



Knowledge of Risk Factors of Dental Caries among Secondary School Students in Nsukka Local Government Area, Enugu State

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Abstract

Dental caries is a complex chronic oral disease. The purpose of this study was to assess the knowledge of risk factors of dental caries among secondary school students in Nsukka local government area, Enugu state. Three objectives, three corresponding research questions and two null hypotheses were posed to guide the study. The descriptive cross-sectional survey design was adopted for the study. The population for the study consisted of 3,039 students in public secondary schools in Nsukka Local Government Area. Multi-stage sampling techniques were used to draw the sample of 384 Secondary School Students for the study. The instrument used for data collection was the researcher structured questionnaire titled knowledge of Risk factors of Dental caries questionnaire (KRDQ). Face validity of the instrument was established by three experts from the department of Human Kinetics and Health Education, University of Nigeria, Nsukka. Percentages and frequencies were used to answer the research questions. The null hypotheses were tested using chi-square at 0.05 level of significance. The study revealed that the overall percentage of secondary school students with correct response on knowledge of risk factors of dental caries was 49.1%, it is low because it is below average. The result showed that more percentage of female secondary school students (51.4%) had correct response on knowledge of risk factors of dental caries than male secondary school student (46.6%). Also, students aged 17-19 had the highest correct response on Knowledge of risk factors of dental caries. It was therefore recommended among others that intensive health education programme focusing more on knowledge of risk factors of dental caries and giving more attention on male students and younger students.

Keywords: Knowledge, Risk factors, Dental caries, Secondary School Students

Introduction

Dental caries results from a complex interaction of factors like host susceptibility, bacteria, diet, and time (duration). According to the World health organization (WHO), dental caries (tooth decay) is defined as the destruction of the enamel layer of the tooth by acids produced by the action of bacteria on sugar (WHO, 2017). It is widely known that dental caries is one of the preventable oral health problems and the most common chronic infectious, childhood diseases (Syreen, Anwar, Ahmad & Rahman, 2018). Consequently, the acid destroys the enamel surface; if the process is not seen, it will result in progressive destruction of the tooth (Garkoti, Singh, Rawat, & Pandey, 2015). Dental caries has many complications like toothache, pulpitis, tooth loss, dental discoloration, and Ludwig angina (Yadav, & Prakash, 2016). Children with dental caries have difficulties in sleeping, playing, eating, performing academic activity and communication problems due to missing, discolored, or damaging teeth, dental caries affects children's physical growth, self-esteem and social development (Turton & Durward, 2017).



Dental caries has impacts on general health, dental infection increases risk of pneumonia, gum disease can complicate diabetes, and oral bacteria are associated with infective arthritis and associated with endocarditis inflammation of the heart's inner lining (Federation of Wholesale Distributors, 2015). A healthy mouth not only enables the nutrition of the physical body, but also enhances social interaction and promotes self-esteem and feelings of well-being (Chen, Gao, Duangthip, Lo, & Chu, 2019). Poor oral health can lead to tooth decay which affects the growth and maturation of secondary dentition (permanent dentition) which leads to malocclusion of teeth (Chugh, Sahu, & Chugh, 2018).

Globally, it has been estimated that 60% to 90% of school children have dental caries; this means that six to nine children in every ten are affected by tooth decay (Ozdemir, 2014). It is estimated that nearly 3.5 billion people are affected by oral disease in the world (WHO, 2020). Approximately 36 per cent of the world populations have dental caries in their permanent teeth (Yadav & Prakash, 2016). In developed countries, dental Caries ranges from 32% to 80% in Poland, Canada and United States (Szatko, Wierzwicka, Dybizbanska, Struzycka, Iwanicka-Frankowska, 2004; Tinanoff & Reisine, 2009). About 80% of children and 60% of adults suffer from dental caries (Dixit, Shakya, Shrestha, & Shrestha, 2013). Many industrialized countries have experienced a dramatic decline in dental caries which has been attributed to improved socio-economic conditions, changing lifestyles, self-care practices, use of fluorides, and effective use of preventive oral health services (Yadav & Prakash, 2016). In low- and middle-income countries, the incidence of dental caries is rapidly increasing among children and adults (Treerutkuarkul & Gruber, 2015).

