

ASSOCIATION BETWEEN DENTAL CARIES, ORAL HYGIENE STATUS AND ORAL HEALTH PRACTICES OF FIRST YEAR UNDERGRADUATE STUDENTS IN A NIGERIAN PRIVATE UNIVERSITY

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DOI: <https://dx.doi.org/10.4314/gdj.v23i1.8>

ABSTRACT

BACKGROUND: Oral health is a functional, structural, aesthetic, physiologic and psychological state of well-being which is essential to an individual's general health and quality of life.

AIM: To determine the association between dental caries, oral hygiene status and oral health care practices among first year undergraduate students in a private university in Nigeria and the association between demographic variables and utilization of oral health care practice among these students.

METHODS: A cross sectional study that recruited first year undergraduate students in a Nigerian University during their mandatory medical screening. Data collection was in two parts- a self-administered questionnaire followed by oral examination by qualified dentists.

RESULTS: The prevalence of dental caries in this study was 10.6% while the oral hygiene profile showed majority had fair oral hygiene (58.9%).

Frequency of tooth brushing morning after meal and night after meal was less than 6% across all age groups, and in both genders and about 50% of the study population across all age groups and gender had, at one time or the other, used dental floss.

There was significant difference in the consumption of refined sugar between females and males ($P=0.01$) with 34.1% of females consuming refined sugars more than twice daily. Only 7.4% of the study participants visit the dental clinic once every 6 months.

There was a higher prevalence of poor oral hygiene in students who brushed once daily (56.0%). In addition, participants that took no action after consuming refined sugars had higher dental caries experience (12.3%) compared to others.

CONCLUSION: This study recorded low "good oral hygiene" status and higher significance of refined sugar consumption in-between meals. The refined sugar consumption was statistically significant across gender and age groups. Students who brush once daily had poorer oral hygiene compared with others.

KEY WORDS: First year undergraduate, Refined sugar consumption, Oral health, Toothbrushing, Dental floss, Frequency.

INTRODUCTION

Oral health is the standard of health of the oral and related tissues that enables an individual to eat, communicate, and socialize without active disease, discomfort or embarrassment thus contributing to a person's general well-being.¹ It is essential to an individual's general health and important in maintaining a healthy smile.

Diseases related to the oral health are known to be one of the most common public health issues worldwide with significant socioeconomic, environmental, biologic and behavioral impact, yet they are frequently neglected in public health policies and are often diagnosed as a result of accidental discoveries.²

Dental caries and gingival/periodontal diseases are the most common oral diseases that affect a large percentage of the world population, and can lead to prolonged physical discomfort, pain, infection and tooth loss amongst other things.³ The etiologies of most diseases affecting the oral region have long been shown to be behavioral related and adopting and maintaining preventive oral care practices can prevent these.⁴⁻⁶ These preventive oral health care practices include the use of fluoridated toothpaste, regular and effective tooth brushing, use of dental floss for interdental cleaning and regular dental check-up. It also involves avoidance or reduction in the consumption of refined carbohydrates, especially in-between meals, that have been implicated in the etiology of dental caries.⁷⁻⁹

The prevalence of caries in Nigeria has been shown to be low from various studies.¹⁰⁻¹² Despite the low caries prevalence reported in a study by Oziegbe and Esan however, untreated dental caries was very high.¹⁰ This may have been due to lack of adequate knowledge about

preventive oral health care and the need for seeking care among the populace or because of a low level of literacy. The role of education cannot be ruled out for preventive oral health care and in the utilization of dental services. It is expected that the educational level of university students should place them in a vantage position to know, understand and practice oral health care but this may not be so as education tends to be irrelevant unless oral health education is available and accessible to an educated population.¹³

This study aimed at determining the association between dental caries, oral hygiene status and oral health care practice among the first-year undergraduate students in a private university, Nigeria. It also aimed to determine the association between demographic variables and utilization of oral health care practice among these students.

