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Dental Anxiety, Expected Social Outcomes and Halitosis

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ABSTRACT

Objective: To determine the relationship between dental anxiety, expected social outcome and halitosis among undergraduates of University of Benin, Nigeria.

Methods: This questionnaire-based cross-sectional study among 150 students. This self-administered questionnaire elicited information on oral concerns, dental anxiety, self-reported perception of oral breath, awareness of bad breath, timing of bad breath, treatment received for bad breath, oral hygiene practices and smoking. Data analysis was done using IBM SPSS version 20.0 and statistical significance was set at $p < 0.05$.

Results: The majority of the participants attach high importance to their body (78.7%) and mouth (75.3%). More than half (54.0%) of the participants clean their mouth more than once daily and 14.7% of them consume tobacco. The prevalence of gingival bleeding, halitosis and dental anxiety among the participants was 31.3%, 34% and 26% respectively. The mean anxiety score for anticipated dental visit was 2.48 ± 1.60 , waiting room 2.37 ± 1.38 tooth drill 3.35 ± 1.16 , tooth scale and polish 2.71 ± 1.20 , anaesthetics injection 3.98 ± 1.31 and overall dental anxiety 14.88 ± 5.17 . The dental anxiety was higher among participants older than 22 years (15.27 ± 5.22), males (15.24 ± 5.25), non-indigenous participants (15.04 ± 5.64), participants studying non science related courses (14.89 ± 5.83), less religious participants (15.29 ± 5.04), participants who clean their teeth more than once daily (14.84 ± 5.51), tobacco users (16.00 ± 4.31), participants with gingival bleeding (16.02 ± 5.51) and participants with halitosis (16.39 ± 5.00). The majority of the halitosis sufferers had experienced it for less than 1 month (37.3%) and it was usually worse in the morning (45.1%). Less religious participants ($P = 0.038$), those with low expected social outcome ($P = 0.033$), irregular teeth cleaner ($P = 0.008$) and anxious participants ($P = 0.001$) significantly reported halitosis more than their counterparts. Regression statistical analysis revealed that dental anxiety emerged as the significant predictor of halitosis.

Conclusion: Dental anxiety, halitosis and high expected social outcome were prevalent among the participants. Dental anxiety emerged as the significant predictor of halitosis in this study.

Keywords: dental anxiety, halitosis, oral concerns, undergraduates

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INTRODUCTION

Dental anxiety, which is an anticipatory reaction to dental visit and procedures, is a common condition worldwide. It exerts a wide range of dynamic impact on human life such as sleep disturbance, work interference, adverse social effect and relationship impediments.¹ Dental anxiety adversely affects oral health-related quality of life.^{2,3} Individuals with high dental anxiety exhibit indicators of poor oral health behaviour in form of suboptimal oral self-care, irregular dental

attendance, dental procedure postponement and total dental treatment avoidance which will culminate into poor orodental health.⁴ The trait disposition of dental anxiety has been stated as a significant risk indicator of poor dental and periodontal status.² This poor oral health status may lead to offensive odour emanating from the mouth, which is referred to as halitosis.

Halitosis usually triggers self-medication over dental attendance because of its high rating as a cosmetic problem.⁵ There is also possibility that the barrier to dental attendance among halitosis sufferers may be due to dental anxiety. Psychological factors, such as anxiety, depression and stress, as well as some personality traits have considered as risk factors for subjective halitosis.⁶ Previous studies reported that stress situations increased VSC concentration, thus causing halitosis.^{7,8} Also, reports stated that subjective halitosis sufferers are significantly more anxious,

stressed and depressed.^{9,10} This bidirectional relationship between anxiety and halitosis may be related to psychology, social belief and behavioural tendencies. The objective of the study was to determine the relationship between dental anxiety, expected social outcomes and halitosis.