In Nigeria, the prevalence of dental Caries ranges from 6.6% to 23.5%, but the most striking finding in our locality is that the carious lesions remain untreated (Adeniyi, et al., 2009; Iyun, Denloye, Bankole, & Popoola, 2014; Olatosi et al., 2015). Nigeria, a developing country, faces many challenges in rendering oral health needs. Despite credible scientific advances and the fact that caries is preventable, the disease continues to be a major public health problem (Folayan et al., 2015). Untreated caries are often associated with pain, infection, difficulty in chewing, premature tooth loss and speech difficulties (Donell & Hector, 2004). In most low- and middle-income countries, the general population does not benefit from systematic oral health care, nor have preventive programmes been established. In some countries the incidence of dental caries has increased over recent years and may further increase as a result of the growing consumption of sugars and inadequate exposure to fluorides (Dixit, Shakya, Shrestha, & Shrestha, 2013). The early diagnosis and treatment of caries in young children will lead to better oral health in adulthood.

Dental caries is defined as a multi-factorial infectious disease caused by plaque bacteria. When food enters the mouth, bacteria metabolize fermentable carbohydrates, producing acids, which diffuse into hard dental tissue, and demineralize tooth enamel (Featherstone, 2008). Healthy mouth not only enables the nutrition of the physical body, but also enhances social interaction and promotes self-esteem and feelings of well-being (Chen, Gao, Duangthip, Lo, & Chu, 2019; Roy, 2018). In the absence of proper dental hygiene, this process has an increased likelihood of resulting in dental caries. Dental caries currently represents the most common chronic disease among children; it is 5 times more common than asthma, and seven times more common than seasonal allergies (U.S. Department of Health and Human Services, 2014). Yee et al. (2002) reported in third world countries, dental caries is the fourth most expensive disease to



treat. They are three principal factors that when interplay is responsible for this multifactorial disease; the host which is teeth and saliva. Microorganisms in the form of dental plaque and Substrate (diet), thus, caries requires a susceptible host, cariogenic oral flora and a suitable substrate, which must be present for a sufficient length of time. When a tooth has deficiency in fluorine, zinc, lead and iron content of the enamel is associated with increased caries. Which results in deep, narrow occlusal fissures, and lingual and buccal pits tend to trap food debris and bacteria, which can cause caries. As teeth get worn (attrition), caries declines. The inter-dental areas are more susceptible to dental caries. Also, mal -alignment of the teeth such as crowding, abnormal spacing, etc. can increase the susceptibility to caries. Saliva has a cleansing effect on the teeth. Normally, 700– 800 ml of saliva is secreted per day. Caries activity increases as the viscosity of the saliva increases, while eating fibrous food and chewing vigorously increases salivation, which help in digestion as well as improves cleansing of the teeth. Also, caries is formed as a result of interplay between oral microflora, fermentable carbohydrates like sugary snacks, a susceptible tooth, and adequate time (Okoye & Ekwueme, 2011). The quantity as well as composition, pH, viscosity and buffering capacity of the saliva plays a role in dental caries (Shah, 2018). However, no country claims to have caries free children (WHO, 2003), and the explanation for why young children develop dental caries is complex.

Prevalent of dental caries is the rate at which dental caries exist among adolescence. Dental caries (decay or cavities) is a breakdown of teeth as a result of bacteria, it is the most prevalent chronic disease of childhood, yet oral health is often neglected within the health care system (Mignogna & Fedele, 2006). It is the second most common cause of tooth loss and is found universally, irrespective of age, sex, and geographic location. It is considered to be a disease of civilized society, related to lifestyle factors, and heredity also plays a role (Shah, 2018). In the late stages, it causes severe pain, is expensive to treat and leads to loss of precious man-hours. More than 530 million of children lose their primary teeth due to dental caries (WHO, 2020). Due to lack of health education and insufficient preventive measures, there is a high prevalence of morbidity that affects the health status of children (Haque et al., 2016). In the United States, dental caries is the most common chronic childhood disease; it is 5 times more common than asthma (Yadav & Prakash, 2016). Dental caries remains highly prevalent in most of the developing countries like Nigeria (Ramesh & Sundari, 2019). The increase in the prevalence of dental caries has been attributed to some risk factors such as high sugar consumption, a shift to a westernized diet, poor social economic status, and the rate of urbanization (WHO, 2020).

