Dental Caries Risk Factors Among Symptomatic And Asymptomatic Selected People

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ABSTRACT: Background: Dental caries, the most common chronic infectious disease that affects humans is one of the most common preventable diseases. It is now recognized as a major public health oral disease which hinders the achievement and maintenance of oral health in all age groups, sex and tribes all over the world by gradually destroying the tooth structure and causes discomfort. To know the important factors responsible for formation of tooth decay and use these factors as guide for prevention. **Materials and methods:** Useful information was obtained from the study subjects by imploring them to fill questionnaire through the Google Forms Application. The responses gotten from respondents were analyzed using Social Sciences Statistical Package (Version 23). **Results:** Out of the 100 respondents (53 females and 47 males), 68% had tooth decay. Patients between ages 21-35 years had the highest frequency (57%) out of those that participated in the study. There is correlation (-0.04) between dwelling area of the patients and tooth decay. It was observed that the majority (89%) of respondents did not visit the dentist for regular annual oral examination. **Conclusion:** Due to limited information on risk factors of dental caries in vulnerable populations and lack of access to dental caries, preventable efforts are hindered. Thus the need to educate this populations the common risk factors of tooth decay and that early diagnosis should be treated with immediate effect.

Keywords: Risk factors, teeth, dental caries, age, sex, prevention

INTRODUCTION

Tooth is one of the hardest structures in humans located in the mouth. One of the chronic infections of the tooth is known as tooth decay, also called dental caries. Dental caries chronic nature makes it to gradually cause foul taste in the mouth, severe tooth sensitivity and gradually destroy the tooth structure, causing unavoidable pain in both young and old (especially when eating), total discomfort and finally loss of tooth. Age, sex and hereditary conditions are intrinsic risk factors of dental caries to the individual which can neither be changed nor modified (Featherstone, 2008). Dental caries being considered as heritable disease is linked with high blood pressure, diabetes, heart diseases and sometimes multiple sclerosis along with continuous pain that gets aggravated by cold, heat, sugar and drinks (Tahir and Nazir, 2018).

Common risk factors of dental caries include poverty, stress or application of force on tooth probably while eating or through domestic violence, unbalanced diet and addiction to alcoholic drinks and other sugary drinks, tobacco and other strong drugs. All these risk factors have been heightened during the Coronavirus disease pandemic (Ece *et al.*, 2020). Warren *et al.* (2003) listed some indirect causes of tooth decay to be low fluoride content, loss of some natural teeth and inability to replace them, malalignment of the teeth and gingival recession and abrasion defects at the neck of the tooth. Three important factors responsible for dental caries formation is the susceptibility of the host to infection, presence of microorganisms that can cause caries and human diet (Naseem, 2004). Tooth decay ought to be a preventable oral disease based on its common risk factors and indirect causes, but it is now recognized as a serious oral health problem to both sex, all ages and tribes all over the world (Yadav and Prakash, 2016).

Oral bacteria can be transferred from mothers or caregivers to children and thus colonize the soft tissues even before eruption of teeth (Featherstone, 2008). Even when taking universal precautions (Kohn *et al.*, 2003), Dentists have high risk of being infected because of their closeness to infected patients while giving care. Patient's face are not covered with masks and mouths are opened during consultation and treatment which can pose problems to the health givers. In the case of Covid-19, infected patients can infect the health

givers while they can as well transmit the virus to other patients thereby causing hospital acquired infection. Covid-19 patients, especially those ones showing symptoms are advised to avoid non-emergent dental care and oral health givers should also stop attending to them until the patient has recovered (Ece *et al*., 2020).

There are numerous microorganisms found everywhere but only microorganisms that can withstand the oral environment can be associated with or cause tooth decay. That is, a normal oral microbe by itself will not cause tooth decay unless there is a food source or diet that permits it and also a susceptible host. Over 700 bacterial species were found in healthy oral cavities, some of which show specificity as to individual subjects, others are specific to particular sites within the oral cavity (Devi *et al.*, 2012). These organisms include both gram positive and gram negative bacteria. These oral bacteria ferment foods, produce acids and thereby dissolve tooth minerals (Featherstone, 2008). The group of organisms responsible for dental caries are called dental biofilm. In addition to bacteria, other organisms such as fungi, diatoms and other algae, amoebae and ciliates can also be found in biofilms, but their quantity depends on their specific environment (Aparna and Yadav, 2008). *Streptococcus mutans* and *Lactobacilli* sp. are common organisms found to be the primary cause of dental caries while others include *Staphylococcus* sp., *Proteus* sp. (Devi *et al*., 2012; Tahir and Nazir, 2018).