MATERIALS AND METHODS

This cross-sectional study was conducted among the undergraduates of the University of Benin, Benin City, Nigeria. Informed consent was obtained from the participants. Participation was voluntary and no incentive was offered. The data collection tool was self-administered validated questionnaire. The questionnaire elicited information on demographic characteristics, oral health concerns, expected social outcomes of having healthy teeth, level of dental anxiety and importance attached to their body and mouth. The demographic characteristics assessed include age, gender, course of study, ethnicity and religious activity attendance. The oral health concerns assessed were tobacco use, tooth brushing frequency and gingival bleeding on tooth brushing. Religious activity attendance was assessed with single question; how often do you attend religious activities in your community? the options were never, rarely, 1-2 times a month and once a week or more. Those that attended once a week or more were categorised as more religious and the other group as less religious.

Halitosis evaluation was done using a three-item tool. Assessment was done by asking the participant to exhale on the back of the palm and smell it. If it smells yes was indicated for halitosis if it does not smell on was indicated for halitosis. If yes, the duration of the halitosis and when it is majorly perceived were also assessed.

Expected social outcomes (ESOs) of having healthy teeth were assessed with a scale of six items;^{11,12} 'People judge each other in part on the basis of their teeth', 'In social contacts well maintained teeth are important', 'It is embarrassing when someone has badly maintained teeth', 'Someone's teeth are important for the first impression he or she makes', 'I appreciate it when people with whom I socialize have well maintained teeth' and 'In social contacts fresh breath is important'. Responses ranged from disagree (1) to agree (5) and a sum score (ranging from 6 to 30) was computed by summing up scores on all six items that measured the concept ESOs. A higher sum score indicated a higher expected social outcomes while a lower sum score indicated a lower expected social outcomes. The ESOs of having healthy teeth was dichotomized into low and high ESOs based on score 6-23 and 24-30 respectively.

Dental anxiety was assessed using a five-item Modified Dental Anxiety Scale (MDAS) scale. The items are; "If you are going to go to your dentist for treatment tomorrow, how would you feel?", "If you were sitting in the waiting room, how would you feel?", "If you were about to have a tooth drilled, how would you feel?", "If you were about to have your teeth scaled and polished, how would you feel?" and "If you were about to have a local anaesthetic injection in your gum, how would you feel?" Items were scored on a scale of 1-5, and higher sum scores (ranging from 5 to 25) indicated higher dental anxiety. The dental anxiety was then dichotomized into low and high dental anxiety based on score 5-18 and 19-25 respectively.

The importance the participants attached to their own body was assessed using a single -item on a scale of 0-10, where 0 meant not important and 10 very important. A higher score indicated that they attached a higher importance attached to their body. The scores were categorized into low, moderate and high importance based on score 0-3, 4-7 and 8-10 respectively.

The importance participants attached to their own mouth was assessed using a single -item on a scale of 0-10, where 0 meant not important and 10 very important. A higher score indicated that they attached a higher importance attached to their mouth. The scores were also categorized into low, moderate and high importance based on score 0-3, 4-7 and 8-10 respectively.

The obtained data was subjected to descriptive statistics and binary logistic regression statistics using IBM SPSS version 21.0. The statistical significance was set at $P < 0.05$.

RESULTS

Half of the participants were greater than 22 years old, about two-thirds (61.3%) the participants were male and less than half (47.3%) of participants were of indigenous ethnicity. More than half of the participants were more religious (58.7%) and studying science related course (52.0%). The majority of the participants attach high importance to their body (78.7%) and mouth (75.3%). More than three-quarters (86.7%) reported high social outcome. More than half (54.0%) of the participants clean their mouth more than once daily and 14.7% of them consume tobacco. The prevalence of gingival bleeding, halitosis and dental anxiety among the participants was 31.3%, 34.0.0% and 26% respectively.