Risk factors are those factors that predispose one to having a particular health challenge. According to (WHO, 2016), risk factors as any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury. Dental caries is an infectious microbiological disease of the teeth that results in localized dissolution and destruction of the calcified tissues. Dental caries is increasing highly among children due to the excessive consumption of sugary substances, poor oral hygiene, lack of fluoride exposure, and inadequate health service utilization (Mulu, Demilie, Yimer, Meshesha, & Abera, 2014). Some risk factors toward prevalence of dental caries include; adolescents gaining independence over their personal care, thereby making oral hygiene of a lower priority, their choices about diet, which may include a high consumption of sugary foods and drinks, smoking, using teeth as bottle opener, intake of collusive and acidic substance, lack of balanced diet, lack of frequent intake of water. (Pai, Acharya, Vaghela & Mankar, 2017). Adolescent age group, especially boys, could be at



high risk for dental caries due to their behaviors as they spend longer times outdoors, their higher consumption of snacks between meals and cariogenic diet (Alshahrani, Tikare, Meer, Mustafa, Abdulwahab & Sadatullah, 2018). In this study, risk factors are those attribute or exposure that increases the likelihood of secondary school students in developing dental caries. The knowledge of these risk factors can help to reduce prevalence of dental caries.

Knowledge is derived from information and the information, when accepted and believed will be translated into an action which in turn becomes a habit. The knowledge of caries helps in understanding the nature of dental caries and assists to formulate strategies for prevention and treatment (WHO, 2013). It might be possible to improve the attitude and oral health status of adolescents if they could be made more aware of the risks from dental plaque and cariogenic diet which might lead to dental caries and gingival disease (Khudanova et al., 2018). Maintaining good oral hygiene is considered a lifelong habit. Moreover, these oral health habits are said to begin in an early stage of life. In order to follow healthy oral habits, it is important to have good knowledge and attitude toward oral health. Parents, siblings and schoolteachers play an important role in grooming healthy habits in young children. A good knowledge about oral health is essential for oral health related behavior (Al Subait, Alousaimi, Geeverghese, Ali, & El Metwally, 2016). In this study, knowledge is that information which exposes the risk factors of dental caries to enable adolescent avoid such lifestyle hence preventing it occurrence. School is a very good environment that knowledge about risk factors of dental caries can be thought.

School has a major role in Promoting the oral health of adolescents through education. Schools are the best center for effectively implementing the comprehensive health care program as children are easily accessible at school (Pai, Acharya, Vaghela, & Mankar, 2017). Secondary schools are the school setting between the primary and tertiary institutions; it contains students mostly the adolescent age from 10-19 years. Adolescence is the age of change and a transition phase from childhood to adulthood. It is a vulnerable time when children might develop unhealthy habits that grow into problems in their adult life. Without proper nutrition and healthcare, they are susceptible to illnesses. According to WHO (2015), 1.3 million adolescents died in 2015, a majority of them had preventable disease, such as dental caries. Unhealthy eating habits prevent them from getting the nutrition they need. Poor oral health has a detrimental effect on children's performance in school and their success in later life. Children who suffer from poor oral health are more likely to have restricted activity days, including missing school (Pongpichit, Sheiham, Pikhart, & Tsakos, 2008). Adolescence years are a higher risk time for oral piercings, increased sugar intake, nicotine initiation, and orthodontic considerations. Adolescents need a unique approach to motivate them about their oral health issues. Schools have a major role in promoting and implementing health problems like dental caries. Schools are the best center for effectively implementing the comprehensive health care program as children are easily accessible at school (Pai, Acharya, Vaghela, & Mankar, 2017). In Nigeria, oral health problems, prevention, and treatment are unmet health issues by the government, therefore, identification of prevalence and risk factors will help to suggest interventions in order to reduce occurrence of dental caries.

