

Knowledge And Perception of Halitosis of Self-Esteem among students in University of Calabar

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Abstract

The Descriptive Cross-Sectional Survey design study aimed to assess the knowledge and perception of Halitosis of self-esteem among students in University of Calabar. Three objectives in line with research questions and two hypothesis were formulated to guide the study. The simple random sampling technique was used to select 358 participant from the Department of Nursing Science, University of Calabar were. The instrument of data collection was a structured questionnaire. Data collected were analyzed using frequencies, percentage, charts and means. The findings of the study revealed that majority of the participants 51.1% had good knowledge of halitosis, high knowledge while 48.9% had moderate knowledge. Similarly, 54.7% respondents had high perception towards halitosis, while few (45.3%) had low perception. The management strategies implemented by students were brushing frequently, use of herbal paste, toothpaste, rinsing the mouth immediately after eating. There was no statistical relationship between age and management strategies of halitosis of self-esteem among students in University of Calabar. Based on the findings of the study it was concluded that knowledge regarding the different aspects of halitosis seem to be relatively low among student hence recommended that enlightenment program to educate the students should be adequately enhanced.

Keyword: Knowledge, Perception, Halitosis, self-esteem, Student

INTRODUCTION

Oral health is a public health issue of concern as it is a key measure of the overall health, wellbeing and quality of life of people worldwide with over 3.58 billion people affected (WHO, 2020). Good oral hygiene is necessary in many cases to maintain good oral health and prevent common oral ill health conditions such as dental cavities, gingivitis, periodontal (gum) diseases, and bad breath, this is mostly faced by adolescents however not exempting any class of people. Adolescence is a

transition period inundated by imperfections and is a time of great physical, emotional, and social changes (Umezudike, Oyetola, Ayanbadejo, Alade, and Ameh, 2016). Adolescence is also a time when behaviours and attitudes toward health are formed which can last throughout life (Cassolato and Turnbull, 2011) and affect the quality of life. Halitosis or malodor is an unpleasant breath odor that interferes with self-confidence and with people's professional and social life or unpleasant or offensive breath emitted consistently from a person's mouth (Hughes & McNab, 2018; Bornstein, Stocker, Seemann, Bürgin & Lussi, 2019; Settineri, Mento, Gugliotta, Saitta & Terranova, 2010).

Many studies on perception of halitosis have stressed that the problem of bad breath is often not self-perceived. The unfortunate fact is that many people do not know that they have a breath problem unless someone directly informs them. Iwakura et al, (2014) classified people suffering from oral malodour into three groups; Type 1, Self-conscious; Type 2, Conscious by the indication of others, and Type 3, Conscious by presumption from the attitude of others. Some bad breath, however, are considered to be somewhat normal. One example is "morning mouth" which is as a result of changes in the conditions of the mouth during sleep. During the day, saliva washes decaying food and odours out of the mouth. Less saliva is produced at night thus the mouth becomes dry and dead cells stick to the tongue and the insides of the cheek. When bacteria living in the mouth use these cells for food, they produce foul odour (Van Steenberghe & Rosenberg, 2016). Halitosis is perceived to cause major social impacts on those who suffer from it and may profoundly affect their normal daily life activities, including daily communication with others during social and professional interactions. Observations shows that it can affect the individual's self-esteem and confidence, cause embarrassment and reduce employment and career opportunities, thereby decreasing the quality of life (Oho, Yoshida, Shimazaki, Yamashita & Koga, 2011) however, if discovered on time situation can be salvage hence, there is need for the application of knowledge as this will rescue it patients and as well improve the perception towards self-esteem. Halitosis can be detected, either directly or indirectly, by using many methods. Knowledge is the result of knowing obtained by humans by sensing an object. Knowledge becomes the main domain for the creation of human behavior. While awareness is a form of someone's readiness to face all forms of surrounding events and cognitive events including memory, thoughts, feelings and physical. Both of these are interrelated and play an important role in preventing halitosis.