Materials and Methods

This was secondary data details of which have been reported by Oyedele et al.¹⁴ It was a cross sectional study that recruited first year undergraduate students in a private university during their mandatory medical screening exercise. The study was conducted at one of the leading private Universities in Nigeria with a population of about ten thousand students.

Sample size

The sample size calculation for the primary data was determined using the statistical formula proposed by Araoye.¹⁵ A total of 1,164 participants were available for analysis for this present study.

Data collection.

The data collection was in two parts using a questionnaire for the first part followed by oral examination by a qualified

dentist. The first part of the questionnaire was self-administered, and this section captured the socio-demographic variables of the study participants (age, sex, socioeconomic status, and family structure) and assessment of oral health care practices. The following were assessed under health care practices:

Frequency of tooth brushing: The participants were asked how often they brushed daily giving the following options – “once daily”, “twice daily”, “three times daily” and “after every meal”.

Time of brushing: They were given options to choose from to determine the time of brushing- “morning before meal”, “morning after meal”, “morning before meal and night before bed” and “morning after meal and night before bed”.

In-between meals: The participants were also assessed for frequency of refined carbohydrate consumption in-between meals. The options were – “once a day”, “twice a day”, “quite often” and “rarely”.

Actions taken after taking in-between meals: The participants were also asked to indicate action taken after taking refined carbohydrates in-between meals with the options being – “brush my teeth immediately”, “rinse my mouth with water”, “rinse my mouth with mouthwash” and “do nothing”.

Interdental cleaning with dental floss: Participants were asked if they did interdental cleaning using dental floss, with an answer of “yes” or “no”.

Frequency of using dental floss: For those that indicated the use of dental floss, they were asked for the frequency choosing from – “once daily”, “after every meal”, “rarely” and “never”.

Dental check-up: Participants were asked about how often they utilize dental services; “once in six-months”, “once a year”, “rarely” and “never” were options available.

Last dental check-up: Participants were also asked the last time they visited a dental facility for utilization of the services. Options given were – “less than six-months”, “within 6-12-months”, “between 1-2-years”, and “never”.

The second part of the data collection was the assessment of their oral health, specifically assessing participants’ oral hygiene and presence of dental caries. Qualified dentists who were calibrated before the commencement of data collection conducted the assessment.

Oral hygiene assessment: Oral hygiene was determined using the simplified-oral hygiene index (OHI-S) by Greene and Vermillion.¹⁶ The OHI-S has debris index and the calculus index. Each of the components was based on numerical determinations representing the amount of debris or calculus found on the preselected tooth surfaces. The calculus index simplified (CI-S) and debris index simplified (DI-S) value ranged from 0 to 3; the OHI-S value was the sum of CI-S and DI-S. The score ranged from 0 to 6. Oral hygiene index score of 0-1.2 was put as good oral hygiene; 1.3-3.0- fair oral hygiene and 3.1-6.0- poor oral hygiene.

Dental caries assessment: Dental caries was assessed by dentists using the World Health Organization criteria for oral health survey methods.¹⁷ The examination for dental

caries was conducted with a dental mouth mirror and WHO probe, using the light source from the dental unit, while the student was on the dental chair. Caries status was assessed using the Decayed Missing and Filled (DMFT) index. The participants were categorized into two; those with presence of dental caries and those with no dental caries.

Data analysis

The data was processed and analyzed using STATA version 13 for Mac Air. All the discrete variables were analyzed using descriptive analysis; Pearson’s Chi-square test was used to establish the association between dental caries, oral hygiene, and preventive oral health care. Likewise, association between age, sex and preventive oral health care was carried out with Pearson’s Chi-square test. Relationship between preventive oral health care and dental caries and oral hygiene was done using logistic regression. Statistical significance was also established at P values equal to or less than 0.05.

Standardization of examiner.

Before the commencement of the study, the dentists who carried out the intra-oral examination went through calibration exercises. Calibration for the diagnosis of dental caries and assessment of oral hygiene status was done. Inter-examiner and intra-examiner’s variability scores were 0.85 and 0.90 respectively.