Available literatures on dental caries show various risk factors were responsible for dental caries. The study conducted by Shitie, Addis, Tilahun, and Negash, (2021), indicated that male children were 2 times more likely to have dental caries than females. Also, they considered some other factors such as sex, age, grade level, consumption of sweet food, habit of brush teeth;



history of dental aches, oral health education, lack of parent insistence, and poor mouth wash after food has been associated with dental caries. A study conducted by Okoye and Ekwueme (2011), on Sex distribution of caries showed that 28 (9.3%) were males, while 79 (26.2%) were females. More females had caries experience than males, though this was not statistically significant ($p = 0.054$). The present study was set to determine the influence of gender and students class on knowledge of risk factors of dental caries among secondary school students in Nsukka LGA.

Nsukka is one of the 17 Local Government Areas in Enugu State southern Nigeria. It lies in the Udi Hills. It consists of three autonomous communities: Ihe/Owerre, Nru and Nkpananou. Towns like Edem, Opi (prominent archaeological site), Ede-Oballa and Obimo share a common border with Nsukka. Weaving is a traditional local craft. Nsukka is the site of the University of Nigeria (1960), the first university established in Nigeria after independence. Nsukka is also the site of a teacher-training college and an agrometeorologic station. Nsukka is surrounded by lands, markets of different sizes, financial institutions, hospitals, police stations, schools of all types and dwellers from all parts of the country and beyond with different ethnic, religious and socio-cultural background. Hence, Nsukka has great opportunity of having great number of students. Since students' characteristics predispose them to lifestyles which may result to ill health situation such as dental caries, this is the reason for the study.

Purpose of the Study

The purpose of this study was to determine the knowledge of risk factors of dental caries among secondary school students in Nsukka Local Government Area of Enugu State. Specifically, the study sought to determine:

1. Knowledge of risk factors of dental caries among secondary school students in Nsukka Local Government Area of Enugu State.
2. Knowledge of risk factors of dental caries among secondary school students in Nsukka Local Government Area of Enugu State based on gender.
3. Knowledge of risk factors of dental caries among secondary school students in Nsukka Local Government Area of Enugu State based on students class.

Research Questions

The following research questions guided the study

1. What is the Knowledge of risk factors of dental caries among secondary school students in Nsukka Local Government Area of Enugu State?
2. What is the Knowledge of risk factors of dental caries among secondary school students in Nsukka Local Government Area of Enugu State according to gender?
3. What is Knowledge of risk factors of dental caries among secondary school students in Nsukka Local Government Area of Enugu State according to students' class?

Hypotheses

The following null hypotheses were postulated to guide the study and they were tested at .05 level of significance:



1. There is no significant difference in Knowledge of risk factors of dental caries among secondary school students in Nsukka Local Government Area of Enugu State according to gender?
2. There is no significant difference in Knowledge of risk factors of dental caries among secondary school students in Nsukka Local Government Area of Enugu State according to students' class

Methods

The descriptive research design utilizing cross sectional survey research was used for the study. The population for the study consisted of 3,039 secondary school students in public schools in Nsukka LGA. The sample size for the study was 384 Secondary School Students. Multistage sampling procedure was used in selecting the sample. The first stage involved selection of public schools using purposive sampling technique, 2nd stage involved random selection of mixed schools from the seventeen (17) public schools in Nsukka LGA. The third stage involved using simple random sampling technique of balloting without replacement to select four (4) schools from the twelve mixed schools in Nsukka LGA. From the four schools, we selected JS1, JS2, SS1 and SS2 because JSS3 and SS3 because they are examination classes. 4th stage involved, using simple random sampling technique to select twenty-four students from each approved class. This is to ensure that all secondary school students had an equal opportunity of being selected without bias. Thus from the four selected schools a total of three hundred and eighty-four secondary school students were selected and used for the study. The instrument for data collection was a researcher structured questionnaire. The instrument was face validated by three experts from the Department of Human Kinetics and Health Education, UNN. The reliability of the instrument was also established using the split half method. The reliability co-efficient of 0.85 was obtained and was deemed appropriate for the study. The entire 384 questionnaire distributed to secondary school students were collected back. Analysis of data was done using statistical package for social sciences (SPSS) version 21. The responses on the questionnaire were checked to ensure they were properly filled. Frequency tables and percentage were used for answering the research questions while Chi-square statistics was used to test the null hypothesis at 0.05 level of significance.