The mean score for anticipated dental visit 2.48 ± 1.60 , waiting room 2.37 ± 1.38 tooth drill 3.35 ± 1.16 , tooth scale and polish 2.71 ± 1.20 , anaesthetic injection 3.98 ± 1.31 and dental anxiety

14.88±5.17. The dental anxiety was higher among participants older than 22 years (15.27±5.22), males (15.24±5.25), non-indigenous participants (15.04±5.64), participants studying non-science related courses (14.89±5.83), less religious participants (15.29±5.04), participants that clean their teeth more than once daily (14.84±5.51), tobacco users (16.00±4.31), participants with

Table 1: Sample characteristics

Characteristics	n	%
Age (years)		
≤ 22	75	50.0
>22	75	50.0
Sex		
Male	92	61.3
Female	58	38.7
Ethnicity		
Indigenous	71	47.3
Non-indigenous	79	52.7
Religiosity		
Less	62	41.3
More	88	58.7
Course of study		
Science	78	52.0
Non science	72	48.0
Importance attached to own body		
Low	4	2.7
Moderate	33	22.0
High	113	75.3
Importance attached to own mouth		
Low	7	4.7
Moderate	25	16.7
High	118	78.7
Expected social outcome		
Low	20	13.3
High	130	86.7
Teeth cleaning frequency		
Not everyday	16	10.7
Once-daily	53	35.3
>Once-daily	81	54.0
Tobacco use		
Yes	22	14.7
No	128	85.3
Gingival bleeding		
Yes	47	31.3
No	103	68.7
Halitosis		
Yes	51	34.0
No	97	66.0
Dental anxiety		
Present	39	26.0
Absent	111	74.0
Total	150	100.0

gingival bleeding (16.02±5.51) and halitosis (16.39±5.00) (Table 2). The majority of the halitosis sufferers had experienced it for less than 1 month (37.3%) and it was usually worse in the morning (45.1%) and after waking up (29.4%) (Table 3). Less religious (0.038), low expected social outcome (0.033), irregular teeth cleaner (0.008) and anxious (0.001) participants significantly reported more halitosis than their counterparts (Table 4). Regression statistical analysis revealed that dental anxiety emerged as the significant predictor of halitosis. The anxious participants have 3.955 odds of having halitosis at 95% confidence interval (1.638-9.552) than non-anxious participants.

Table 3: Awareness duration and timing of worst halitosis among the participants

Variable	n (%)
How long have you been aware about your halitosis?	
>2years	1 (2.0)
1-2years	6 (11.8)
7-11months	3 (5.9)
1-6months	5 (9.8)
<1 month	19 (37.3)
Unspecified	17 (33.3)
What time of the day do you find your breath the worst?	
After waking up	15 (29.4)
In the morning	23 (45.1)
When hungry	2 (3.9)
When thirsty	2 (3.9)
While talking with people	0 (0.0)
When tired	1 (2.0)
During work	5 (9.8)
Afternoon	2 (3.9)
Throughout the day	1 (2.0)
Total	51 (100.0)

DISCUSSION

This study with set objective to determine the association between expected social outcomes, dental anxiety and halitosis found dental anxiety among about one-quarter (26.0%) of the participants in this study which was higher than 19.2% reported among Nigerian primary school teachers by Azodo and Umoh¹⁴ and 7.4% reported among dental patients by Arigbede et al.¹⁵ The prevalence of dental anxiety in this study was higher than the values reported in compared studies because the study setting was urban and

