



## Selfperception, Knowledge and Attitude about Halitosis Among Young Adults: A Cross Sectional Questionnaire Study

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### ABSTRACT

**Background:**Halitosis is a very common condition that affects the quality of the life of an individual and has important social and psychological implications. Our survey was to evaluate the self-acknowledgement and understanding of halitosis among the young adults in the age group of 18 to 30 years.

**Materials and methods:** This is a cross sectional survey conducted using a questionnaire that was shared with the participants using Google forms. (<https://forms.gle/ED3uMpXJ2pa4iAJT7>)

**Results:**Most of the young adults who participated in the study claimed they do not have bad breath (54%). More females than males answered that they suffer from halitosis. Most of the participants experienced halitosis right after waking up in the morning.

**Conclusion:** Those with good oral hygiene practices like tooth brushing and using back of toothbrush to scrape tongue was found to have less intense bad breath.

**Keywords:**halitosis, oral hygiene, young adults, tooth brushing

### I. INTRODUCTION

Halitosis is a common and not usually serious condition characterized by a persistent unpleasant odor in exhaled breath, also known as bad breath in layman terms. Halitosis is defined as breath that is offensive to others, which is caused by number of reasons including bacterial coating of tongue, periodontal disease, systemic disorders and different types of food. [1] The term halitosis was derived from Latin halitus which means breath and Greek osis which means pathological process and together the term means bad breath [2].

It is an important problem that can disrupt life in small ways for most people. The sufferers of halitosis are so many and reasons so varied that it requires a more thorough understanding in order to combat the issue [3]. Halitosis can cause major social problems and can make the person feel extremely unattractive. Social implications of halitosis seem it a very important subject for oral health professionals [4].

An alteration in normal bacterial population and an increase in volatile sulfur compounds can be found in the oral cavity of most people who suffer from halitosis. Bacterial load present on tongue is the major source for creating bad odour of mouth. Effective treatment of combating halitosis includes brushing teeth twice daily with a good fluoridated toothpaste and everyday use of mouthwash. [5]

So this study was conducted to assess self-perception, knowledge and attitude about halitosis among young adults.

### II. MATERIALS AND METHODS

This cross sectional study was conducted among the students of Sri Sankara Dental College, Akathumuri, for a duration of two months (April 2022-May 2022). Convenience sampling was used. Accordingly, young adults who are aged between 18 to 30 years and who gave consent to participate were enrolled in study.

The study was conducted using a questionnaire and was distributed among the participants through Google forms (<https://forms.gle/ED3uMpXJ2pa4iAJT7>). It consists of 30 questions based on age, gender, knowledge, attitude and self-perception on halitosis.



Statistical analysis was done using SPSS software version 25.0. Frequency and percentage distribution of the data was done using descriptive statistics. Chi square test was used to assess the association between variables

### III. RESULTS

The questionnaire was distributed among 168 participants out of whom 150 of them were enrolled according to the inclusion criteria.

Table 1 shows the frequency and percentage of age, gender, self-perception, knowledge and attitude about halitosis. 48.7% of them are from the age group of 24-26 years. Among the participants 81.3% were females and 18.7% were males. 86% participants knew what halitosis is and 14% did not know what halitosis is. 54% don't have bad breath, 60% people most often experience bad breath after waking up in the morning, 36% don't have intense bad breath and 40.7% have weakly intense bad breath. Most of the people among these participants don't have a habit of smoking (97.3%) and drinking (96.7%). 47.3% participants told they suffer from stress sometimes and 34% suffer from stress often. 74% don't have gum bleeding, 84% don't have coating on their tongue. 78.7% suffer from dry mouth. 94.7% don't have any effect on their social life due to bad breath, 75.3% don't have anxiety issues due to bad breath and 69.3% haven't encountered any problems due to bad breath. Among these participants 38.7% changed their tooth brush at a frequency of three months, 32% participants use roll stroke brushing technique, 72.7% don't use mouth wash and 74.7% do not use tooth pick or dental floss. 49.3% clean their tongue with back side of tooth brush and 85.3% rinse their mouth after eating. 56.7% are not sure if they have bad breath by self-testing.