Human diet also plays an important role in formation of tooth decay. Increase in the consumption of sweet and sweetened drinks and food in Nigeria combined with poor oral hygiene might lead to a higher level of caries (May *et al*., 2006; Balogun *et al*., 2017). The major food source in our diet is carbohydrate. Some examples of carbohydrate foods are yam, pasta, cereals, bread and processed sugars. All these carbohydrate foods, natural sugars found in fruits and veggies and also drinks like beverages, juices and soft drinks are all sugar-rich foods and drinks that have potential to cause tooth decay. The importance of adopting of good oral health behaviors such as regular brushing of teeth, using of mouthwash and flossing teeth in reducing the disease burden and attaining optimal oral health was illustrated and the role of sugary foods (majorly from carbohydrate source) in cariogenesis was also well established (Alhabdan *et al*., 2018). Sugar molecules from carbohydrate foods are then attached to the tooth or teeth surface (enamel, crown or root) and acted upon by common cariogenic bacteria (*Streptococcus mutans* and *Lactobacilli* sp.). These bacteria starts growing gradually and proliferate which cause the teeth to start wasting away due to the acid produced and thereby leaving hole on the teeth (Tahir and Nazir, 2018). The process is achieved by

dental biofilm which because of their synergy were able to resist any form of host-defense mechanisms.

The overall oral health has not improved during the last 25 years, the number of people with untreated oral conditions reached 3.5 billion in 2015; untreated caries in permanent teeth affected 2.5 billion people; untreated caries in deciduous teeth affected 573 million children; severe periodontal disease affected 538 million people; and total tooth loss affected 276 million people worldwide. These are likely to continue increasing as many populations continue growing and aging but only more efforts are needed to achieve this by 2020   (Kas'sebaum *et al*., 2015). Dental caries are responsible for high rate morbidity among the population and are associated with a reduced quality of life (Nelio *et al*., 2016). In Nigeria, 4-30% of the population has dental caries (Akpata, 2004). Approximately 2.43 billion people which is 36% of the population (both the permanent and baby teeth) are affected by dental caries (Yadav and Prakash, 2016).

Interest of improving oral health globally with the use of set goals was not attained (Alhabdan *et al*., 2018). Antibiotic resistance increases the morbidity associated with dental caries and thus contributes to the rising costs of care and the need for more expensive drugs (Yadav and Prakash, 2017). Some of the cariogenic organisms are resistant to available antibiotics, though have deleterious effects if used for long. Nevertheless,   they are considered to be more effective against dental caries bacteria but effectiveness of medicinal plants is slow with fewer side effects and can be used for long terms (Devi *et al.,* 2012). As chronic as dental caries is, it is preventable with greater efforts and maybe a different strategy may be employed if improved oral health is to be achieved.

Efforts to prevent dental caries are hampered due to limited information on associated risk factors of dental caries in vulnerable populations. New approaches to oral care is teledentistry which can be used for education, consultation and triage, allowing providers to interact and advise patients using telephone or mobile set (Ece *et al*., 2020; Brian and Weintraub, 2020). Apart from urgent or emergency cases, a new approach of teledentistry has been in use. This has limited routine oral care especially for patients with dental caries which involve aerosol generating procedures during treatment. Due to the Covid-19 direct and indirect infection, preventive measures must be taken to avoid any form of oral health problems. This greater effort and the different strategy will not be something difficult if people are well educated to know about the risk factors that can make their teeth prone to decay and possibly avoid these factors.

