Oral health knowledge and practices of dentists practicing in a teaching hospital in Nigeria

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ABSTRACT

Aim: To assess the oral health practices and knowledge of practicing dentists at a tertiary health institution in Nigeria, and the possible association of age and sex with caries prevention practices.

Methodology: A cross-sectional study was conducted. All practicing dentists in the institution were eligible to participate in the study. A questionnaire that assessed oral health practices and knowledge was administered. Respondents were expected to select the most appropriate responses that reflected their knowledge of oral health practices and caries prevention practices. Questions included assessment of knowledge and practice of tooth brushing, flossing, refined carbohydrate intake, and dental service utilization. Participants’ responses were scored and dichotomized to poor and good knowledge, and poor and good practices, using the median scores. Bivariate analysis was conducted to identify factors associated with good and poor oral health practices, and good and poor knowledge.

Results: Fifty-two eligible study participants were accessible at the time of questionnaire administration. Only 46 respondents returned the filled questionnaire giving a response rate of 88.5%. The age of respondents ranged between 25 and 48 years. The majority of respondents had good oral health practices (65.2%) and good oral health knowledge (85%). However, few respondents had good caries prevention practices: 39.2% brushed at least twice daily, 45.7% took refined carbohydrate less than once daily, 36.9% used dental floss at least once daily, and 60.9% undertook preventive dental care. The correlation between the dentists’ oral health knowledge score and oral health practices score was insignificant (0.90; \( P = 0.55 \)).

Conclusion: A large number of dentists practicing in the tertiary hospital had good oral health practices and good oral health knowledge. However, the proportion of dentists with good caries prevention practices was low.

Key words: Dentist, health, knowledge, Nigeria, oral, practices

Oral health is an essential component of overall health and well-being, it is a state of being free from acute and chronic oral lesions which limit an individual’s capacity to bite, chew, smile, and speak, as well as limit the individual’s psychological well-being.¹⁻³ Good oral health enables an individual to speak, eat, and socialize without discomfort or embarrassment.⁴ Good oral health practices have an inverse relationship with oral disease and those who attend the dental clinic routinely have better-than-average oral health, fewer teeth missing due to caries and a lower decayed missing filled teeth score.⁵⁻⁷ The attainment of good oral health requires the acquisition of knowledge about oral disease prevention, having acceptable oral health behavior such as maintenance of good oral hygiene and nonharmful dietary practices, as

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well as utilization of oral health facilities for preventive care, prompt disease diagnosis, and treatment. Preventive oral health practices include regular, twice daily conscious cleaning of the teeth, dental flossing, decreased intake of sugar between meals, and regular attendance at the dental clinic, at least once every year.

One of the requirements for the success of oral health promotion strategies is the availability of knowledgeable practitioners who serve individuals and groups in need of dental care. Because of the great influence of such a workforce on community health, promoting social responsibility, and ethical practices of caregivers have been emphasized by the World Health Organization as an objective for the year 2020. Furthermore, the availability of prevention-orientated health service practitioners who serve individuals and groups in need of dental care is equally important.

With regard to the current burden of oral diseases in Nigeria, several authors have recommended a sharper focus on oral health promotion programs. This will equally require a workforce capable of addressing preventive oral health needs in both children and adults. Dentists may, however, lack the self-motivation to practice basic preventive oral health habits and their preventive oral health practices may be sub-optimal. Very little is however known about motivating factors for preventive oral health practices by dentists, especially in a country like Nigeria where there are concerns about the low prevention of oral health care practices by the general population. This study seeks to determine the proportion of practicing dentists in a tertiary health institution in Nigeria that have good oral health knowledge and good oral health practices; and to determine the association between age, gender, oral health knowledge, and oral health practices.

**METHODOLOGY**

**Study design and study population**
This study was a cross-sectional survey conducted at the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife. The hospital had an estimated population of about sixty dentists when the study was conducted in 2012. Study participants included all practicing qualified and certified dentists in the institution irrespective of their professional ranking. The study recruited all dentists available in the institution during the 1-week period of data collection.