Results

Tables1: Socio-demographic characteristics of Respondents (n=384).

S/N	Variables	F	%
1.	Gender		
	Male	184	47.9
	Female	200	52.1
2.	Age		
	10-12yrs	131	34.1
	13-16yrs	138	36.0
	17-19yrs	115	29.9

Table 1 shows the socio demographic characteristics of respondents. The result show the percentage of female respondents (52.1%) is greater than that of male (47.1%). The aged range



of 13-16 years had a higher percentage (36.0%) than those in the age range 10-12 years (34.1%) and 17-19 years (29.9%). The result further shows that those between the ages of 10-12 years (34.1%) had more respondents than those between the ages of 17-19 years (29.9%).

Table 2: Percentage response of secondary school students on Knowledge of Risk factors of dental caries (n=384)

S/N	Knowledge of Risk factors of dental caries	Correct responses		Incorrect responses	
		f	%	f	%
1.	Lack of oral health education	126	32.81	258	67.19
2.	Poor oral hygiene	225	58.59	159	41.41
3.	Lack of fluoride exposure	169	44.01	215	55.99
4.	Inadequate health service utilization	175	45.57	209	54.43
5.	High intake of sugary foods and drinks	211	54.95	173	45.05
6.	Unhealthy eating habits	199	51.82	185	48.1
7.	Oral piercings	215	55.99	169	44.0
8.	Oral exposure to extreme temperature	119	30.99	265	69.01
9.	Using the teeth on hard objects	283	73.70	101	26.30
10.	Inadequate water intake	162	42.19	223	58.07
	Percentage average		49.1		50.9

Table 2 shows that the overall percentage average of secondary school students with correct response on Knowledge of risk factors of dental caries was 49.1% this indicates that the proportion of secondary student with correct response are slightly lower than average. Most of the respondent did not know that lack of fluoride (55.99%), Lack of oral health education (67.19%), oral exposure to extreme temperature (69.01%) and inadequate water intake (58.07%) can lead to dental caries. The table further revealed that most of the respondent knew that; Poor oral hygiene (58.59%), high intake of sugary foods and drinks (54.95%), oral piercings (55.99%) and using the teeth on hard objects (73.70%) are risk factors of dental caries.

Table 3: Percentage response of secondary school students on Knowledge of Risk factors of dental caries based on gender (n=384)

S/N	Risk factors of dental caries based on gender (%)	Male			f
		Yes	No	Yes	
	Female				
	No				
	Yes				
1.	Lack of oral health education	42(22.8)	142(77.2)	84(42.0)	
	116(58.0)				
2.	Poor mouth wash after food	85(46.2)	99(53.8)	140(70.0)	
	60(30.0)				
3.	Lack of fluoride exposure	103(56.0)	81(44.0)	66(33.0)	
	134(67.0)				



4. Inadequate health service utilization 90(45.0)	65(35.3)	119(64.7)	110(55.0)
5. High intake of sugary foods and drinks 72(36.0)	83(45.1)	101(54.9)	128(64.0)
6. Unhealthy eating habits 113(56.5)	112(60.9)	72(39.1)	87(43.5)
7. Oral piercings 85(42.5)	100(54.3)	84(45.7)	115(57.5)
8. Oral exposure to extreme temperature 154(77.0)	73(39.7)	111(60.3)	46(23.0)
9. Using the teeth on hard objects 21(10.5)	104(56.5)	80(43.5)	179(89.5)
10. Inadequate water intake 128(64.0)	90(48.9)	94(51.1)	72(36.0)
Percentage average	46.6	53.4	51.4
48.6			