Table 2 reflects the comparison between the age and self-perception on halitosis. 40% of people of the age group 18-20 years, 56.3% of age group 21-23 years, 54.8% of age group 24-26 years and 37.5% of age group 27-30 years don't have bad breath. 80% of age group 18-20 years, 54.7% of age group 21-23 years, 64.4% of age group 24-26 years and 50% of age group 27-30 years, experience bad breath most often after waking up in the morning. In the Age group of 18-20 years 60% and in the age group of 27-30 years 50% don't have intense bad breath. 42.2% of age group 21-23 years and 42.5% of age group 24-26 years have weak intense bad breath. Among these participants, majority of the people don't smoke (80% of 18-20 years, 98.4% of 21-23 years, 100% of 24-26 years and 75% of 27-30 years). Majority of participants

don't have habit of consuming alcohol (100% of 18-20 year, 96.9% of 21-23 years, 97.3% of 24-26 years and 87.5% of 27-30 years. Majority of participants seem to suffer from stress (80% of age group 18-20 years, 43.8% of age group 21-23 years, 46.6% of age group 24-26 and 62.5% of age group 27-30 year). Most of the participants don't experience bleeding of gums (100% of age group 18-20 years, 79.7% of age group 21-23 years, 69.9% of age group 24-26 and 50% of age group between 27-30 years). Most of the participants don't have any coating on their tongue (100% of age group 18-20 years, 85.9% of age group 21-23 years, 87.7% of 24-26 years). 50% of people of age group 27-30 years don't have any idea about coating on their tongue. Most of the participants don't suffer from dry mouth (100% of age group 18-20 years, 76.6% of age group 21-23 years, 83.6% of age group 24-26 years and 37.5% of age group 27-30 years). Most of the participants don't have anxiety about bad breath when talking to other people (80% of age group 18-20 years, 71.9% of age group 21-23 years, 78.1% of age group 24-26 years, 75% of age group 27-30 years). Majority of participants have never encountered any problems due to bad breath (60% of age group of 18-20 years, 68.8% of age group 21-23 years and 76.7% of age group 24-26 years).

Table 3 shows the comparison of gender with self-perception on halitosis. 59% of female participants and 32.1% of male participants don't have bad breath. 63.9% of female and 42.9% of male participants experience bad breath most often after waking up in the morning. 42.9% of males and 40.2% of females have weak intense bad breath. 99.2% of females and 89.3% of males don't have a habit of smoking. 97.5% of females and 92.9% of males don't have a habit of consumption of alcohol. 71.4% of males and 41.8% of females stated that they suffer from stress. 78.7% of females and 53.6% of males don't have any experience of bleeding gums. 93.4% of females and 42.9% of males don't have any coating on tongue. 86.1% females and 46.4% males don't suffer from dry mouth. 73.8% of females and 82.2% of males don't have anxiety about bad breath when talking to others. 75.4% of females and 42.9% of males haven't encountered any problems due to bad breath.

Table 4 explains about comparison of self-testing halitosis with their attitude towards oral health. 37.6% don't have any odor and they change the tooth brush with a frequency of 3 months. 50% have slight and noticeable odour and changes tooth brush with a frequency of 3 months. 60% have moderate odour and changes tooth brush with a



frequency of 6 months. 50 % experience strong odor and changes tooth brush with a frequency of one year. 54.5% don't have any odour and informed to have been using horizontal stroke method of brushing technique.36.6% experience moderate odor and uses vertical stoke brushing technique.40.7% experience strong odor and uses roll stroke brushing technique.72.9% do not have any odor and doesn't use mouth wash.75% do not use mouth wash and experience strong odour. 80% don't use tooth pick or dental floss and have moderate odour. 53.3% of participants use back side of the tooth brush to clean their tongue and have moderate odour.92.9% of participants rinse their mouth after eating and don't have any odour.

Table 5 shows the comparison of knowledge about halitosis and the attitude towards oral health.50% of participants change their tooth brush with a frequency of 6 months and have average intensity of bad breath. 54.5% of participants use horizontal stroke as brushing technique and have very intense bad breath. 63.6% don't use mouth wash and have very intense bad breath. 85.7% don't use tooth pick or dental floss and experience average bad breath. 54.5% use back side of tooth brush to clean their tongue and have very intense bad breath.86.4% don't rinse their mouth after eating and they experience weak intensity in bad breath.