**Study data collection tool**
Data were collected through a self-administered questionnaire. The questionnaire consisted of twenty structured questions: Eleven explored questions on oral health practices and eight explored questions on oral health knowledge. In an effort to reduce bias responses, questions on practices were asked before the question on knowledge. No clinical examination was conducted. The questions on oral health practices explored such issues as frequency of tooth brushing, time of day when teeth are brushed, frequency of changing toothbrush each year, and possible use of fluoridated toothpaste when tooth brushing. Other questions explored the intake of sugary diet in-between meals and practice after intake of sugary diet (three questions), dental flossing habit, and dental service utilization practices (two questions) (Table 1 for details of the study tool). Scores were assigned to the responses. Each question had a range of 3–5 options from which the participants chose the best that described their practices. All good practices were scored “1” while all poor practices were scored “0.” The total score on oral health practice was computed for each respondent.

Questions on oral health knowledge explored each respondent’s knowledge of appropriate oral practices with respect to the frequency of tooth brushing, frequency of change of toothbrush each year, sugary diet intake, and dental service utilization (Table 2 for the details of the study tool). Each question had a range of options participants were required to choose from. Respondents who recognized the need to brush twice daily morning and night, change toothbrush every 2–3 months, use medium textured toothbrush, start flossing as soon as there is contact between the teeth, floss after meals and at night before sleep, tooth brushing along with flossing was most effective for plaque removal, rinsing mouth with water, and/or tooth brushing after a diet of refined carbohydrate, and dental checkup every 6–12 months scored “1” for their responses. Other responses were scored “0.”

**Validity and reliability of the questionnaire**
The questionnaire was adapted from that used by Folayan et al. to assess oral health practices of dental students. It was adapted to explore more issues on oral health knowledge and practices. The face validity of the questionnaire was assessed through the review of two senior dentists. The instrument’s reliability and validity had been reported by Folayan et al.

**Ethical consideration**
Before administration of the questionnaire, informed consent of the participants was obtained and there were no incentives offered. Ethical clearance was obtained from the Obafemi Awolowo University Teaching Hospitals Complex Ethics and Research Committee. Information was collected without identifiers, and data were handled confidentially.

**Data analysis**
The analysis of the data obtained was done using SPSS 17, WinWrap basic, 2003-2007, Polar Engineering and Consulting, Chicago, IL, USA. Descriptive analysis was done to describe the sociodemographic profile of study participants. Chi-square test was used to establish the association between gender, age, oral
Table 1: Questionnaire on oral health practices