Ethical approval.

Ethics approval for the primary study was obtained from the University’s Health and Research Ethics Committee. Informed consent was obtained from all participants before the study commenced.

RESULTS.

A total of 1,164 persons’ data were available for this study: 721 (61.9%) and 443 (38.1%) female and male participants respectively. The higher percentage of females in the study population reflects higher female enrolment in the institution. The mean age for the study participants was 18.13 ±4.99 years. The prevalence of dental caries in the study population was 10.6% and the oral hygiene profile of the study population showed that only 30.3% had good oral hygiene while majority (58.9%) had fair oral hygiene.

Table 1 shows the association between oral health care measures, gender, and age of the study participants. Regarding the frequency of brushing, more than half of the study population (57.6%) brush their teeth once daily while a little over two fifth (41.7%) brush twice daily. Of all the participants, 43.4% of the female participants and 38.8% of the male participants brush twice daily. Less than 1% of the participants brush thrice daily or after every meal. There was no significant difference between the frequency of tooth brushing, age, and gender (P=0.98; P=0.23) respectively.

A majority of the study participants including males (63.0%) and females (56.4%) and across all age groups brush “morning before meal” while 36.5% females, and 29.3% males brush “morning before meal” and “night after meal” respectively. Over 30% of the participants across all age groups brush “morning before meal and night after meal”. The frequency of tooth brushing “morning after meal and night after meal” was less than 6% across all age groups, and in both genders.

Although, about 50% of the study population across all age groups and both males and females had used dental floss at one time or the other, only 6.4% females and 10.8% males use it once daily. Across the age groups, 5.8% of 15–17-year-olds, 10.1% of 18–20-year-olds and 10.6% of 21–23-year-olds use dental floss daily (Table 1).

Table 1. Association between oral health care measures, gender, and age of study participants.

	Gender, n (%)		Age Group (Years), n (%)			
Variables	Female	Male	15-17	18-20	21-23	Total
<i>Frequency of tooth brushing.</i>						
Once daily	405 (56.2)	266 (60.0)	321 (57.8)	275 (57.7)	75 (56.8)	671 (57.6)
Twice daily	313 (43.4)	172 (38.8)	230 (41.4)	198 (41.5)	57 (43.2)	485 (41.7)
Thrice daily	2 (0.3)	4 (0.9)	3 (0.5)	3 (0.6)	-	6 (0.5)
After every meal	1 (0.1)	1 (0.2)	1 (0.2)	1(0.2)	-	2 (0.2)
P value	P=0.23		P=0.98			
<i>Time of brushing.</i>						
MBM	407 (56.4)	279 (63.0)	329 (59.3)	280 (58.7)	77 (58.3)	686 (58.9)
MAM	21 (2.9)	10 (2.3)	12 (2.2)	15 (3.1)	4 (3.0)	31 (2.7)
MBMAM	263 (36.5)	130 (29.3)	193 (34.8)	155 (32.5)	45 (34.1)	393 (33.8)
MAMAM	30 (4.2)	24 (5.4)	21 (3.7)	27 (5.7)	6 (4.5)	54 (4.6)
<i>Dental Flossing.</i>						
Yes	372 (51.6)	212 (47.9)	291 (52.4)	233 (48.8)	60 (45.5)	584 (50.2)
No	349 (48.4)	231 (52.1)	264 (47.6)	244 (51.2)	72 (54.5)	580 (49.8)
<i>Frequency of dental flossing.</i>						
AEM	45 (6.2)	30 (6.8)	33 (5.9)	32 (6.7)	10 (7.6)	75 (6.4)
Once daily	46 (6.4)	48 (10.8)	32 (5.8)	48 (10.1)	14 (10.6)	94 (8.1)
Rarely	288 (39.9)	141 (31.8)	233 (42.0)	160 (33.5)	36 (27.3)	429 (36.9)
Never	342 (47.3)	224 (50.6)	257 (46.3)	237 (49.7)	72 (54.5)	566 (48.6)
Total	721 (61.9)	443 (38.1)	555 (47.7)	477 (41.0)	132 (11.3)	1,164 (100.0)

NB: MBM: morning before meal; MAM: morning after meal; MBMAM: morning before meal night after meal; MAMAM: morning after meal night after meal; AEM: after every meal.