Table 2: Dental anxiety among the participants

Variable	Treatment tomorrow	waiting room	tooth drill	scale & polish	Anaesthetic injection	Dental anxiety
Age(years)						
≤22	2.43±1.60	2.29±1.36	3.23±1.19	2.57±1.12	3.97±1.34	14.49±5.14
>22	2.53±1.62	2.44±1.40	3.47±1.12	2.84±1.26	3.99±1.30	15.27±5.22
Sex						
Male	2.42±1.61	2.34±1.34	3.27±	2.64±1.21	3.98±1.34	14.65±5.14
Female	2.57±1.60	2.41±1.45	3.47±1.10	2.81±1.18	3.98±1.28	15.24±5.25
Ethnicity						
Indigenous	2.36±1.50	2.26±1.32	3.36±1.12	2.71±1.14	4.06±1.20	14.74±4.66
Non-indigenous	2.61±1.69	2.47±1.44	3.34±1.21	2.71±1.25	3.91±1.42	15.04±5.64
Religiosity						
Less	2.65±1.68	2.53±1.26	3.24±1.11	2.87±1.21	4.00±1.31	15.29±5.04
More	2.36±1.55	2.25±1.45	3.42±1.19	2.59±1.18	3.97±1.33	14.59±5.28
Course						
Science	2.38±1.60	2.31±1.33	3.38±1.00	2.67±1.07	4.13±1.10	14.87±4.53
Non-Science	2.58±1.62	2.43±1.43	3.31±1.32	2.75±1.33	3.82±1.50	14.89±5.83
Tooth cleaning frequency						
Not everyday	3.63±1.45	3.38±1.09	3.88±1.09	3.13±1.31	4.31±1.14	18.31±4.22
Once daily	2.09±1.51	1.98±1.17	3.19±1.08	2.57±1.07	4.08±1.12	13.91±4.49
>Once daily	2.51±1.60	2.42±1.46	3.35±1.21	2.72±1.25	3.85±1.45	14.84±5.51
Tobacco use						
Yes	2.91±1.82	2.68±1.21	3.18±1.01	3.05±1.09	4.18±0.91	16.00±4.31
No	2.41±1.56	2.31±1.40	3.38±1.18	2.65±1.21	3.95±1.37	14.69±5.30
Gingival bleeding						
Yes	2.91±1.74	2.79±1.38	3.45±1.21	2.81±1.25	4.06±1.28	16.02±5.51
No	2.28±1.50	2.17±1.34	3.30±1.14	2.66±1.17	3.94±1.33	14.36±4.96
Halitosis						
Yes	3.39±1.74	2.82±1.38	3.37±1.10	2.78±1.14	4.02±1.24	16.39±5.00
No	1.95±1.25	2.07±1.27	3.30±1.18	2.70±1.22	3.94±1.36	13.96±5.07
Body importance attachment						
Low	1.75±1.50	1.75±0.98	1.50±1.00	1.75±0.96	2.50±1.73	9.25±5.06
Moderate	2.48±1.60	2.61±1.40	3.42±1.23	3.09±1.21	3.88±1.54	15.48±5.71
High	2.50±1.62	2.32±1.38	3.39±1.10	2.63±1.17	4.06±1.21	14.90±4.94
Mouth importance attachment						
Low	2.86±1.78	2.43±1.40	2.57±1.51	2.57±1.13	3.14±1.57	13.57±6.21
Moderate	1.96±1.60	2.12±1.33	2.80±1.22	2.80±1.38	3.44±1.64	13.1±6.00
High	2.57±1.59	2.42±1.39	3.51±1.08	2.69±1.17	4.14±1.18	15.33±4.88
Expected social outcome						
Low	2.90±1.80	2.70±1.17	3.20±1.15	2.95±1.15	3.75±1.29	15.50±4.62
High	2.42±1.57	2.32±1.40	3.37±1.16	2.67±1.20	4.02±1.32	14.78±5.27
Total	2.48±1.60	2.37±1.38	3.35±1.16	2.71±1.20	3.98±1.31	14.88±5.17

the participants were students as urban dwellers and students have been found to report higher dental anxiety.¹⁶ This prevalence should be of concern to dentists treating undergraduates as dental anxiety inhibits patient's co-operation, increases recall appointment default, hinders receipt of treatment and adversely affects management outcome.¹⁷⁻²⁰

Dental anxiety expressed by a mean MDAS score (14.88) in this study is higher than the mean values

reported in previous studies among adults Saudi Arabian (12.63)²¹, United Arab Emirate College students (11.52)²², adult Britons (10.36)²³ and Indian dental patients (9.22).¹⁶ This finding may suggests an ethnic/racial difference in dental anxiety as such difference were noted among the indigenous and non-indigenous participants in this study.²⁴ Anticipation of curative dental care in form of anesthetics injection and tooth drilling elicited higher anxiety scores than preventive