| Number | Questions and filters                                      | Coding categories                      | Scores |
|--------|-----------------------------------------------------------|----------------------------------------|--------|
| Q1     | How often do you brush your teeth in a day?               | Once a day                              | 0      |
|        |                                                            | Twice a day                             | 1      |
|        |                                                            | Thrice a day                            | 1      |
|        |                                                            | After every meal                        | 1      |
| Q2     | When do you do your brushing?                            | Morning before meal                     | 0      |
|        |                                                            | Morning after meal                      | 0      |
|        |                                                            | Morning before meal and night before bed| 0      |
|        |                                                            | Morning after meal and night before bed | 1      |
|        |                                                            | After every meal                        | 1      |
| Q3     | Do you use fluoridated toothpaste for brushing?           | Yes always                              | 1      |
|        |                                                            | Quite often                             | 0      |
|        |                                                            | Rarely                                  | 0      |
|        |                                                            | Never                                   | 0      |
| Q4     | How often do you change your tooth brush                  | Once in 2 months                        | 1      |
|        |                                                            | Once in 3 months                        | 1      |
|        |                                                            | Once in 6 months                        | 0      |
|        |                                                            | Never                                   | 0      |
| Q5     | How often do you eat a sugar containing snack or drink (other than tea and coffee) between your meals in a day? | Once a day                              | 0      |
|        |                                                            | Twice a day                             | 0      |
|        |                                                            | Quite often                             | 0      |
|        |                                                            | Rarely                                  | 1      |
| Q6     | Which of the following do you often take between meals?   | Refined carbohydrates                  | 0      |
|        |                                                            | Nuts                                    | 1      |
|        |                                                            | Fruits/vegetables                       | 1      |
|        |                                                            | All of them                             | 0      |
| Q7     | After taking sugary snack between meals, what do you do?  | Brush my teeth immediately              | 1      |
|        |                                                            | I rinse my mouth with mouthwash         | 1      |
|        |                                                            | Rinse my mouth with water               | 1      |
|        |                                                            | I do nothing                            | 0      |
|        |                                                            | Yes                                     | 1      |
|        |                                                            | No                                      | 0      |
| Q8a    | Do you floss your teeth?                                  | Yes                                     | 1      |
| Q8b    | If so how often?                                          | Once a day                              | 1      |
|        |                                                            | After every meal                        | 1      |
|        |                                                            | Rarely                                  | 0      |
|        |                                                            | Never                                   | 0      |
| Q9     | How often do you go for a dental checkup?                 | Once in 6 months                        | 1      |
|        |                                                            | Once in a year                          | 1      |
|        |                                                            | Rarely                                  | 0      |
|        |                                                            | Never                                   | 0      |
| Q10    | When was your last dental checkup?                        | <6 months ago                           | 1      |
|        |                                                            | Within 6-12 months                      | 1      |
|        |                                                            | Between 1 and 2 years                   | 0      |
|        |                                                            | Never                                   | 0      |
| Q11    | Do you visit a dentist without a dental problem (just for checkup) | Yes                                     | 1      |
|        |                                                            | No                                      | 0      |
| Q12    | Number of decayed, missing (due to caries) of filled teeth?| 1-4                                     | 1      |
|        |                                                            | 5-9                                     | 2      |
|        |                                                            | 10 and above                            | 3      |
|        |                                                            | None                                    | 4      |

health knowledge, and oral health practices of dentists. Pearson correlation analysis was done to determine the correlation between the scores of oral health knowledge and oral health practice. Statistical significance was established at $P \leq 0.05$.

RESULTS

A total of 52 practicing dentists gave their consent to participate in the study. Only 46 respondents returned the filled questionnaire, giving a response rate of 88.5%. The study participants comprised 13 (28.1%) females and 33 (71.7%) males. Their age ranged from 25 to 48, with mean age of $33.9 \pm (4.9)$ years. Most of the respondents (63%) were between 25 and 34 years old (the profile of the study participants is shown in Table 3).

Oral health knowledge and oral health practice scores

Table 4 highlights the average scores for each of the questions on oral health knowledge and oral health practices. The scores for oral health practices ranged from 1 to 9. The mean score was $5.4 \pm (2.10)$, the median score was 5, and 65.2% of the participants had good oral health practice. With respect to oral health practices, 60% of respondents...
Oral health knowledge and practices of dentists

Jegede, et al.