Table 2 shows the association between preventive oral health measures, gender, and age of the study participants. A little more than a quarter (28.8%) of the respondents consume refined sugars quite often. Within these, females consume refined sugars more than the males ($p=0.01$) where 29.4% of females consume refined sugar more than twice daily as against 27.8% males.

Across the age groups, those 21-23-years of age consumed refined sugars more than twice daily (40.2%) compared to other age groups. There was no statistically significant relationship ($p=0.06$) however, empirically, older participants consume refined sugar more frequently than the younger ones.

With respect to action taken after refined sugar consumption, even though more than half of the participants take action after consuming refined sugar, few participants brush (3.5%) or rinse with mouthwash (6.4%).

More females (47.2%) do nothing after refined sugar consumption compared to males (26.6%). However, this was not statistically significant ($p=0.22$). With respect to age, more younger participants (≤ 20 years of age) do nothing after they consume refined sugar compared to older (above 20 years) participants ($p=0.00$).

The results of dental clinic visit showed that 7.4% of the study participants visit the dental clinic once every 6-months, 7.7% visit once a year, 36.3% rarely visit the dental clinic while 48.5% had never visited any dental clinic. There was no significant difference in dental clinic visits in terms of gender and across all age groups ($p=0.47$; $p=0.29$ respectively). About 8.0% of the study participants visited a dental clinic in the last 6-months, 11.0% visited within the last 6-12-months and 28.9% visited within the last 1-2-years.

Table 2. Association between preventive oral health measures, gender, and age of study participants.

	Gender, n (%)		Age group (Years), n (%)			
Variables	Female	Male	15-17	18-20	21-23	Total
<i>Frequency of sugar consumption.</i>						
Rarely	317 (44.0)	169 (38.1)	229 (41.3)	209 (43.8)	48 (36.4)	486 (41.8)
Once daily	166 (23.0)	133 (30.0)	163 (29.4)	111 (23.3)	25 (18.9)	299 (25.7)
Twice daily	26 (3.6)	18 (4.1)	18 (3.2)	20 (4.2)	6 (4.5)	44 (3.8)
Quite often	212 (29.4)	123 (27.8)	145 (26.1)	137 (28.7)	53 (40.2)	335 (28.8)
P value	P=0.01*		P=0.06			
<i>Action taken after sugar consumption.</i>						
Brush	26 (3.6)	15 (3.4)	9 (1.6)	27 (5.7)	5 (3.8)	41 (3.5)
Rinse mouthwash	39 (5.4)	35 (7.9)	33 (5.9)	33 (6.9)	8 (6.1)	74 (6.4)
Rinse with water	316 (43.8)	205 (46.3)	246 (44.3)	203 (42.6)	72 (54.5)	521 (44.8)
Do nothing	340 (47.2)	188 (26.6)	267 (48.1)	214 (44.9)	47 (35.6)	528 (45.4)
P value	P=0.22		P=0.00*			
<i>Frequency of dental visits.</i>						
Once in 6 months	52 (7.2)	34 (7.7)	44 (7.9)	37 (7.8)	5 (3.8)	86 (7.4)
Once a year	49 (6.8)	41 (9.3)	44 (7.9)	31 (6.5)	15 (11.4)	90 (7.7)
Rarely	266 (36.9)	157 (35.4)	193 (34.8)	177 (37.1)	53 (40.2)	423 (36.3)
Never	354 (49.1)	211 (47.6)	274 (49.4)	232 (48.6)	59 (44.7)	565 (48.5)
P value	P=0.47		P=0.29			
<i>Last dental visit.</i>						
< 6 months	63 (8.7)	30 (6.8)	44 (7.9)	36 (7.5)	13 (9.8)	93 (8.0)
6-12 months	62 (8.6)	66 (14.9)	58 (10.5)	57 (11.9)	13 (9.8)	128 (11.0)
1-2 years	216 (30.0)	120 (27.1)	171 (30.8)	123 (25.8)	42 (31.8)	336 (28.9)
Never	380 (52.7)	227 (51.2)	282 (50.8)	261 (54.7)	64 (48.6)	607 (52.1)
Total	721 (61.9)	443 (38.1)	555 (47.7)	477 (41.0)	132 (11.3)	1,164 (100.0)