Table 3 shows an overall percentage of male secondary school student (46.6%) and female secondary school student (51.4%) that had correct response on Knowledge of risk factors of dental caries, while percentage of secondary school student that had false response was male (53.4%) and female (48.6%). Female secondary school student had more correct response than male. The table further revealed that (22.85%) of males and (42.0%) of female knew that lack of oral health education, that (46.2%) of male and (70.0%) of female knew that Poor mouth wash after food, that (56.0%) of male and (33.0%) of female knew that Lack of fluoride exposure. (35.3%) of male and (55.0%) of female knew that Inadequate health service utilization, that (45.1%) of male and (64.0%) of female knew that high intake of sugary foods and drinks, that (60.9%) of male and (43.5%) of female knew that unhealthy eating habits, that (54.3%) of male and (57.5%) of female knew that oral piercing, that (39.7%) of male and (23.0%) of female knew that oral exposure to extreme temperature, that (56.5%) of male and (89.5%) of female knew that using the teeth on hard objects, that (48.9%) of male and (36.0%) of female knew that inadequate water intake is a risk factor of dental caries.

Table 4: Percentage response of secondary school students on Knowledge of Risk factors of dental caries based on age (n=384)

S/N Items	10 -12yrs (n=131)		13-16yrs (n=138)		17-19yrs
	Yes	No	Yes	No	Yes
f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
1. Lack of oral health education 41(35.7) 74(64.3)	35(26.7)	96(73.3)	50(36.2)	88(63.8)	
2. Poor oral hygiene 87(75.7) 28(24.3)	49(37.4)	82(62.6)	89(64.5)	49(35.5)	



3. Lack of fluoride exposure 65(56.5) 50(43.5)	44(33.6)	87(66.4)	60(43.5)	78(56.5)	
4. Inadequate health service utilization 70(60.9) 45(39.1)	50(38.2)	81(61.8)	55(39.9)	83(60.1)	
5. High intake of sugary foods and drinks 69(60.0) 46(40.0)	75(57.3)	56(42.7)	67(48.6)	71(51.4)	
6. Unhealthy eating habits 81(70.4) 34(29.6)	46(35.1)	85(64.9)	72(52.2)	66(47.8)	
7. Oral piercings 79(68.7) 36(31.3)	56(42.7)	75(57.3)	80(58.0)	58(42.0)	
8. Oral exposure to extreme temperature 71(61.7) 44(38.3)	43(32.8)	88(67.2)	85(61.6)	53(38.4)	
9. Using the teeth on hard objects 84(73.0) 31(27.0)	112(85.5)	19(14.5)	87(63.0)	51(37.0)	
10. Inadequate water intake 55(47.8) 60(52.2)	57(43.5)	74(56.5)	50(36.2)	88(63.8)	
Percentage Average 39.0	43.3	56.7	50.4	49.6	61.0

Table 4 shows that the overall percentages of age brackets of the respondents that had correct response on Knowledge of risk factors of dental caries; 10-12years(43.3%), 13-16years (50.4%) and 17-19years (61.0%). Those who had false response; 10-12years (56.7%), 13-16years(49.6%), and 17-19years(39.0%). The table further revealed that secondary schools students who had correct response were more among 17-19years (61.0%), followed by those within the age group 13-16years (50.4%), the response showed that older students had more correct response on risk factors of dental caries than the younger ones 10-12years (43.3%).

Table 5: Summary of Chi-square Analysis on Response of Knowledge of Risk Factors of Dental Caries Based on Gender (n=384)

Variables	N	Correct	False	Chi-square	df	p-value	
Decision							
Gender	384			.869	1	.351	Not
Reject Ho							
Male	184	86 (46.7)	98(53.3)				
Female	200	103 (51.5)	97(48.5)				

Table 5 shows that the Chi-square ($\chi^2 = .869$) values with the responding p-value = .351, since the p-value = .351 was less than .05 level of significance, the null hypothesis was not rejected. This implies that there was no statistically significant difference on knowledge of risk factors of dental caries among secondary school students in Nsukka LGA based on gender. However, gender has influence on response of Knowledge of risk factors of dental caries among secondary school students in Nsukka LGA.