Indian Journal of Dental Research, 27(2), 2016

Table 2: Questionnaire on oral health knowledge

| Number | Questions and filters                      | Coding categories                     | Scores |
|--------|-------------------------------------------|---------------------------------------|--------|
| Q13    | How many times a day should the teeth be brushed? | Twice a day                           | 1      |
|        |                                            | Once in the morning                    | 0      |
|        |                                            | After meals                            | 1      |
|        |                                            | Once before sleep                      | 0      |
|        |                                            | I don’t know                           | 0      |
|        |                                            | Every 6 months                         | 0      |
|        |                                            | Once a year                            | 0      |
|        |                                            | Every 6-12 months                     | 0      |
|        |                                            | When tooth brushes loses its efficiency | 1      |
|        |                                            | Hard                                   | 0      |
|        |                                            | Medium                                 | 1      |
|        |                                            | Soft                                   | 0      |
|        |                                            | I don’t know                           | 0      |
| Q14    | How often should a tooth brush be changed? | After meals                            | 1      |
|        |                                            | Night before sleep                     | 1      |
|        |                                            | After tooth brushing                   | 0      |
|        |                                            | I don’t know                           | 0      |
| Q15    | What kind of tooth brush is suitable for healthy people? | Tooth brushing is not enough, use dental floss | 1     |
|        |                                            | Tooth brushing is not enough, hardly use dental floss | 0     |
|        |                                            | Tooth brush once a day, don’t use dental floss | 0     |
|        |                                            | Nothing                                | 0      |
|        |                                            | Eat fruits                             | 0      |
|        |                                            | Rinse mouth with rinse                  | 1      |
|        |                                            | Tooth brushing                         | 1      |
|        |                                            | I don’t know                           | 0      |
| Q16    | When should dental flossing begin?         | As soon as possible when there is contact between the teeth | 1     |
|        |                                            | I don’t know                           | 0      |
|        |                                            | After meals                            | 1      |
|        |                                            | Night before sleep                     | 1      |
|        |                                            | After tooth brushing                   | 0      |
| Q17    | When should dental flossing be done in a day? | After meals                           | 1      |
|        |                                            | Night before sleep                     | 1      |
|        |                                            | After tooth brushing                   | 0      |
| Q18    | Which statement about the efficiency of tooth brushing is correct? | Tooth brushing is not enough, use dental floss | 1     |
|        |                                            | Tooth brushing is not enough, hardly use dental floss | 0     |
|        |                                            | Tooth brush once a day, don’t use dental floss | 0     |
|        |                                            | Nothing                                | 0      |
| Q19    | What should be done after eating refined carbohydrate | Nothing                                | 0      |
|        |                                            | Eat fruits                             | 0      |
|        |                                            | Rinse mouth with rinse                  | 1      |
|        |                                            | Tooth brushing                         | 1      |
|        |                                            | I don’t know                           | 0      |
| Q20    | How often is regular checkup for prevention of dental caries necessary? | Every 6 months                        | 1      |
|        |                                            | Once a year                            | 1      |
|        |                                            | Every 2 years                          | 0      |
|        |                                            | I don’t know                           | 0      |

The scores for oral health knowledge ranged from 4 to 8. The mean score was $6.6 \pm (1.00)$, and the median score was 6. Furthermore, 87% of the participants had good oral health knowledge. All dentists (100%) knew that the teeth should be brushed at least twice daily, that the tooth brush should be changed at least every 2–3 months and that flossing should start once there’s contact between the teeth. Eighty-seven percent of respondents knew that flossing should be done at least once daily; 83% knew that tooth brushing alone is not adequate as a caries preventive measure but should be accompanied by flossing, and 85% of respondents knew that individuals should have dental checkup at least once a year.

There was a high insignificant correlation between the score of oral health knowledge and oral health practice ($0.90; P = 0.55$). The $R^2$ value of model was 0.81%, implying that the oral health knowledge of study participants only explains about 0.81% of changes in oral hygiene practices.

Gender, age, and oral health practices

Table 5 highlights the association between oral health practice, age, and the gender of study participants. All study brushed less than twice daily, 78% changed their toothbrush after 6 months, 76% consumed sugary snacks in between meals, and 65% had not had an annual oral examination at the time of the study.
participants (100%) used fluoridated toothpaste. There was a significant difference in the proportion of dentists who had their last dental checkup within the last 1 year by gender: More males than females had their last dental checkup within the last 1 year (45.5% vs. 7.7%; \( P = 0.02 \)).

There was no statistical difference in the proportion of males and females who brushed their teeth twice a day (36.4% vs. 46.2%; \( P = 0.54 \)). There was also no significant difference in the proportion of male and female dentists who took sugary snacks in-between meals less than once a day (45.5% vs. 46.2%; \( P = 0.97 \)), and those who flossed at least once a day (30.3% vs. 53.8%; \( P = 0.14 \)).

There was a significant difference in the age group of dentists who brushed at the proper timing and those who do not. More respondents who were in the age bracket 25–34 years brushed their teeth after breakfast and the last thing at night when compared with the 35–48 years age group (34.5% vs. 0%; \( P = 0.01 \)).