#### IV. DISCUSSION

In the present study, more than half of the participants said that they don't experience bad breath. Other participants who said that they experience bad breath did so mostly right after waking up in the morning (60%).While comparing age and gender with self -perception on halitosis most of the participants said that they don't have any anxiety about bad breath. Most of the participants in all age group do not smoke or consume alcohol and said that they do not have any coating on their tongue. This was seen with the

study conducted by Oliviero-Neto JM et al which showed that most of the participants experienced halitosis right after waking up in the morning and was due to the coating of the tongue. [14]

The percentage of female participants who reported to suffer from halitosis was more than that of the male participants. Oral environment is sensitive to changes in the endocrine system.The fluctuations in hormonal levels may be the reason for change in the normal oral environment in turn leading to halitosis. Also, the female sex hormones such as estrogen and progesterone are known to cause changes in periodontal tissue which could also be a contributing factor for this trend. The supporting evidence can be found in the article published by S.M.MahamadulHasan et al. in which he conducted a study in the females of Dhaka district in Bangladesh. [15]

While comparing the participants attitude towards oral health and self-testing halitosis, most of the patients with no odor changed their tooth brush once in 3 months (37.6%), cleaned their tongue using back side of the toothbrush (50.6%) and rinsed their mouth after eating (92.9%). Whereas the ones with strong odor, changes their toothbrush once in a year (50%), do not clean their tongue (57%) and don't rinse their mouth after eating (50%). The study conducted by Luciana AssiratiCasemiro on effectiveness of brushing tongue with back of toothbrush gives supporting evidence for this observation. [16] [18]

While comparing the intensity of halitosis with attitude towards oral hygiene practice, those with very intense odor used a horizontal stroke for brushing (54.5%) whereas those with no odor used a roll stroke (40.7%). Those with intense odor don't use a mouthwash (63.6%) and did not clean their tongue (54.5%). The supporting evidence for reduction in halitosis with such improved oral hygiene practices can be found in the article by C. M. Kayombo and E. G. Mumghamba. [17]

#### Tables

**Table 1: Frequency and percentage of age, gender, self-perception, knowledge and attitude about halitosis**

		Frequency	Percent
Age	18-20	5	3.3
	21-23	64	42.7
	24-26	73	48.7
	27-30	8	5.3



Sex	Male	28	18.7
	Female	122	81.3
Do you know what Halitosis is?	No	21	14.0
	Yes	129	86.0
How do you know you have bad breath (Halitosis)?	Behavioral signs from other people	11	7.3
	Someone told me	14	9.3
	I just know	44	29.3
	I don't have bad breath	81	54.0
When do you experience bad breath most often?	After waking up in the morning	90	60.0
	When I'm hungry or thirsty	13	8.7
	When I'm tired	5	3.3
	Constantly over the whole day	3	2.0
	At work	3	2.0
	When I talk with other people	3	2.0
	Others	33	22.0
How intense is your bad breath?	Very intense	0	0.00
	Average	35	23.3
	Weak	61	40.7
	None	54	36.0
Do you smoke?	No	146	97.3
	Yes	4	2.7
Do you drink alcohol?	No	145	96.7
	Yes	5	3.3
Do you suffer from stress?	No	28	18.7
	Yes	51	34.0



	May be	71	47.3
Do your gums bleed?	No	111	74.0
	Yes	22	14.7
	May be	17	11.3
Is there any coating on your tongue?	No	126	84.0
	Yes	8	5.3
	Don't know	16	10.7
Do you suffer from dry mouth?	No	118	78.7
	Yes	15	10.0
	Don't know	17	11.3
Has bad breath disturbed your social life?	No	142	94.7
	Yes	8	5.3
Do you have anxiety about bad breath when talking to people	No	113	75.3
	Yes	37	24.7
Have you encountered any of the following problems because of bad breath	I avoid talking with other people	21	14.0
	I am shy whenever someone approaches me	10	6.7
	I don't like meeting other people	6	4.0
	I cannot start a relationship	7	4.7
	Other people avoid me	2	1.3
	I haven't encountered any problems	104	69.3
How often do you change your toothbrush	3 months	58	38.7
	6 months	56	37.3
	1 year	17	11.3
	Till bristles get frayed	19	12.7



