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Impact of dental education on DMFT index among undergraduate dental students in selected Nigerian universities

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Abstract

Background: DMFT is used to denote decayed, missing and filled teeth. The DMFT index is the universally employed index for measuring dental caries status. Dental caries is the most common oral disease affecting all age groups and a major cause of tooth loss. A fundamental purpose of dental education is to develop health professionals who will maintain and improve the oral health status of individuals and populations. The aim of this study was to investigate the impact of dental education on the occurrence of DMFT among undergraduate dental students in Nigeria.
Materials and Method: The study was a cross-sectional survey involving the use of a multi-stage sampling technique to select 812 undergraduate dental students from six institutions. Structured questionnaires were designed in two sections (A and B). Section A on socio-demographic data was self-administered and section B on oral examination was interviewer-administered. Data were analyzed using Chi-square test at 5% level of significance.
Results: The mean age of the respondents was 22.0±3.0 years. The overall prevalence of dental caries among the participants was 24%. The median DMFT score was 0.0 and the range was 0.0 – 8.0. The decayed component of the DMFT decreased significantly from 22.4% in 100 level to 7.2% in 600 level ($p<0.0001$) and the filled component increased significantly from 2.5% in 100 level to 13.1% in 600 level ($p<0.018$).
Conclusion: Dental education had a positive influence on dental caries status of the subjects.

Key words: Impact, Dental education, DMFT Index, Dental students

Introduction

Dental caries is the most common oral disease affecting all age groups and a major cause of tooth loss[1]. Although a decrease in the prevalence of dental caries has been marked across the globe, in many countries it has remained a major oral-health problem[1]. DMFT is used to denote the decayed, missing and filled teeth. The DMFT index measures the total lifetime caries status. Therefore DMFT index quantifies the dental caries status in terms of the number of decayed teeth with untreated caries lesion, i.e. (D) component of DMFT and the number of teeth, which have been lost due to caries, i.e. (M) component of DMFT as well as the number of filled teeth present, i.e. (F) component of DMFT.[2] The DMFT index is the universally employed index for measuring dental caries status,[2-4] which is a component of oral health status.

A fundamental purpose of dental education is to develop health professionals who will maintain and improve the oral health status of individuals and populations.[5] They are more likely to be able to do this if they themselves are motivated.[6] Their training would require knowledge of the impact of dental education on dental health status. A study of dental

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students' own dental caries status and the impact of dental education on this status during their training could be of great value, since they are the ones who will apply their knowledge to patients and improve the treatment process during their own practices.[7] Several studies have been done to assess the effect of oral health education on DMFT but only very few were done among dental students in Nigeria. Hence the aim of this study was to investigate the impact of dental education on the number of decayed, missing and filled teeth among undergraduate dental students in Nigeria.

Materials and Method

Study Design and Study Area: The study was an analytical cross-sectional survey involving 812 undergraduate dental students from 6 accredited dental institutions in Nigeria: University of Benin (UNIBEN), University of Ibadan (UI), University of Lagos (UNILAG), Obafemi Awolowo University (OAU), University of Port Harcourt (UNIPORT) and Bayero University, Kano (BUK).

Sample Size: A sample size of 700 was calculated using the formula for cross-sectional study for quantitative outcome[8].

$$n = \frac{z^2_{\alpha} S^2}{d^2}$$

Where:

n = the desired minimum sample size

Z_{α} = the value of the standard normal deviate corresponding to specified confidence level.

Z_{α} = 1.96, corresponding to a 95% confidence level.

S = 0.54 = the standard deviation of the mean DMFT score in a study of dental caries status among undergraduate dental students[9]

d = 0.04 = desired level of precision

A sample size of 700 was obtained from the above formula as shown below:

$n = 1.96^2 \times 0.54^2$

= 700

However, this was adjusted to 875 to compensate for possible non-response rate of 20%.

Sampling Technique: A multi-stage sampling technique was used to select 875 students from 6 accredited dental institutions in Nigeria.