METHODOLOGY

This study was carried out in Ogun-State using a prepared online survey questionnaire. The

online survey questionnaire used has the following contents; personal data of the study subjects which include sex, age range, tribe, address and occupational status. This is followed by their oral hygiene status which include knowledge on oral hygiene, number of time they wash their teeth daily, method of oral hygiene used (use of toothpaste or chewing stick) and type of toothbrush or chewing stick used. Their diet type, their take on consumption of sugary foods in causing tooth decay and also how often they visit the dental clinic for consultation were also required. They were also asked whether they have tooth decay or carried-free. Their dental caries details like tooth affected with caries, jaw affected and side of the jaw affected and mode of treatment used were also questioned. Over 200 people were sensitized before sending out the online questionnaire to them through their e-mail addresses and WhatsApp links. One hundred study subjects who

were interested in the study research only responded. These 100 responses (from the respondents) were then imported to MS-Excel and analyzed with Statistical Packages for Social Sciences (SPSS) Version 23.

RESULTS

A total number of 100 respondents were recorded participated in the study, out of which 53 (53%) were females and 47 (47%) were males (Table 1). The respondents were within the age range below 21 (< 21), 21-35, 36-50, 51-65 and above 65 (> 65) years respectively (Figure 1). Respondents within 21-35 years had the highest frequency (57%), followed by 36-50 years (30%), below 21 years (11%) and lastly 51-65 years (2%) participated in the study (Figure 1). There was no respondent that is above 66 years in this study.

Table 1: Sex percentage of the respondents

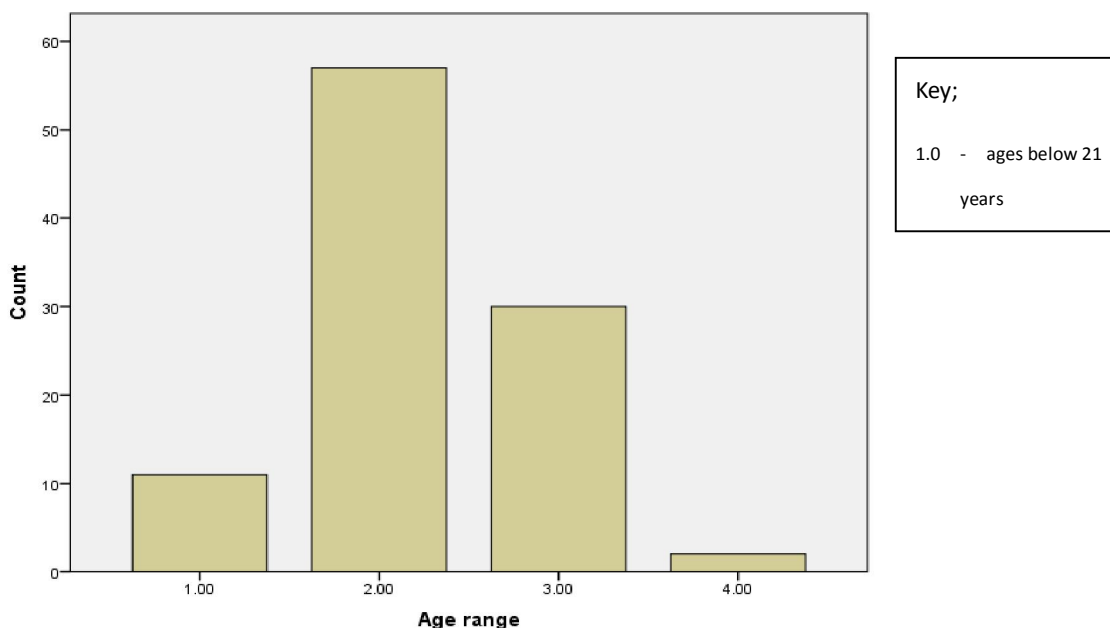|	Frequency	Percent	Valid Percent	Cumulative Percent
Female	53	53.0	53.0	53.0
Male	47	47.0	47.0	100.0
Total	100	100.0	100.0	

Key;

1.0　-　ages below 21 years

Figure 1: Frequency of the age range of the respondents

Out of the 100 respondents, 68 (68%) declared they have tooth decay. Some are infected in one of the tooth while others have more than one tooth infected in any part and tooth. Few respondents 11 (11%) were not infected at all while others were not sure of whether the oral pain they have is due to the onset of tooth decay infection or other oral infections (Table 2).