Table 3 shows the association between oral health care measures, dental caries, and oral hygiene. Dental caries prevalence was higher (56.1%) in respondents who brush once daily compared with those that brush more than once daily. With regards to the time of brushing and dental caries, participants that brush in the morning before meal had a higher prevalence of dental caries (56.1%) while those that brush morning after meal and in the morning after meal and at night after meal (before bed) had a lower prevalence of dental caries (3.3% and 4.1% respectively).

There was no significant difference in dental caries experience between those that use dental floss and those that do not however, there was higher caries prevalence among those that have never used dental floss (46.3%) compared to those that use it once daily, after every meal or rarely (10.7%, 8.9%, 34.1% respectively).

There was a higher prevalence of poor oral hygiene in respondents who brush once daily (56.0%) compared with those that brush more than once daily ($p=0.04$) and among those that brush morning before meal (60%) compared with those that brush morning after meal (1.6%), morning before meal and night after meal (34.4%) and morning after meal and night after meal (4.0%).

Higher poor oral hygiene prevalence was seen among participants who rarely use dental floss (36.0%) and those that had never used dental floss (41.6%). Table 3.

Table 3. Association between oral health measures, dental caries, and oral hygiene.

	Dental caries, n (%)		Oral hygiene, n (%)			
Variables	Present	Absent	Good	Fair	Poor	Total
<i>Frequency of tooth brushing.</i>						
Once daily	69 (56.1)	602 (57.8)	226 (64.0)	375 (54.7)	70 (56.0)	671 (57.6)
Twice daily	53 (43.1)	432 (41.5)	123 (34.8)	308 (63.5)	54 (43.2)	485 (41.7)
Thrice daily	1 (0.8)	5 (0.5)	2 (0.6)	3 (50.0)	1 (0.8)	6 (0.5)
After every meal	-	2 (0.2)	2 (0.6)	-	-	2 (0.3)
P value	P= 0.57		P= 0.04*			
<i>Time of brushing.</i>						
MBM	69 (56.1)	617 (57.8)	224 (63.5)	387 (56.4)	75 (60.0)	686 (58.9)
MAM	4 (3.3)	27 (2.6)	7 (2.0)	22 (3.2)	2 (1.6)	31 (1.6)
MBMNAM	45 (36.6)	348 (33.4)	107 (30.3)	243 (35.4)	43 (34.4)	393 (33.8)
MAMNAM	5 (4.1)	49 (4.7)	15 (4.2)	34 (5.0)	5 (4.0)	54 (4.6)
P value	P= 0.85		P= 0.41			
<i>Dental Flossing.</i>						
AEM	11 (8.9)	64 (6.1)	15 (4.2)	49 (7.1)	11 (8.8)	75 (6.4)
Once daily	13 (10.7)	81 (7.8)	26 (7.4)	51 (7.4)	17 (13.6)	94 (8.1)
Rarely	42 (34.1)	387 (37.2)	143 (40.5)	241 (35.1)	45 (36.0)	429 (36.9)
Never	57 (46.3)	509 (48.9)	169 (47.9)	345 (50.3)	52 (41.6)	566 (48.6)
P value	P= 0.42		P= 0.04*			
Total	123 (10.6)	1041 (89.4)	353 (30.3)	686 (58.9)	125 (10.7)	1164 (100.0)

NB: MBM: morning before meal; MAM: morning after meal; MBMNAM: morning before meal night after meal; MAMNAM: morning after meal night after meal; AEM: after every meal.