There was no statistically significant difference in the proportion of dentists who were in the age bracket 25–34 years and those in the 35–48 years age group who brushed twice a day (41.4% vs. 35.3%; \( P = 0.68 \)), those who took sugary snacks in-between meals less than once a day (44.8% vs. 47.1%; \( P = 0.88 \)), those who flossed at least once a day (65.5% vs. 52.9%; \( P = 0.40 \)) and those who visit their dentists at least annually (34.5% vs. 35.3%; \( P = 0.96 \)).

**Gender, age, and oral health knowledge**

Table 6 highlights the association between oral health knowledge and gender. All the dentists had good knowledge on frequency of tooth brushing, frequency for changing toothbrush, and time tooth flossing should start. There was no significant difference in the proportion of male and female dentists, and the proportion of dentists in the 25–34 years age group and those in the 35–48 years group with good oral health knowledge.
Oral health knowledge and practices of dentists Jegede, et al.

| Oral health knowledge                  | Sex | Age | Total (%) |
|----------------------------------------|-----|-----|-----------|
| Frequency of tooth brushing            |     |     |           |
| Good                                   | 33  | 29  | 46        |
| Poor                                   | 13  | 17  |           |
| Frequency of tooth brushes change      |     |     |           |
| Good                                   | 33  | 29  | 46        |
| Poor                                   | 13  | 17  |           |
| Type of tooth brush used               |     |     |           |
| Good                                   | 20  | 16  | 28        |
| Poor                                   | 13  | 12  |           |
| Time when flossing should start        |     |     |           |
| Good                                   | 33  | 29  | 46        |
| Poor                                   | 13  | 17  |           |
| Flossing timing                        |     |     |           |
| Good                                   | 29  | 27  | 38        |
| Poor                                   | 4   | 2   |           |
| Tooth brushing efficiency              |     |     |           |
| Good                                   | 29  | 24  | 38        |
| Poor                                   | 4   | 5   |           |
| Action taken after refined carbohydrate intake |     |     |           |
| Good                                   | 12  | 11  | 19        |
| Poor                                   | 21  | 18  | 27        |
| Dental check                           |     |     |           |
| Good                                   | 29  | 24  | 39        |
| Poor                                   | 4   | 5   |           |

DISCUSSION

The aim of this study was to determine the association between age, gender, oral health knowledge, and oral health practice. Results from the study showed the mean knowledge score of study participants was high; mean oral health practice was moderate, and the correlation between knowledge and practice was also high although insignificant. Age and sex of dentists were significantly associated with some oral health practices but not significantly associated with oral health knowledge.

These findings are important because the health practices of physicians determine what they tell their patients[16] and this, in addition to their knowledge, serve as a framework for practice.[15] Likewise, the knowledge and attitude of dentists play an important role in the type of information they share with their clients and the populace at large.[17] While a large number of respondents knew that the appropriate tooth brushing frequency was twice a day, very few actually brushed twice a day. The frequency of those who brushed twice daily in this study population was lower than that reported by Gopinath[17] for practicing dentists in Chennai, India (55.9%), Mongolia (81%),[18] and Iran (59%).[19] Since brushing is one of the main focus in caries preventive measures, it is expected that the frequency of regular brushing among dentists should be well above average.

The proportion of dental students who brushed their teeth more than once daily (47%)[15] was higher than those we found in this study who brush more than once daily. We also noticed in this study that the younger dentists brushed their teeth more than once daily although this proportion was not significantly higher than the number of older dentists who brushed their teeth more than once daily. What we may be seeing is an evolution of oral health practice with younger dentists acquiring better oral health behavior with time. Hopefully, this evolution would also inform the public oral health practices as currently, the tooth brushing practice of dentists is better than that of the populace: About 18% of adults and 12% of children more than once daily.[20]

Furthermore, while this low proportion of twice daily tooth brushing frequency of dentists, students, and community members give cause for concern, there is really no evidence to show that it is associated with detrimental oral health in the study populations. While it may be good practice to encourage twice daily tooth brushing[20,21] for the purpose of reducing caries risk, there is still a need to provide evidence to justify the need to promote any change in tooth brushing habits for this community, with high use of fluoridated toothpaste, prior to investing limited human and financial resources in any change campaign or program.