The specific management of halitosis could involve the use of drugs and/or herbal remedies (Kaizu, Tsunoda, Sato & Sato, 2018). Treatment modalities include mechanical reduction of intra-oral nutrients and microorganisms by tongue cleaning, tooth brushing, etc., chemical reduction of oral microbial load using mouth washes, rinses and oxidizing lozenges, rendering malodourous gases nonvolatile and masking the malodour with mouth sprays, lozenges and chewing gums containing volatiles with pleasant odour. Halitosis is a source of concern to those affected and frequently causes embarrassment that may disrupt interpersonal social communication (Nwhator, Isiekwe, Soroye & Agbaje, 2015). hence the aim of this study is to find out knowledge and perception of Halitosis of self-esteem among students in University of Calabar.

METHODOLOGY

The descriptive design was adopted for the study. The setting of this study is the department of Nursing Science. The department of nursing science is under faculty of Allied medical sciences, college of medicine, university of Calabar, it has been in existence for over 20years, the department

comprises of both generic and direct entry students whom have met their admission requirements. The department of nursing science is situated close to the university library, adjacent the department is the department of radiography and opposite is the department of modern languages.

The sampling technique used was simple random sampling to enable the researcher to select three hundred and fifty eight (358) students that constituted the sample for this study. The sample was calculated with the aid of Slovin's formula as shown below;

$$N/(1+Ne^2)$$

Where;

n is the sample size

N = the population of nursing students

e = margin of error

$$n = \frac{840}{1+840(0.04^2)} \quad n = \frac{840}{1+1.344} \quad n = \frac{840}{2.344} \quad n = 358$$

The sample used for this study was three hundred and fifty eight (358) students.

The instrument used for data collection from the respondents was a self-developed and structured questionnaire. The instrument was divided into four (4) sections. The reliability was done using test-retest method. Here the researchers gave 20 questionnaires to patients in Department of Radiology who were not part of the study and collected. Thereafter, the questionnaires were administered to the same group of people after three (3) weeks and the two tests were correlated using Pearson's Product Moment Coefficient and a reliability coefficient of 0.87 was obtained

Test-Retest Reliability table on knowledge and perception of halitosis among students

Variable	No of items	Testing	Mean	Standard deviation	<i>r_{cal}</i>
Knowledge of halitosis among students	6	1 st	6.81	3.44	0.8114
		2 nd	5.91	2.98	
Perception of halitosis among students	6	1 st	5.73	4.21	0.8783
		2 nd	4.12	3.64	
					0.9500
Management of halitosis among students	6	1 st	4.62	2.75	
		2 nd	3.55	2.59	

The questionnaire were administered to the subjects face to face with the help of a research assistant. Three hundred and fifty eight questionnaires were administered and same number was retrieved. Data collected through the questionnaire were analyzed using descriptive statistics (simple percentages and frequency tables), while the hypothesis was tested using the Chi-Square test statistic at 0.05 level of significance.

Ethical consideration

The researchers introduced their selves by presenting a copy of letter of introduction they obtained from Research and Ethical Board Committee. The topic for the research was introduced and instructions given on how the questionnaires should be filled. The researcher reassured the participants that all information must be only for academic purpose and clients' names was not indicated so as to maintain confidentiality and privacy. The consent of the respondents was adequately gained by giving them adequate information to enable them to express their feelings.

RESULTS

Table 1: Socio-Demographic data of respondents (n= 358)

Variable	Frequencies	Percentage (%)
Age		
18-22years	104	29.1
23 -27years	69	19.3
28-32years	79	22.0
33-37years	58	16.2
38-42years	48	13.4
Sex		
Male	157	43.9
Female	201	56.1
Marital status		
Married	148	41.3
Single	210	56.7
Separated	0	0.0
Religion		
Christianity	236	65.9
Muslim	49	13.7
Others	73	20.4
Academic Level		
200	156	43.6
300	89	24.9
400	66	18.4
500	47	13.1
Mode of entry		
Direct	90	25.1
Generic	268	74.9

Table 1 represent the socio-demographic data of students which reveals that majority of the respondents 104(29.1%) were within the age range of 18 – 22years, 69(19.3%) respondents were within 23 – 27years, 79(22.0%) respondents were within 28 – 32years, 58(16.2%) respondents were within 33 – 37years while 48(13.40%) of the respondents were within 38 – 42years. On assessing the sex of the respondents, data reveals that majority of the respondents 201(56.1%) were female while 157(43.9%) respondents were male.