Table 2: Prevalence of tooth decay

Tooth decay	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	68	68.0	68.0	68.0
No	11	11.0	11.0	79.0
Not sure at all	9	9.0	9.0	88.0
Likely	9	9.0	9.0	97.0
Can't say	3	3.0	3.0	100.0
Total	100	100.0	100.0	

There is no correlation (-0.04) between dwelling area of the respondents and infection with tooth decay (Table 3). There is correlation significance (1-tailed) difference (P<0.05) between intake of sweet foods, brushing of teeth and tooth decay (Table 4 and table 5).

Table 3: Correlations between dwelling area of the patient with tooth decay

		Dwelling area	Tooth Decay
Dwelling area	Pearson Correlation	1	-.044
	Sig. (2-tailed)		.662
	N	100	100
Tooth Decay	Pearson Correlation	-.044	1
	Sig. (2-tailed)	.662	
	N	100	100

Table 4: Correlations between sweet food and brushing

Control Variables			Sweet food	Brushing
Tooth Decay	Sweet food	Correlation	1.000	.064
		Significance (1-tailed)	.	.266
		Difference	0	97
	Brushing	Correlation	.064	1.000
		Significance (1-tailed)	.266	.
		Difference	97	0

Table 5: Correlations between sweet food, toothpaste used and brushing

Control Variables			Sweet food	Toothpaste	Brushing
Tooth Decay	Sweet food	Correlation	1.000	-.025	.064
		Significance (2-tailed)	.	.806	.532
		Difference	0	97	97
	Toothpaste	Correlation	-.025	1.000	-.004
		Significance (2-tailed)	.806	.	.972
		Difference	97	0	97
	Brushing	Correlation	.064	-.004	1.000
		Significance (2-tailed)	.532	.972	.
		Difference	97	97	0

Respondents strongly agreed that oral hygiene is essential with the use of toothpaste and toothbrush for oral cleaning. The toothpastes for oral cleaning used by the respondents are Oral-B (45%), Closeup (26%), Darbur (4%) and Colgate toothpaste (14%) respectively. Other respondents (11%) are using other materials like chewing sticks for their oral cleaning (Table 6). Out of 100 respondents, it was observed that majority (89%) of the respondents were not visiting the dentist for annual oral checkup, others 6%, 3%, 1% and 1% visited once in a year, every six months, every 3 months and every month (Figure 2).

Table 6: Percentage of toothpastes used

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Oral-B	45	45.0	45.0	45.0
	Closeup	26	26.0	26.0	71.0
	Darbur	4	4.0	4.0	75.0
	Colgate	14	14.0	14.0	89.0
	Others	11	11.0	11.0	100.0
	Total	100	100.0	100.0	
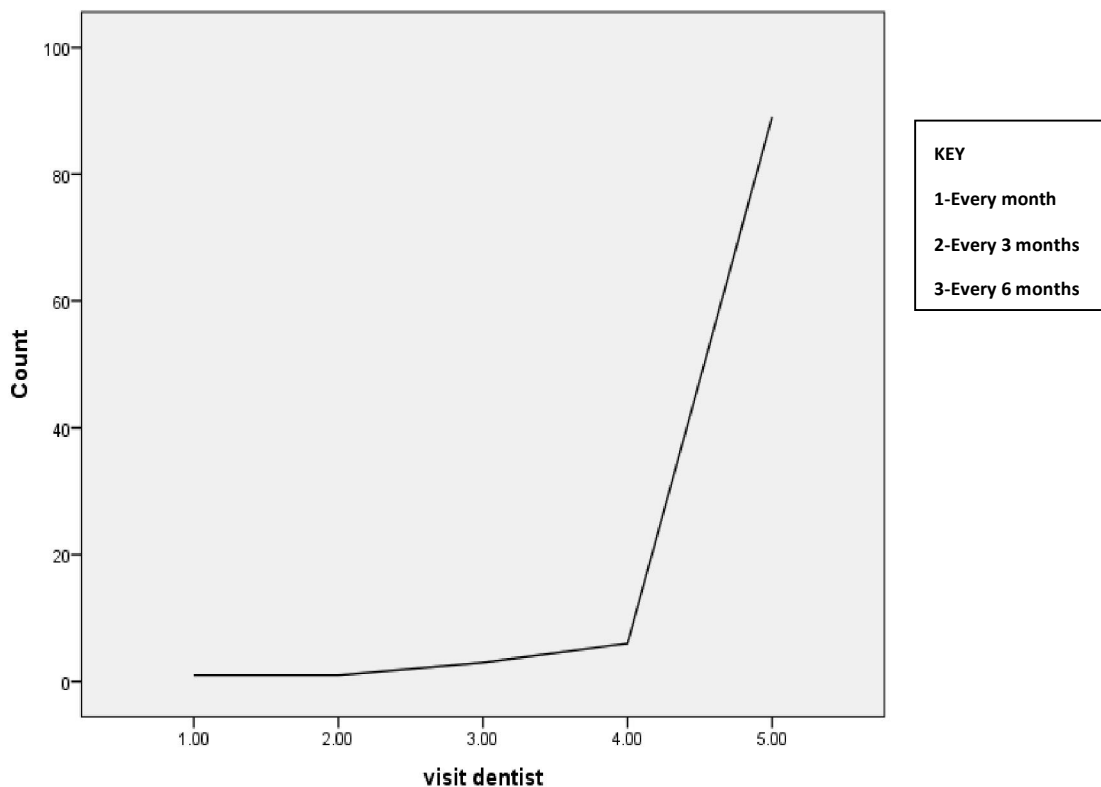
Figure 2: Frequency of visiting the dentist in a year