Stage-1: Six out of eight Universities where dentistry is studied in Nigeria were selected through purposive sampling technique. The schools were: UI, UNIBEN, UNILAG, OAU, UNIPORT and BUK. Population of students in all the six schools (N) was 1171.

Stage-2: Stratified sampling technique was used to divide the selected population into six strata by the schools. Using **equal sampling ratio (proportional allocation)**, the sample size in each school (n_s) was calculated from: $n_s = n/N (N_s)$, where: Ns = Number of Students in each school and n/N = Sampling ratio = 875/1171.

Stage-3: In each of the schools, stratification was made into 6 strata by the study level and the required number of students from each study level (n_L) was again calculated using **equal sampling ratio** from $n_L = n_s/Ns (N_L)$, where: N_L = Number of Students in each level and n_s/Ns = Sampling fraction in each school (which also equals the general sampling ratio).

The summary of the total (N) and the required (n) number of students in each of the study levels in all the six schools is presented in table-1:

Stage-4: The final selection was done using convenience sampling technique. The questionnaires were administered to any student seen in each class until the required number of subjects from that class is reached.

Data collection procedures:

Structured questionnaires of both closed and open-ended questions were designed in two sections (A and B). Section A on socio-demographic data and section B on oral examination. The oral examination made use of the decayed, missing and filled teeth (DMFT) index and was used to assess the caries experience (mean DMFT score) of the students. Sections A was self-administered, while section B was interviewer-administered.

The inter-examiner variability in each of the six sets of examiners was not statistically significant.

Criteria for caries diagnosis

This followed the recommendations of the WHO oral health survey method. The examination for the presence of dental caries was conducted under

natural light. The criteria are as follows:

Sound Crown: A crown was recorded as sound, if it shows no evidence of treated or untreated clinical caries. The stages of caries that precede cavitation, as well as other conditions similar to early stages of the caries were excluded because they cannot be reliably diagnosed. Thus, a crown with defects such as white/chalky spots, discolored rough spots, stained pits and fissures or abrasion like lesion in the absence of other positive criteria, was coded as sound.

Decayed Crown (D): Caries was recorded as present when a lesion in a pit or fissure or on a smooth tooth surface, has an unmistakable cavity, undermined enamel or a detectable softened floor or wall. A tooth with a temporary filling was included in this category. Caries was not recorded when in doubt. A crown was also scored as decayed when it had one or more permanent restorations plus one or more areas that are decayed.

Filled Crown (F): Presence of one or more permanent restorations with no evidence of caries anywhere on the crown.

Missing tooth as a result of caries (M): Tooth extracted because of caries was scored based on the information provided by the respondent as to how tooth was lost. When in doubt, it was not recorded.

Study Variables: The study variables include one outcome variable (the DMFT) and one explanatory variable (the study level of the students). The latter had 6 categories: year-1, year-2, year-3, year-4, year-5 and year-6.

DMFT Index: DMFT is used to denote the decayed, missing and filled teeth in the mouth. Therefore DMFT index quantifies the dental caries status in terms of the number of decayed teeth with untreated caries lesion, i.e. (D) component of DMFT and the number of teeth, which have been lost due to caries, i.e. (M) component of DMFT as well as the number of filled teeth present, i.e. (F) component of DMFT[4]. The DMFT values were interpreted according to DMFT scoring scale. According to this scale, a DMFT value between 0-4 is considered low dental caries status, the value in the range of 5-9 is moderate dental caries status and value greater than 9 is high dental caries status[5]. In terms of occurrence of dental caries, DMFT score of zero means absence of dental caries and DMFT score of greater than zero means presence of dental caries.

Data Management and Analysis: The data were entered, cleaned and analyzed using SPSS statistical package, version 20. Simple summary statistics (percentage for categorical and mean for quantitative variables) was done for all variables. The dental caries experience (mean DMFT score) and prevalence among the participants were analyzed and reported using descriptive statistics. Chi-square test was used to investigate associations between study level and the various components of DMFT.

