral health care observed in our study may explain the differences in findings. Although root canal treatment (RCT) could have been the best option for treating the non-life-threatening sequelae of dental caries, extraction was necessary for most of the patients in this study. The majority of patients opted for the extraction despite having information on the possibility of saving the tooth. Lack of funding for dental care and, universal health insurance coverage, as well as poor attitude to dental care, could have led to this inevitable tooth mortality. Tooth extraction was regarded as patients' disposition to access oral care.[31,32] More females as compared to male patients had treatment in this study, though the difference was not statistically significant. The female predominance could be due to the better health-seeking behavior of females compared to their male counterparts.[24] The dental professionals in our clime have to do more in educating and convincing patients on the possibilities and benefits of teeth conservation.

Conclusion

Dental caries is a major public health problem affecting individuals from all communities. Pathologies from untreated dental caries could lead to sequelae that could be life-threatening. Early presentation and treatment could prevent patients' morbidity and tooth loss due to extraction. It is imperative to look at the underlying social determinants of dental caries as a public health problem and barriers to getting primary oral health care, so also organizing educative programs for the masses as well as reorganizing dental services at both clinical and community levels. The dental professionals are expected to do more in persuading patients about the options of teeth conservation.

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