Which type of brushing technique do you use	Horizontal stroke	39	26.0
	Vertical stroke	46	30.7
	Roll stroke	48	32.0
	I am not aware	17	11.3
Do you use mouthwash	No	109	72.7
	Yes	41	27.3
Do you use toothpick or dental floss	No	112	74.7
	Yes	38	25.3
How do you clean your tongue	Tongue scraper	59	39.3
	Back side of my toothbrush	74	49.3
	I don't clean my tongue	17	11.3
Do you rinse your mouth after eating	No	6	4.0
	Yes	128	85.3
	Sometimes	16	10.7
Self-testing by smelling your breath in your cupped health	No odor/not sure	85	56.7
	Slight ,but noticeable odor	46	30.7
	Moderate odor	15	10.0
	Strong odor	4	2.7

**Table 2: Comparison of age with self-perception on halitosis**

		Age				P value
		18-20	21-23	24-26	27-30	
How do you know you have bad breath	Behavioral signs from other people	20.0%	1.6%	9.6%	25.0%	0.0158*
	Someone told me	20.0%	7.8%	8.2%	25.0%	
	I just know	20.0%	34.4%	27.4%	12.5%	
	I don't have bad breath	40.0%	56.3%	54.8%	37.5%	



When do you experience bad breath most often	After waking up in the morning	80.0%	54.7%	64.4%	50.0%	0.018*
	When I'm hungry or thirsty	0.0%	12.5%	6.8%	0.0%	
	When I'm tired	0.0%	1.6%	2.7%	25.0%	
	Constantly over the whole day	0.0%	1.6%	2.7%	0.0%	
	At work	20.0%	1.6%	1.4%	0.0%	
	When I talk with other people	0.0%	3.1%	0.0%	12.5%	
	Others	0.0%	25%	21.9%	12.5%	
How intense is your bad breath	Very intense					0.502 (NS)
	Average	40.0%	26.6%	20.5%	12.5%	
	Weak	0.0%	42.2%	42.5%	37.5%	
	None	60.0%	31.3%	37.0%	50.0%	
Do you smoke	No	80.0%	98.4%	100%	75.0%	<0.001*
	Yes	20.0%	1.6%	0.0%	25.0%	
Do you drink alcohol	No	100%	96.9%	97.3%	87.5%	0.504(NS)
	Yes	0.0%	3.1%	2.7%	12.5%	
Do you suffer from stress	No	0.0%	17.2%	20.5%	25.0%	0.556 (NS)
	Yes	20.0%	39.1%	32.9%	12.5%	
	May be	80.0%	43.8%	46.6%	62.5%	
Do your gums bleed						0.146(NS)
	No	100%	79.7%	69.9%	50.0%	
	Yes	0.0%	10.9%	19.2%	12.5%	
	May be	0.0%	9.4%	11.0%	37.5%	
Is there any coating on your tongue	No	100%	85.9%	87.7%	25.0%	0.001P
	Yes	0.0%	3.1%	5.5%	25.0%	





	Don't know	0.0%	10.9%	6.8%	50.0%	
Do you suffer from dry mouth	No	100%	76.6%	83.6%	37.5%	0.068(NS)
	Yes	0.0%	9.4%	9.6%	25.0%	
	Don't know	0.0%	14.1%	6.8%	37.5%	
Do you have anxiety about bad breath when talking to people	No	80.0%	71.9%	78.1%	75.0%	0.857(NS)
	Yes	20.0%	28.1%	21.9%	25.0%	
Have you encountered any of the following problems because of bad breath	I avoid talking with other people	0.0%	17.2%	12.3%	12.5%	0.001*
	I am shy whenever someone approaches me	20.0%	9.4%	1.4%	25.0%	
	I don't like meeting other people	20.0%	0.0%	4.1%	25.0%	
	I cannot start a relationship	0.0%	3.1%	5.5%	12.5%	
	Other people avoid me	0.0%	1.6%	0.0%	12.5%	
	I haven't encountered any problems	60.0%	68.8%	76.7%	12.5%	