Ethical Consideration: Ethical approval was obtained from University of Ibadan/University College Hospital Ethics Committee.

Table 1: Summary of the total (N) and the selected (n) number of students in each of the study levels in all the six schools of study.

STUDY	UI		UNIBEN		UNILAG		OAU		UNIPORT		BUK	
LEVEL	N	n	N	n	N	n	N	n	N	n	N	n
100	28	**21**	23	**17**	50	**37**	26	**19**	20	**15**	67	**50**
200	32	**24**	20	**15**	52	**39**	32	**24**	27	**20**	50	**37**
300	33	**25**	20	**15**	77	**58**	32	**24**	33	**25**	26	**19**
400	28	**21**	20	**15**	66	**49**	13	**10**	23	**17**	25	**19**
500	35	**26**	40	**30**	49	**37**	33	**25**	16	**12**	7	**5**
600	33	**25**	32	**24**	55	**41**	38	**28**	10	**7**	0	**0**
Total	189	142	155	116	349	261	174	130	129	96	175	130

Table 2: Socio-demographic characteristics of respondents

Variable	Frequency (n = 812)	Percent (%)
Gender		
Male	471	58.0
Female	341	42.0
Age group in years		
<20	175	21.6
20-24	470	57.9
>24	167	20.5
School		
UI	162	20.0
UNIBEN	138	17.0
UNILAG	228	28.0
OAU	150	18.5
UNIPORT	73	9.0
BUK	61	7.5
Study level		
100	120	14.8
200	140	17.2
300	143	17.7
400	136	16.7
500	135	16.6
600	138	17.0
Fathers occupation		
Senior civil servant	453	56.6
Junior civil servant	49	6.1
Small scale self employed	115	14.4
Large scale self employed	156	19.5
Unemployed	27	3.4
Mother occupation		
Senior civil servant	408	50.6
Junior civil servant	76	9.5
Small scale self employed	174	21.6
Large scale self employed	109	13.5
House wife	26	3.2
Unemployed	13	1.5
Highest educational level of father		

Table-3: Association between study level and occurrence of decayed teeth, missing teeth and filled teeth

Study level	Decayed Teeth		Missing Teeth		Filled Teeth	
	Absent n (%)	**Present n (%)**	**Absent n (%)**	**Present n (%)**	**Absent n (%)**	**Present n (%)**
100	90(77.6)	26(22.4)	111(92.5)	9(7.5)	117(97.5)	3(2.5)
200	110(79.1)	29(20.9)	123(87.9)	17(12.1)	128(91.4)	12(8.6)
300	128(89.5)	15(10.5)	127(89.4)	15(10.6)	137(95.8)	6(4.2)
400	125(92.6)	10(7.4)	119(87.5)	17(12.5)	125(91.9)	1(8.1)
500	120(88.9)	15(11.1)	121(89.6)	14(10.4)	126(93.3)	9(6.7)
600	128(92.8)	10(7.2)	122(88.4)	16(11.6)	119(86.9)	18(13.1)
	(p<0.0001)		(p=0.829)		(p=0.018)	