Table 4 shows that students who consumed refined sugars twice daily and more often had higher caries experience (11.4% and 11.3% respectively) when compared with those that consumed once daily (8.7%) and rarely (11.1%), however this was not a statistically significant relationship. In addition, participants that took no action after consuming refined sugars had higher dental caries experience (12.3%) compared to others. A slightly higher dental caries experience was seen in students who rarely visit dental clinic (13.7%) and in those who had their last dental visit in the last 6-12-months (17.2%). The oral hygiene profile of the study participants showed that more participants had fair oral hygiene overall (58.9%) while 10.7% had poor oral hygiene. There were no significant differences in the oral hygiene status, between meals, what the students do after taking between meals, frequency of dental visit and the last dental visit.

Table 4. Association between preventive oral health measures, dental caries, and oral hygiene.

	Dental caries, n (%)		Oral hygiene, n (%)			
Variables	Present	Absent	Good	Fair	Poor	Total
Frequency of sugar consumption.						
Rarely	54 (11.1)	432 (88.9)	163 (33.5)	275 (56.6)	48 (9.9)	486 (100.0)
Once daily	26 (8.7)	273 (91.3)	92 (30.8)	176 (58.9)	31 (10.3)	299 (100.0)
Twice daily	5 (11.4)	39 (88.6)	8 (18.2)	29 (65.9)	7 (15.9)	44 (100.0)
Quite often	38 (11.3)	297 (88.0)	90 (26.9)	206 (61.5)	39 (11.6)	335 (100.0)
P value	P= 0.68		P= 0.23			
Action taken after sugar consumption.						
Brush	4 (9.8)	37 (90.2)	7 (17.1)	30 (73.2)	4 (9.8)	41 (100.0)
Rinse Mouthwash	5 (6.8)	69 (93.2)	23 (31.1)	43 (58.1)	8 (10.8)	74 (100.0)
Rinse with water	49 (9.4)	472 (90.6)	171 (32.8)	306 (58.7)	44 (8.4)	521 (100.0)
Do nothing	65 (12.3)	463 (87.7)	152 (28.8)	307 (58.1)	69 (13.1)	528 (100.0)
P value	P= 0.31		P= 0.10			
Frequency of dental visits.						
Once in 6 months	11 (12.8)	75 (87.2)	37 (43.0)	39 (45.3)	10 (11.6)	86 (100.0)
Once yearly	10 (11.1)	80 (88.9)	28 (31.1)	52 (57.8)	10 (11.1)	90 (100.0)
Rarely	58 (13.7)	365 (86.3)	124 (29.3)	252 (59.6)	47 (11.1)	423 (100.0)
Never	44 (7.8)	52 (92.2)	164 (29.0)	343 (60.7)	58 (10.3)	565 (100.0)
P value	P= < 0.001*		P= 0.21			
Last dental visit.						
< 6 months	9 (9.7)	84 (90.3)	39 (41.9)	49 (52.7)	5 (5.4)	93 (100.0)
6-12 months	22 (17.2)	106 (82.8)	33 (25.8)	76 (59.4)	19 (14.8)	128 (100.0)
1-2 years	41 (12.2)	295 (87.8)	111 (33.0)	187 (55.7)	38 (11.3)	336 (100.0)
Never	51 (8.4)	556 (91.6)	170 (28.0)	374 (61.6)	63 (10.4)	607 (100.0)
P value	P= 0.02*		P= 0.04*			

DISCUSSION

This study showed a low prevalence of dental caries in the study participants which was in agreement with Oziegbe and Esan's study where a low caries prevalence was reported.¹⁰ This study also recorded low good oral hygiene status. The role of education cannot be ruled out for preventive oral health care and in the utilization of dental services. It is expected that the educational level of the university students should place them at a vantage position to know, understand and practice oral health care but this may not have been so as education tends to be irrelevant unless oral health education is available and accessible to an educated population.¹³

There was higher significance of refined sugar consumption in-between meals among females who also do nothing after the sugar consumption compared to males and higher refined sugar consumption in the older age group. This may suggest that more males who are older compared to the females may be the reason why it reflects the females do less. The older age group consume more sugar and do something about it.