As regards marital status of the respondents, majority of the respondents 210(56.7%) were single while 148(41.3%) respondents were married. Nonetheless, a greater proportion of the respondents 236(65.9%) were Christian, 49(13.7%) of the respondents were Muslim while 73(20.4%) of the respondents were of other religion such as Jehovah's Witness & Eckankar. Also, out of 358 respondents 156(43.6%) respondents were in 200Level, 89(24.9%) were in 300L, 66(18.4%) were in 400Level while 47(13.1%) were in 500L.

Lastly, as regards mode of entry, 268(74.9%) respondents were admitted through jamb into the department of nursing while 90(25.1%) respondents were admitted through direct entry.

Table 2: Knowledge of students towards halitosis

	YES		NO		X
	Freq.	%	Freq.	%	
Have you heard of halitosis?	184	51.4	174	48.6	1.51
Do you know what causes halitosis?	185	51.7	173	48.3	1.52
Do you know that not brushing twice or more daily leads to halitosis	171	47.8	187	52.2	1.47
Do you know that brushing every morning prevent halitosis	190	53.1	168	46.9	1.53
Do you know that eating raw food e.g. onion could cause halitosis?	172	48.0	186	52.0	1.48
Do you know that inappropriate scrub of the tongue leads to halitosis?	200	55.9	158	44.1	1.60
Total					9.06

**Mean ($\bar{X} \pm SD$) Score of 1.5 and above indicates good knowledge towards halitosis, while 1.5 below indicates poor knowledge*

Table 2 revealed that 184(51.4%) respondents affirm that they have heard of halitosis while 174(48.6%) respondents had contrary opinion. Also, 185(51.7%) respondents affirmed that they know the causes of halitosis while 173(48.3%) said no. Furthermore, 171(47.8%) respondents affirmed that not brushing twice or more daily leads to halitosis while 187(52.2) had contrary opinion. However, 190(53.1%) respondents said yes that they know that brushing every morning prevent halitosis meanwhile 168(46.9%) respondents said no.

In addition, 172(48.0%) respondents stated that eating raw food e.g. onion could cause halitosis, but 186 (52.0%) respondents did not. Again, 200(55.9%) respondents disclosed that inappropriate scrub of the tongue leads to halitosis, but 158 (44.1%) respondents did not.

Following the results in Table 2, the table showed the total mean score obtained by the respondents is 9.06 out of 18.0. The highest mean score per item is 1.60 out of 3.0, and it was obtained on inappropriate scrub of the tongue leads to halitosis. The lowest mean score per item is 1.45 out of 3.0, and it was obtained on not brushing twice or more daily leads to halitosis. This is followed by a mean score of 1.48 which is obtained on eating raw food e.g. onion could cause halitosis.

Table 3: Perception of students towards halitosis

	SA		A		D		SD		X
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
I perceived that cleaning the tongue reduce the rate of bacteria	150	41.8	79	22.1	88	24.6	41	11.5	2.94
I perceived that chewing gum help to reduce bad breath	97	27.1	43	12.0	92	25.7	126	35.2	2.31
I perceived that seed oils are best substances for curing halitosis	104	29.1	87	24.3	68	18.9	99	27.7	2.54
I perceived that brushing the teeth eliminate bacteria only from some easily assessable part of the oral cavity	121	33.8	98	27.4	42	11.7	97	27.1	2.67
I perceived that brushing the teeth after eating prevent the mouth from smelling.	89	24.0	114	31.8	38	10.6	117	32.7	2.48
I perceived that closing the mouth for a long time can cause bad breath	128	35.8	68	18.9	87	24.3	75	21.0	2.69
Total									15.63

**Mean ($\bar{X} \pm SD$) Score of 2.5 and above indicates high perception towards halitosis, while 2.5 below indicates low perception*