DISCUSSION

Compared to caried-free respondents, the proportion of respondents with tooth decay infection was high. Both males and females were found to have tooth decay infections, as observed in this study. Observation of major risk factors in all ages, demographic and socioeconomic classes, shows that dental caries are prevalent. Yadav and Prakash (2016) stated that the prevalence of dental caries now varies due to high prevalence with age, sex, socio-economic status, race, geographical location, food habits and oral hygiene practices. Tahir and Nazir (2018) reported that the prevalence of dental

caries has been correlated with socio-economic and demographic factors as well as behavioral aspects within the general population. It was found that dental caries occurred in each age group involved in the survey.

Virtually all respondents liked a sugar-rich diet. Even though they agreed on the evidence that one major risk factor for dental caries is sugar foods. In addition, this research established that diet also plays a major role in respondents' dental caries. Infection of caries has occurred in one tooth or more than one tooth and in various areas of the individual tooth. Different tooth surfaces may develop primary

caries (Yadav and Prakash, 2016). All the respondents are urban dwellers, which means that practically urban dwellers are those affected with caries. This is consistent with findings in Nigeria showing that 4-30 percent of the population has dental caries and that the prevalence appears to be growing among certain segments of the urban communities than rural communities (Akpata, 2004). The etiology of dental caries is associated with four principal factors. Dental caries-related factors include bacteria, time, susceptible tooth surface, and diet rich in fermentable carbohydrates, while some behavioral and socio-demographic factors such as bad oral hygiene, age, inappropriate tooth brushing practices and sugar-containing drinks are other factors likely to increase the risk (Tahir and Nazir, 2018).

Due to the consequence of high prevalence of dental caries, the treatment need is increased (Yadav and Prakash, 2016). Majority of the respondents take oral hygiene as essential because they use toothbrushes and fluoridated toothpastes according to the manufacturers for their oral cleaning. Only few people were observed to use other methods of oral cleaning. Over half of the respondents reported that they had never been to the dentist, this group also includes those that have tooth decay infection. Eating sugar-rich foods, poor oral cleaning method, not going for oral checkup even when the tooth/teeth had already been infected will make all effort to control and even treat dental caries infection to be difficult to achieve.

CONCLUSION

Due to insufficient knowledge on associated risk factors of dental caries in vulnerable communities, preventable measures are hindered. Thus, the common risk factors of dental caries need to be informed and reminded to this population. Carbohydrates, for example, can be difficult to avoid being the most common in the Nigerian diet, but intake can be controlled and required measures such as teeth brushing, flossing after eating can be adopted. The rate of infection of dental caries would be minimal with good sensitization, education and potentially free access to dental care.

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