Just like tooth brushing, many respondents knew that intake of sugary diet should be limited to less than once a day, but only a little more than half of the respondents actually practice this. This is similar to findings among practicing dentists in Iran,[19] Mongolia,[18] and Chennai.[17] However, unlike Gopinath’s[17] observation in Chennai where female dentists consumed sugary snacks more frequently than male.
dentists, this study found no gender-based difference in the frequency of consumption of refined carbohydrate per day. Unfortunately, the proportion of practicing dentists who consume sugary diet in-between meals was higher than the proportion of dental students in the same institution (52%), and the proportion of adults and children resident in the same community who consume sugary diet in-between meals. We think the high intake of sugary snacks in between meals by oral health professionals and students, despite being aware of the detrimental effects, may be due to their ready access to these snacks during working hours. The faculty does not have a cafeteria where staff can have access to good meals. Rather, what is readily accessible is sugary snacks and drinks which staff and students can access when they need meals. This highlights the need for organizations and institutions to provide support for access to healthy diets including ensuring cafeterias serving healthy tasty meals are located within working premises accessible to all cadres of staff of the organization and institution. This postulation, however, needs more studies before recommendations can be made to the faculty for change in institutional structures to support good feeding practices.

Flossing has been encouraged as an adjunct to tooth brushing as it helps prevent interdental caries and periodontal pocket formation. Only about a third of respondents floss at least once a day; an observation higher than what was observed in India. The proportion of dentists who floss at least once a day (37%) was higher than the proportion of dental students (7.3%), parents, and children who floss once a day on the study environment. The high use of dental floss by students in comparison to others may reflect a gradual translation of knowledge into practice. Dentists may also have more access to dental floss than others as dental floss is not yet a regular oral health product found in the Nigerian open market. Further studies may be required to understand why and how to increase the use of dental floss by dentists and the general public.

Similarly, only a third of respondents visit the dentist every 6–12 months for checkup, practice just like that reported by Gopinath of dentists in Chennai. Unfortunately, the proportion of dentist who make annual dental visits is less than observed among dental students although higher than observed in adults and children in the study population. The low attendance as regards dental checkup may be a reflection of the problem-based orientation toward hospital attendance by the general public. It is scary to note that a proportion of dentists who have regular access to oral health care facilities do not, themselves, use these facilities regularly. The implication of this finding for public awareness and patients’ motivation for annual dental visits can be grave as this attitude may reflect in the poor promotion of annual oral health visits for patients and the public.

It was encouraging to observe that all respondents used fluoridated toothpaste for tooth brushing always. This is in contrast to observation in Mongolia where only 62% used fluoridated toothpaste always; Iran where 74% used fluoridated toothpaste always, and Chennai where 55.1% used fluoridated toothpaste always. The ease of access to fluoridated toothpaste, through the promulgation of laws that ban the production or importation of toothpaste that do not contain fluoride in Nigeria, have further strengthened the prospect for the use of fluoridated toothpaste in the study community. Earlier studies have reported high use of fluoridated toothpastes by children in Nigeria. Thus, prescription of fluoridated toothpaste by practicing dentists in the study environment may have limited impact on patients’ choice of toothpaste since the availability of toothpaste without fluoride in the open market is restricted by the law.

One of the limitations of this study is the small sample size and the recruitment of study participants from only one tertiary health institution in Nigeria. This makes it difficult to generalize the results of this study to practicing dentists in Nigeria. However, the information provides insight into the oral health knowledge and practices of practicing dentists in Nigeria. To be able to make further recommendations, it would be important to generate information on how oral health practices impact on the oral health of dentists, and identify challenges with, and barriers to, access to preventive oral self-care practices. Only after this can recommendations be made about how to close the current gap between oral health knowledge and oral health practices of practicing dentists in the study population.

CONCLUSION

Although the study shows that a large number of dentists practicing in the tertiary hospital had good oral health practices and good oral health knowledge, however, good caries preventive practices was lacking in a large number of dentist practicing in this tertiary hospital.

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