**Table 3: Comparison of gender with self-perception on halitosis**

		Gender		
		Male	Female	P value
How do you know you have bad breath	Behavioral signs from other people	14.3%	5.7%	0.013
	Someone told me	21.4%	6.6%	
	I just know	32.1%	28.7%	
	I don't have bad breath	32.1%	59.0%	
When do you experience bad breath most often	After waking up in the morning	42.9%	63.9%	<0.001*
	When I'm hungry or thirsty	3.6%	9.8%	





	When I'm tired	14.3%	0.8%	
	Constantly over the whole day	7.1%	0.8%	
	At work	10.7%	0.0%	
	When I talk with other people	3.6%	1.6%	
	Others	17.9%	23.0%	
How intense is your bad breath	Very intense			0.894 (NS)
	Average	25.0%	23.0%	
	Weak	42.9%	40.2%	
	None	32.1%	36.9%	
Do you smoke	Yes	89.3%	99.2%	0.003*
	No	10.7%	0.8%	
Do you drink alcohol	Yes	92.9%	97.5%	0.213(NS)
	No	7.1%	2.5%	
Do you suffer from stress	Yes	17.9%	18.9%	0.008*
	No	10.7%	39.3%	
	May be	71.4%	41.8%	
Do your gums bleed	Yes	53.6%	78.7%	<0.001*
	No	7.1%	16.4%	
	May be	39.3%	4.9%	
Is there any coating on your tongue	Yes	42.9%	93.4%	<0.001*
	No	14.3%	3.3%	
	Don't know	42.9%	3.3%	
Do you suffer from dry mouth	Yes	46.4%	86.1%	<0.001*
	No	17.9%	8.2%	
	Don't know	35.7%	5.7%	
Do you have anxiety about bad breath when talking to people	Yes	82.1%	73.8%	0.354*
	No	17.9%	26.2%	
Have you encountered any of the following problems because of bad breath	I avoid talking with other people	10.7%	14.8%	<0.001*
	I am shy whenever someone approaches me	10.7%	5.7%	
	I don't like meeting other people	10.7%	2.5%	
	I cannot start a relationship	21.4%	0.8%	
	Other people avoid me	3.6%	0.8%	
	I haven't encountered any	42.9%	75.4%	



	problems			
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**Table 4: Comparison of self-testing halitosis with their attitude towards oral health**

		Self-testing by smelling your breath in your cupped health				P value
		No odor/not sure	Slight ,but noticeable odor	Moderate odor	Strong odor	
How often do you change your toothbrush	3 months	37.6%	50.0%	13.3%	25.0%	0.040
	6 months	36.5%	34.8%	60.0%	0.0%	
	1 year	10.6%	10.9%	6.7%	50.0%	
	Till bristles get frayed	15.3%	4.3%	20.0%	25.0%	
Which type of brushing technique do you use	Horizontal stroke	54.5%	28.6%	25.0%	22.2%	<0.001*
	Vertical stroke	0.0%	28.6%	38.6%	30.9%	
	Roll stroke	9.1%	28.6%	22.7%	40.7%	
	I am not aware	36.4%	14.3%	13.6%	6.2%	
Do you use mouthwash	No	72.9%	69.6%	80.0%	75.0%	0.887
	Yes	27.1%	30.4%	20.0%	25.0%	
Do you use tooth pick or dental floss	No	76.5%	69.6%	80.0%	75.0%	0.800
	Yes	23.5%	30.4%	20.0%	25.0%	
How do you clean your tongue	Tongue scraper	44.7%	39.1%	20.0%	0.0%	0.013
	Back side of my toothbrush	50.6%	45.7%	53.3%	50.0%	
	I don't clean my tongue	4.7%	15.2%	26.7%	50.0%	
Do you rinse your mouth after eating	yes	0.0%	2.2%	20.0%	50.0%	<0.001*
	No	92.9%	89.1%	53.3%	0.0%	
	Sometimes	7.1%	8.7%	26.7%	50.0%	