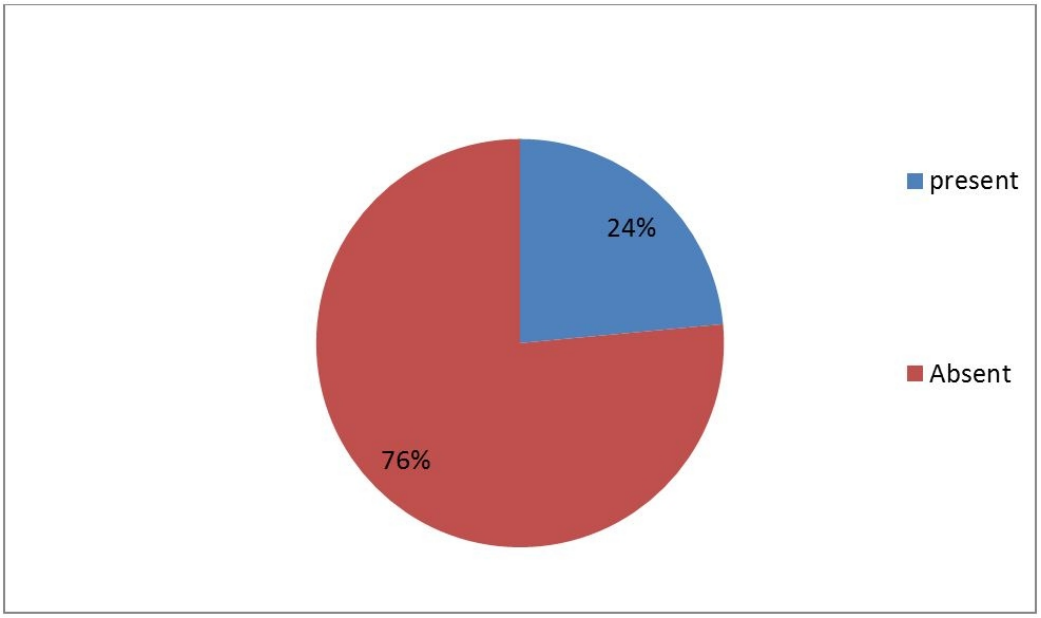

Figure-1: Prevalence of dental caries among the participants

Results

Out of 875 questionnaires administered, 841(96%) students responded and 812 (93%) duly completed questionnaires were analyzed.

Table-2 shows the socio-demographic characteristics of respondents. The ratio of male to female respondents was about 3:2. The mean age of the respondents was 22.0±3.0 years. Many of the students (57.9%) were between 20 and 24 years, 28.1% were from UNILAG and 17.7% were 300 level students. More than half of the respondents' fathers (56.6%) and about half of their mothers (50.6%) were senior civil servants. More than half of both fathers (77.4%) and mothers (71.4%) of respondents had tertiary education.

Figure-1 shows that the overall prevalence of dental caries among the participants was 24%. The median DMFT score was 0.0 and the range was 0.0 – 8.0.

Table-3 shows the association between study level and the occurrence of decayed, missing and filled teeth among the students. The decay component of the DMFT was decreased significantly from 22.4% in 100 level to 7.2% in 600 level (p<0.0001) and the filled component increased significantly from 2.5% in 100 level to 13.1% in 600 level (p<0.018). There was no significant difference in the missing component of the DMFT (P= 0.829).

Discussion:

Dentists play an important role in the improvement of the public's oral health education. Therefore, acquiring knowledge and attitudes related to dental health and the prevention of oral disease is very important during the future dentists' training period[10].

The overall caries experience observed in this study was low and much better than those observed in many other studies among undergraduate dental students in different Universities in other countries where the values observed range from 1.38±0.54[9] to 8.5±6.8[11]. The low caries experience observed in this study may be related to the high socio-economic background of majority of the subjects as over 70% of the parents had tertiary education and more than half were either senior civil servants or large scale self-employed.

Although there was no significant difference in the dental caries status when measured by the mean DMFT score among the different professional years, the decay component of the mean DMFT was significantly decreased from 100 level to 600 level and the filled component significantly increased from 100 level to 600 level, reflecting positive influence of their dental education on their dental caries status. A similar finding was observed in a DMFT index study among undergraduate dental students of Lahore medical and dental college (Pakistan) in different professional years of dentistry[9], which also reported that dental students completed their undergraduate training period with higher number of treated teeth. This has been attributed to their motivation and good perception of their dental health. There was no significant difference in the missing component of the DMFT. This shows that the senior students had lesser tendency to lost their teeth than the junior ones. The latter again reflects a positive influence of their dental education and higher motivation of the senior students regarding their dental health.

In conclusion, dental education had a positive impact on the decayed, missing and filled components of the DMFT index of the subjects. Therefore, we wish to recommend that dental students should start learning about preventive aspects of oral health as early as their first year in the University.

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