The above table revealed that 150(41.8%) respondents strongly agreed to cleaning the tongue reduce the rate of bacteria, 79(22.1%) agreed, 88(24.6%) disagreed while 41(11.5%) strongly disagreed. Also, 97(27.1%) respondents strongly agreed that chewing gum help to reduce bad breath, 43(12.0%) agreed, 92(25.7%) disagreed while 126(35.2%) respondents strongly disagreed. Nevertheless, 104(29.1%) respondents strongly agreed that seed oils are best substances for curing halitosis, 87(24.3%) respondents agreed, 68(18.9%) respondents disagreed while 99(27.7%) respondents strongly disagreed. However, 121(33.8%) respondents strongly affirmed that brushing the teeth eliminate bacteria only from some easily assessable part of the oral cavity, 98(27.4%) respondents agreed, 42(11.7%) respondents disagreed meanwhile 97(27.1%) strongly disagreed. Furthermore, majority of the respondents 117(32.7%) strongly disagreed that brushing the teeth after eating prevent the mouth from smelling, 38(10.6%) disagreed, 114(31.8%) agreed while 89(24.0%) strongly agreed. Lastly, 128(35.8%) strongly agreed that closing the mouth for a long time can cause bad breath, 68(18.9%) agreed, 87(24.3%) disagreed while 75(21.0%) strongly disagreed.

Table 3: Management strategies of students towards halitosis

	SA		A		D		SD		X
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
I use toothpaste to brush my teeth everyday	106	29.6	78	21.8	49	13.7	125	34.9	2.46
I use charcoal and sand to brush my teeth	49	13.7	136	38.0	88	24.6	85	23.7	2.41
I use herbal paste to brush my teeth	112	31.3	59	16.5	105	29.3	82	22.9	2.56
I ensure I rinse my mouth after eating	108	30.2	82	22.9	70	19.5	98	27.4	2.63
I ensure I chew gum always	106	29.6	66	18.4	108	30.2	78	21.8	2.55
I ensure I don't close my mouth for a long time	98	27.4	102	28.5	89	24.9	69	19.2	2.63
Total									15.24

*Mean ($\bar{X} \pm SD$) Score of 2.5 and above indicates high management towards halitosis, while 2.5 below indicates low management strategy

Data reveals that majority of the respondents 125(34.9%) strongly disagreed that they use toothpaste to brush their teeth everyday, 106(29.6%) strongly agreed, 78(21.8%) agreed while 49(13.7%) disagreed. Again, 88(24.6%) respondents disagreed that they use charcoal and sand to brush their teeth 85(23.7%) strongly disagreed, 49(13.7%) strongly agreed while 136(38.0%) agreed. Also, 112(31.3%) respondents strongly agreed that they use herbal paste to brush their teeth 59(16.5%) agreed 105(29.3%) disagreed while 82(22.9%) disagreed.

Nonetheless, 108(30.2%) strongly agreed that they ensure they ensure their rinse their mouth after eating 82(22.9%) agreed 98(27.4%) disagreed while 70(19.5%) strongly disagreed. As regards I ensure I chew gum always 106(29.6%) respondents strongly agreed, 66(18.4%) agreed, 108(30.2%) strongly disagreed while 78(21.8%) disagreed. Lastly, 98(27.4%) strongly agreed that

they ensure they don't close their mouth for a long time 102(28.5%) agreed 89(24.9%) disagreed while 69(19.2%) strongly disagreed.

Following results in the above table, it can be observed that the management strategies towards halitosis among students of the department of nursing Science, University of Calabar, Calabar is moderate. The respondents obtained a total score of 15.24 out of 18.0 on management strategies of halitosis. This also indicates that the management strategies towards halitosis is moderate. The lowest mean (X) score (2.41) was obtained on I use charcoal and sand to brush my teeth, while the highest (2.63) was obtained on I ensure I rinse my mouth after eating.

Test of Hypothesis

There is no significant relationship between age and management strategies of halitosis of self-esteem among students in University of Calabar. To test this hypothesis, data collected on age in years and management strategies of halitosis of self-esteem were analyzed using Chi-square (X^2) analysis. Respondents who exhibited high management strategies of halitosis of self-esteem (who had average mean scores above ≥ 2.0) were 184(51.4%), while those who exhibited low management strategies (who had average mean scores below <2.0) were 174(48.6%). The result of Chi-square (X^2) analysis is presented in Table 4.