Table 4: Relationship between sample characteristics and halitosis among the participants

Characteristics	Halitosis		P-value
	Yes	No	
Age (years)			0.228
≤22	29 (38.7)	46 (61.3)	
>22	22 (29.3)	53 (70.7)	
Sex			0.420
Male	29 (31.5)	63 (68.5)	
Female	22 (37.9)	36 (62.1)	
Course			0.868
Science	27 (34.6)	51 (65.4)	
Non-science	24 (33.3)	48 (66.7)	
Ethnicity			0.278
Indigenous	21 (29.6)	50 (70.4)	
Non-indigenous	30 (38.0)	49 (62.0)	
Religiosity			0.038
Less	27 (43.5)	35 (56.5)	
More	24 (27.3)	64 (72.7)	
Importance attachment to body			0.791
Low	2 (50.0)	2 (50.0)	
Moderate	11 (33.3)	22 (66.7)	
High	38 (33.6)	99 (66.4)	
Importance attachment to mouth			0.414
Low	4 (57.1)	3 (42.9)	
Moderate	8 (32.0)	17 (68.0)	
High	39 (33.1)	79 (66.9)	
Expected social outcome			0.033
Low	11 (55.0)	9 (45.0)	
High	40 (30.8)	90 (69.2)	
Teeth cleaning frequency			0.008
Not everyday	10 (62.5)	6 (37.5)	
Once	21 (39.6)	32 (60.4)	
>once	20 (24.7)	61 (75.3)	
Tobacco use			0.459
Yes	9(40.9)	13 (59.1)	
No	42 (32.8)	86 (67.2)	
Gingival bleeding			0.062
Yes	21 (44.7)	26 (55.3)	
No	30 (29.1)	73 (70.9)	
Anxiety			0.001
No	29 (26.1)	82 (73.9)	
Yes	22 (56.4)	17 (43.6)	

dental care which was in agreement with findings among Jordanian undergraduates by Al-Omari and Al-Omiri²⁵ and adults in Saudi.²¹ The highest mean anxiety score for the local anesthetic injection in this study has been similarly reported among Indian dental patients by Fotedar et al.¹⁶ and Appukuttan et al.²⁶, Danish population by Moore et al.²⁷ and adult Britons by Humphris et al.²⁸ This may

be explained by the fact that injection needle feeling is the most fearful stimulus.^{29,30}

Older participants reported higher mean anxiety scores in all situation than younger participants. This similar trend (i.e higher anxiety in 25years and above in comparison to those below 25 years) was seen in studies conducted in Nigerian dental clinics using Corah dental anxiety scale.^{31,32} The

higher perceived exhibition of strength and control among younger individuals may inhibit them from reporting anxiety in comparison with older participants. Females expressed higher mean anxiety scores in all situation except

anaesthetics injection. This may be related to the societal inhibition of open expressiveness of anxiety and fear among men because of their cultural role as armour and protector of women.

Variable	B	S.E.	Wald	df	Odd Ratio	95% C.I.	P-value
Age	-.297	.410	.523	1	.743	0.332-1.661	.470
Sex	.515	.420	1.503	1	1.674	0.735-3.814	.220
Course	-.300	.417	.519	1	.741	0.327-1.677	.471
Ethnicity	.450	.410	1.210	1	1.569	0.703-3.501	.271
Religiosity	-.499	.415	1.447	1	.607	0.269-1.369	.229
Body attachment importance			.931	2			.628
Moderate	.490	1.538	.101	1	1.632	0.080-33.261	.750
High	-.507	.656	.598	1	.602	0.167-2.177	.439
Mouth attachment importance			.162	2			.922
Moderate	.516	1.294	.159	1	1.675	0.133-21.141	.690
High	.129	.700	.034	1	1.137	0.288-4.487	.854
Expected social outcome	-1.490	.769	3.758	1	.225	0.050-1.017	.053
Tobacco use	-.728	.672	1.175	1	.483	0.129-1.801	.278
Gingival bleeding	.470	.430	1.197	1	1.600	0.689-3.716	.274
Teeth cleaning frequency			4.603	2			.100
Once	-.582	.660	.779	1	.559	0.153-2.036	.378
Twice	-1.223	.630	3.761	1	.294	0.086-1.013	.052
Anxiety	1.375	.450	9.343	1	3.955	1.638-9.552	.002
Constant	2.786	1.877	2.203	1	16.214		.138