Table 6: Summary of Chi-square Analysis on Response of Knowledge of Risk Factors of Dental Caries Based on Age (n=384)

Variables	N	Correct	False	Chi-square	df	p-value	
Decision							
Age	384			10.393	2	.006	Reject
Ho							
10 -12 years	131	57(43.5)	74(56.5)				
13 – 16 years	138	70(50.7)	68(49.3)				
17 -19 years	115	70(64.2)	39(35.8)				

Table 6 shows that the Chi-square ($\chi^2= 10.393$) values with the responding p-value = .006. Since p-value = .006 was less than 0.05 level of significance, the null hypothesis was rejected. This implies that there was statistically, significant difference on knowledge of risk factors of dental caries based on age, among secondary school students in Nsukka LGA. However, age had influence on knowledge of risk factors of dental caries among secondary school students in Nsukka LGA.

Discussion

The findings in Table 2 shows that the overall percentage of secondary school students with correct response on Knowledge of risk factors of dental caries was 49.1%, majority of the respondents had false response (50.9%). This findings was not expected because these students are in school, it is expected that most of these things they should know because it might be taught to them through their subjects. The study was in slight agreement the study carried out by Okoye and Ekwueme (2011) which noted that Prevalence of caries was low among students who were 11-16years of age. Table 2, further revealed that most of the respondent did not know that lack of fluoride (55.99%) was a risk factor of dental caries. This contradicts the report by Okoye and Ekwueme (2011), that revealed that fluoridated toothpaste was used infrequently by those students (90.5%) who cleaned with toothbrush and paste. In this study, most of the respondent did not know that Lack of oral health education (67.19%) was risk factors of dental caries. This result is similar to those studies conducted in Nepal and Bangladesh; children who did not receive oral health education were significantly associated with having dental caries as indicated by Dixit, Shakya, Shrestha, and Shrestha (2013). This might be that those children who had health education might have obtained the educational messages through school or media regarding factors contributing to dental caries and have good knowledge about how to prevent dental caries.

Table 3 shows percentage of male (53.4%) secondary school student that had false response was more than and female (48.6%). Also, Table 5 revealed that there was no statistically significant difference in secondary school students in Nsukka LGA on Knowledge of risk factors of dental caries based on gender. This is similar to study by Shitie, Addis, Tilahun, and Negash, (2021) who reported that males were 2 times more likely to have dental caries than female. This finding was similar to a study



conducted in Bihar (India) by Goenka, Dutta, Marwah, Sarawgi, Nirwan, and Mishra (2018) and Okoye (2010) reported that more females had caries experience than males, though this was not statistically significant ($P = 0.054$). Also, consistent with study by Akinyamoju, Dairo, Adeoye, and Akinyamoju (2019). The reason could be due to the variation in their sex composition. In contrast to this study, in Iran females were 1.4 times more likely to have dental caries as reported by Ali Youssefi and Afroughi (2020). This may be due to the fact that female have the quest to look beautiful, especially their dentition to prevent them from having mouth odour which most male care less about.

Table 4 revealed that secondary schools students who had correct response were more among 17-19years (61.0%), followed by those within the age group 13-16years (50.4%), the response showed that older students had more correct response on risk factors of dental caries than the younger ones 10-12years (43.3%). Also, Table 6 revealed that there was statistically significant difference in secondary school students in Nsukka LGA on risk factors of dental caries based on age. This finding was expected because higher in age to an extent relate to higher in class and also increase in knowledge acquired.

Conclusion

Based on the findings and discussions of the study it can be concluded that most of the female students had correct knowledge on risk factors of dental caries. Most male student knew that unhealthy eating habit is a risk factor to dental caries. However, gender did not have significant influence on knowledge response on risk factors of dental caries. Age had significant influence on knowledge response of risk factors of dental caries among secondary school students.

Recommendations

On the basis of these research findings, the following recommendation was made:

1. Ministry of health in collaboration with ministry of education Intensive health education programme geared toward knowledge on risk factors of dental caries among adolescents to reduce its prevalence.
2. The federal Government through the ministry should conduct seminar and workshops on oral health to the parents and teachers to ensure that training of the students in this area (oral health) are carried out both in the school and at home.
3. Attention should be given to Male students and younger ages interest should be encouraged when health education programmes are carried out.

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