Table 4: Chi-square (X^2) analysis of relationship between student's age and management strategies of halitosis of self-esteem of the department of nursing Science, University of Calabar, Calabar

Age (in Years)	Management Strategies of Halitosis		Total	df	Sig.	X^2 Crit	X^2 Cal	Decision
	High	Low						
18 – 22	78	26	104	4	0.05	9.488	56.7584	Rejected
23 – 27	21	48	69					
28 – 32	34	45	79					
33 – 37	39	19	58					
38 – 42	12	36	48					
Total	184	174	358					

$P > .05$; $\alpha = .05$; $df = 4$; Critical $X^2 = 9.488$; Calculated $X^2 = 56.7584$

The result of Chi-square (X^2) analysis in Table 4 revealed that the calculated value of 56.7584 is higher than the critical value of 9.488 at 0.05 level of significant and 4 degrees of freedom. The result is significant; therefore the null hypothesis which states that there is no significant relationship between student's age and management strategies of halitosis on self-esteem among students in University of Calabar was rejected. The result implies that age relates with management strategies of halitosis on self-esteem is in favour of students below 28 – 32 of year of age.

Hypothesis II:

There is no significant relationship between year of study and perception of students towards halitosis on self-esteem in University of Calabar. To test this hypothesis, data collected on student's year of study in years and management strategies of halitosis of self-esteem were analyzed using Chi-square (X^2) analysis. Respondents who had high perception on halitosis towards self-esteem (who had average mean scores above ≥ 2.5) were 196(54.7%), while those who has low perception on halitosis (who had average mean scores below < 2.5) were 162(45.3%). The result of Chi-square (X^2) analysis is presented in Table 5.

Table 5: Chi-square (X^2) analysis of relationship between student's age and management strategies of halitosis of self-esteem of the department of nursing Science, University of Calabar, Calabar

Level of study	Perception of Halitosis		Total	df	Sig.	X^2 Crit	X^2 Cal	Decision
	High	Low						
200L	102	54	156	3	0.05	7.815	29.9653	Rejected
300L	49	40	89					
400L	17	49	66					
500L	28	19	47					
Total	196	162	358					

$P > .05$; $\alpha = .05$; $df = 3$; Critical $X^2 = 7.815$; Calculated $X^2 = 29.9653$

The result of Chi-square (X^2) analysis in Table 5 revealed that the calculated value of 29.9653 is higher than the critical value of 7.815 at 0.05 level of significant and 3 degrees of freedom. The result is significant; therefore the null hypothesis which states that there is no significant relationship between year of study and perception of students towards halitosis on self-esteem in University of Calabar was rejected. The result implies that age relates with perception of halitosis on self-esteem is in favour of students in lower years of study.

DISCUSSION OF FINDINGS

The findings of this study revealed that all the respondents who participated in this study have good knowledge of halitosis, with 51.1% having high knowledge and 48.9% having poor knowledge. The result correspond with the results of Cameira Nunes, Martínez-Sahuquillo, Cameira & Dias Marques, 2011 who revealed the awareness in Pre-Clinical and Clinical Students shows that 91% of the pre-clinical students had a proper awareness and only 9% had a poor awareness. While clinical students had a poor knowledge result of 15% and proper knowledge of 85%. With the results of this study it was found that the level of awareness of clinical students is lower than pre-clinical students. Conversely, Mubayrik (2017) study, found a relatively low level of self-reported halitosis awareness, but a much larger proportion indicates that bad breath is a problem for people around them. Most respondents indicated that they would overcome bad breath by covering up rather than treating the cause. This is also in line with Ahamed, Moyin, Punathil, Patil & Kale, 2015 who revealed that in Female and Male Students the level of halitosis knowledge in female students with bad knowledge is 36% and proper knowledge is 64%. While male students have a poor knowledge result of 62% and poor knowledge of 38%. The findings of this study revealed that majority (54.7%) of student's in the department of Nursing Science, University of Calabar have high perception towards halitosis, while few (45.3%) have low perception. The findings of this study corresponds with Al-Hawish & Al-Khamis, 2013 who showed a significant that 96% of the students had noted bad breath in other people at least once (among dentistry students: 100%). Bruziewicz-Mikłaszewska, Urbanowicz & Owczarek, 2013 reveals that some oral hygiene habits influenced the level of halitosis such as dental plaque and bacteria colonizing the oral cavity are named as perceived reasons for bad breath and they are the reasons in 85% of those suffering from halitosis. Conversely, Almas, Al-Hawish & Al-Khamis, 2013 reveals that chewing gum and breath fresheners were used almost by all of the students questioned (90%).