They are probably more knowledgeable in terms of oral care when compared with the younger ones.

Significant higher study participants in the age group ¹⁵⁻¹⁷-years of age do nothing after consumption of refined sugar. There was significantly poorer oral hygiene in children that brushed once daily compared with those that brush more than once daily.

The low dental caries prevalence reported in this study may be attributed to the education level and socioeconomic status of the study participants, being a study carried out in a private university where majority of the students are from middle to high socioeconomic class and from educated parents in the study environment.

This study showed that a good number of the study population brushed their teeth at least once daily with fluoridated toothpaste, this was similar to findings by Ejemai et al.¹⁸ This may be attributed to adequate knowledge that translates to practice among the participants. However, the percentage of study participants brushing twice daily in the present study was higher than that reported from the same study by Ejemai et al.¹⁸ Al-Qahtani et al showed that adequate knowledge of oral health care results into practice and this in turns reduces the prevalence of oral health diseases.¹⁹

One of the interesting findings in this study was that a good number of the study participants practice twice daily brushing, but the pattern of this twice daily brushing showed that more participants brushed in the morning before meal and night after meal while few brushed in the morning after meal and night after meal. There was no general concession among oral healthcare providers as to the best pattern of tooth brushing, however, the British Dental Association advise that teeth should be brushed last thing at night and on one occasion during the day.²⁰

Majority of the study participants had used dental floss before but not on a regular basis. This was contrary to the findings by Al-Qahtani et al¹⁹ where it was shown that majority of the study population had never used dental floss. The disparity in the study findings may be due to the difference in the study participants, this present study was carried out among university undergraduate students from mainly high socioeconomic and educated family backgrounds while the study by Al-Qahtani et al¹⁹ was among intermediate school children from public and private schools. Socioeconomic status and educational

level have been shown to be a determinant of good oral health.²¹⁻²³ This finding was also contrary to finding by Ejemai et al¹⁸ which reported a low percentage of participants using dental floss.

The combination of regular tooth brushing and the high percentage of dental floss utilization in the present study group may be responsible for low prevalence of dental caries reported. Studies have shown that when different caries preventive approaches are employed, it reduces the prevalence of dental caries.²⁴⁻²⁵

Despite low caries prevalence in this present study, a large percentage of the study participants rarely or had never visited any dental clinic for regular or routine dental check. This may support the ideal that combination of regular tooth brushing with fluoridated toothpaste and restrictions in consumption of refined sugar in-between meals play a significant role in dental caries prevention in the event that there is no availability of dental health facility.²⁶

The higher caries prevalence in children that brush once daily compared with those that brush more than once daily reinforces the point that the single most effective dental caries preventive measure is the use of fluoridated toothpaste and interdental cleaning. This was supported by Featherstone²⁷ and Horst et al.²⁸ Similarly, poorer oral hygiene noted in children who brush once daily compared with those that brush more than once daily affirms the significance of effective and frequent tooth brushing in the prevention of poor oral hygiene and overall oral health.^{29, 30}

There was no significant dental caries difference between children that consumed refined sugar more regularly compared with those that consumed it rarely, this again may be attributed to regular oral hygiene care.

This present study had some limitations that included lack of information about the use of other forms of fluoride apart from fluoridated toothpaste, failure to elicit information about brushing techniques and other materials used for tooth cleaning. The cross-sectional design limits causal inference and self-reported practices may introduce recall bias.

CONCLUSION.

This study showed a low prevalence of dental caries in the study participants and low good oral hygiene status. There was significant refined sugar consumption in-between meals in females compared to males and higher refined sugar consumption in older age group. The refined sugar consumption was statistically significant across gender and age groups; Female students in older age group had higher consumption of refined sugar. Students who brush once daily had poorer oral hygiene when compared with those that brush more than once daily. Targeted oral health

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