The positive social outcomes, such as having white teeth and a bright smile, are very important. In this study, the participants attached great value to the positive social outcomes of having healthy teeth; in particular, in social contacts, well-maintained teeth and fresh breath which are found to be important necessarily for first impressions. The high expected social outcome generally reported lower dental anxiety scores than their counterparts. The expected social outcome should serve as a tool of interest to clinicians managing anxious patients because it may provide an exploratory insight into the understanding and control of dental anxiety and its untoward effects.

Halitosis which is one of the biggest proscriptions in the society, was of high prevalence in this study. The prevalence was comparable to values (28.2-38.7%) reported among dental students in different parts of the world^{33,34} but higher than values (14.5- 17.1%) reported in Nigerian dental clinics explaining that only a few of the population suffering from this condition seek dental

attention.³⁵⁻³⁷ The self-perceived halitosis in this study was mainly short-term as regard duration and majorly occurred in the morning especially after waking up. The food debris in the mouth and decreased saliva flow during sleep, facilitates the putrefaction by microorganism resulting in volatile sulphur compound responsible for halitosis as teeth cleaning just before sleeping is an uncommon practice in Nigeria. The fact that irregular teeth cleaner significantly reported more halitosis than their counterparts in this study evidently proved the role of teeth cleaning in halitosis control and prevention. Therefore, the improvement in twice-daily cleaning with specific emphasis on teeth cleaning before sleeping through oral health promotion will definitively lead to the control and prevention of halitosis among the studied group.

Little on the effect of religiosity has been documented on oral health.^{38,39} In this study, religiosity was significantly associated with

halitosis with less religious participants significantly reported more halitosis than their counterparts. This is in conformity with the fact that religiosity has been related with healthy lifestyle, good health behaviours and healthy status.⁴⁰ Participants with low expected social outcome significantly reported more halitosis than their counterparts (Table 4).

In this study, dental anxious participants significantly reported more halitosis than their counterparts and self-perceived halitosis sufferers reported higher mean dental anxiety scores in all situation. The undue influence of dental anxiety on salivary flow and immunity may promote the proliferation of periodontopathogenic microorganism producing volatile sulfur compounds and eventual halitosis. Poor oral health practices among dental anxious individuals result in poor oral health status and halitosis explaining the possible link between dental anxiety and halitosis as halitosis sufferers in this study had more provoked gingival bleeding, engaged more in suboptimal daily teeth cleaning frequency and tobacco use. The reported attachment of lesser importance to mouth and body and also lower expected social outcome among self-perceived halitosis sufferers in this study may be the explanation for the finding since social concerns (smelling good and looking good) are the primary motivation behind a successful daily oral hygiene routine. This may be the psychological link between halitosis and dental anxiety.

Regression statistical analysis confirmed dental anxiety as the significant predictor of halitosis with anxious participants odds of having halitosis as 3.955 (C.I. 1.638-9.552) than non-anxious participants. This finding may explain why halitosis sufferers tend to seek help from other sources other than dental setting because their dental anxious state hamper dental attendance by promoting irregular dental attendance and appointment default.¹⁷⁻²⁰ The alleviation of dental anxiety following the possible expected social outcome and awareness may be helpful to management of halitosis and dental professional seeking potential.

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