It was further revealed in this study management strategies associate with halitosis among students in the University of Calabar are brushing frequently, use of herbal paste, use of toothpaste etc. By doing this, they condition on one self esteem is reduced. However, neglecting this management strategies would enhance the efficiency of halitosis.

Findings of the study is in line with McDowell & Kassebaum, 2013 who showed a review of significant aspects of the patient's family and social history (such as dietary and smoking habits), drug histories, illnesses, hospitalizations and surgeries are invaluable in reaching an appropriate diagnosis. Similarly, Miyazaki et al (2019) who established findings in accordance with treatment needs such as oral prophylaxis, professional cleaning and treatment of oral diseases, especially periodontal diseases also treatment of extra oral halitosis should be performed by a physician or medical specialist in line.

Conclusion

Findings reveals that All the respondents who participated in this study have good knowledge of halitosis, with 51.1% having high knowledge, and 48.9% having moderate knowledge. Majority (54.7%) of student nurses in University of Calabar have high perception towards halitosis, while few (45.3%) had low perception. The management strategies implemented by students were brushing frequently, use of herbal paste, toothpaste, rinsing the mouth immediately after eating. There is no statistical relationship between age and management strategies of halitosis of self-esteem among students in University of Calabar. There is no statistical relationship between year of study and perception of students towards halitosis on self-esteem in University of Calabar.

Recommendations

The following recommendations was given;

1. Lecturers should emphasis on oral hygiene among students
2. Emphasis should also be laid on brushing the teeth twice or more in other to prevent accumulation of bacteria.
3. Enlightenment program should be made publicly on the causes of halitosis
4. Adequate seminars should be conducted specifically on the adjustment of one's diet.

REFERENCE

- Al-Ansari JM, Bordai H, Al-Sumait N, Al-Khabbaz A K, Al-Shammari K F, Salako N. (2016). Factors associated with self-reported halitosis in Kuwaiti patients. *Journal of Dentistry*. 34:444–449. [[PubMed](#)] [[Google Scholar](#)]
- AlSadhan SA (2016) Self-perceived halitosis and related factors among adults residing in Riyadh, Saudi Arabia. A cross sectional study. *Saudi Dent J* 28(3): 118-123.
- Annemiek M W T, van den Broek, Feenstra Louw, de Baat Cees. (2017). A review of the current literature on aetiology and measurement methods of halitosis. *Journal of Dentistry*. 35(8):627–635. [[PubMed](#)] [[Google Scholar](#)]
- Attia EL, Marshall KG. (2012). Halitosis. *Canadian Medical Association Journal*. 126:1281. [[PMC free article](#)] [[PubMed](#)] [[Google Scholar](#)]
- Bornstein MM, Stocker BL, Seemann R, Bürgin WB, Lussi A (2019) Prevalence of halitosis in young male adults: A study in Swiss army recruits comparing self-reported and clinical data. *J Periodontol* 80(1): 24-31.
- Calil CM, Marcondes FK. (2016). Influence of anxiety on the production of oral volatile sulfur compounds. *Life Sciences*. 79:660–664. [[PubMed](#)] [[Google Scholar](#)]
- Cassolato, S. F. and Turnbull, R. S. (2013). Xerostomia: Clinical aspects and treatment. *Gerodontol.*,20: 64-77

- Hartley G, El-Maaytah M, Greenman J. (2015). Tongue microflora of subjects with low and high malodour levels. *Journal of Dental Research*. 74:587. [Google Scholar]
- Hughes FJ, McNab R (2008) Oral malodour-a review. *Arch Oral Biol* 53: 1-7.
- Kaizu T, Tsunoda M, Sato H, Sato T.(2018). Reduction of bad breath from periodontal patients by dilute hydrogen peroxide solution. *Bulletin Tokyo Dental College*. 19:209–216. [PubMed] [Google Scholar]
- Miyazaki H, Arao M, Okamura K, Kawaguchi Y, Toyofuku A, Hoshi K, Yaegaki K. (2019). Tentative classification of halitosis and its treatment needs. *Niigata Dental Journal*. 32:7–11. [Google Scholar]
- Miyazaki H, Sakao S, Katoh Y, Takehara T. (2015). Correlation between volatile sulphur compounds and certain oral health measurements in the general population. *Journal of Periodontology*. 66:679–684. [PubMed] [Google Scholar]
- Nachnani S (2011) Oral malodor: Causes, assessment, and treatment. *Compend Contin Educ Dent* 32(1) 22-24.
- Nalcaci R. (2018). Factors associated with self-reported halitosis (SRH) and perceived taste disturbance (PTD) in elderly. *Archives of Gerontology and Geriatrics*. 46(3):307–316. [PubMed] [Google Scholar]
- Nwhator S O, Isiekwe G I, Soroye M O, Agbaje M O. (2015). Bad-breath: Perceptions and misconceptions of Nigerian adults. *Niger J Clin Pract* 18:670-5
- Nwhator, S.O., Isiekwe, G. I., Soroye, M. O., Agbaje, M. O. (2015): Bad breath: perceptions and misconceptions of Nigerian adults. *Nigerian Journal of Clinical Practice*, vol 18(5):670-675
- Oho T, Yoshida Y, Shimazaki Y, Yamashita Y, Koga T. (2011). Characteristic of patients complaining of halitosis and the usefulness of gas chromatography for diagnosing halitosis. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology & Endodontics*. 91(5):531–534. [PubMed] [Google Scholar]
- Richter JL. (2016). Diagnosis of Treatment of Halitosis. *Compendium of Continuing Education in Dentistry*. 17(4):370–372. 374-6. [PubMed] [Google Scholar]
- Settineri A, Mento C, Gugliotta S, Saitta A, Terranova, et al. (2010) Selfreported halitosis and emotional state: Impact on oral conditions and treatments. *Health Qual. Life Outcomes* 8: 34-44.
- The World Health Organisation. (2020): Oral Health. Available at https://www.who.int/health-topics/oral-health/#tab=tab_1.

- Umezudike KA, Oyetola OE, Ayanbadejo PO, Alade GO, Ameh PO. (2016). Prevalence of self-reported halitosis and associated factors among dental patients attending a tertiary hospital in Nigeria. *Sahel Med J* 19:150-4
- Umezudike, K. A., Oyetola, O. E., Ayanbadejo, P. O., Alade, G. O. and Ameh, P. O. (2016): Prevalence of self-reported halitosis and associated factors among dental patients attending a tertiary hospital in Nigeria. *SahelMed J.*, 19: 150-4.
- Van den Broek AM, Feenstra L, de Baat C (2007) A review of the current literature on aetiology and measurement methods of halitosis. *J Dent* 35(8): 627-635.
- Van Steenberghe D, Rosenberg M. (2016). *Bad Breath. A multidisciplinary approach*. Leuven: Leuven University press [[Google Scholar](#)]
- Velde S, Quirynen M, Van Hee P, Van Steenberghe D. (2017). Halitosis associated volatiles in breath of healthy subjects. *Journal of Chromatography*. 2007;853:54–61. [[PubMed](#)] [[Google Scholar](#)]
- Weinberg M. (2010). Halitosis: the 'bad breath' syndrome. *US Pharmacist*. 26(3):46–57. [[Google Scholar](#)]
- Yaegaki K, Coil J M. (2010). Examination, Classification, and Treatment of Halitosis; Clinical Perspectives. *Journal of Canadian Dental Association*. 66:257–261. [[PubMed](#)] [[Google Scholar](#)]