**Table 5: Comparison of intensity of halitosis and the attitude towards oral hygiene practice**

		How intense is your halitosis	
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		Very intense	Average	Weak	None	p value
How often do you change your toothbrush	3 months	36.4%	21.4%	34.1%	44.4%	0.752(NS)
	6 months	36.4%	50.0%	40.9%	33.3%	
	1 year	9.1%	21.4%	13.6%	8.6%	
	Till bristles get frayed	18.2%	7.1%	11.4%	13.6%	
Which type of brushing technique do you use	Horizontal stroke	54.5%	28.6%	25.0%	22.2%	0.011*
	Vertical stroke	0.0%	28.6%	38.6%	30.9%	
	Roll stroke	9.1%	28.6%	22.7%	40.7%	
	I am not aware	36.4%	14.3%	13.6%	6.2%	
Do you use mouthwash	No	63.6%	85.7%	63.6%	76.5%	0.254(NS)
	Yes	36.4%	14.3%	36.4%	23.5%	
Do you use toothpick or dental floss	No	72.7%	85.7%	77.3%	71.6%	0.686(NS)
	Yes	27.3%	14.3%	22.7%	28.4%	
How do you clean your tongue	Tongue scraper	36.4%	21.4%	38.6%	43.2%	0.036*
	Back side of my toothbrush	9.1%	50.0%	40.9%	53.1%	
	I don't clean my tongue	54.5%	28.6%	20.5%	3.7%	
Do you rinse your mouth after eating	Yes	27.3%	14.3%	2.3%	0.0%	<0.001*
	No	63.6%	64.3%	86.4%	91.4%	



	Sometimes	9.1%	21.4%	11.4%	8.6%	
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## V. CONCLUSION

Only less than half of the young adults who participated in the survey suffer from halitosis. Good oral hygiene practices such as good tooth brushing techniques, tongue scraping, rinsing mouth after eating, using dental floss, mouthwash were the factors that had significant association with mild halitosis. Female participants suffered more from the problem than male participants.

## REFERENCES

- [1]. American Academy of Periodontology. Glossary of Periodontal terms. 4<sup>th</sup> ed. Chicago. American Academy of Periodontology; 2002. 56 p.
- [2]. Sujatha Tungare, Nowera Zafar. Halitosis
- [3]. Bigler, T. & Filippi, A. (2016). Importance of halitosis. A survey of adolescents and young adults. Swiss dental journal. 126. 347-359.
- [4]. Iwona Olszewska. Clinical trial evaluating quality of life in patients with intra oral halitosis. J Clin Med. 2022
- [5]. C.E. Kazor, P.M. Mitchell, B.J. Paster. Diversity of bacterial populations on the tongue dorsa of patients with halitosis and healthy patients.
- [6]. Dr. Reyaz Ahmad Mir, Dr. Munaza Shafi, Dr. Prabhati Gupta, Dr. Mirza Umair Yousuf and Dr. Arif Daing. Halitosis: A review article. International Journal of Current research Vol. 5, Issue 12 pp. 3758-3762, December, 2013
- [7]. de Jongh, A., van Wijk, A., Horstman, M. et al. Attitudes towards individuals with halitosis: an online cross sectional survey of the Dutch general population. Br Dent J 216, E8 (2014). <https://doi.org/10.1038/sj.bdj.2014.101>
- [8]. Ahmed Abulwafa, & Najat Abushoufa. (2020). Bad Breath (Halitosis): Narrative Overview. Khalij-libya Journal of Dental and Medical Research, 4(1), 8-29. <https://doi.org/10.5281/zenodo.3948403>
- [9]. Sameer A Mokeem. Halitosis: A Review of the Etiologic Factors and Association with Systemic Conditions and its Management. 10.5005/jp-journals-10024-1622
- [10]. Yu, W.W., Goh, R., Cheong, E., Guan, G., Jin, C., Cannon, R.D., Farella, M. and Mei, L. (2022), Prevalence of halitosis among young adults in Dunedin, New Zealand. Int J Dent Hygiene. Accepted Author Manuscript. <https://doi.org/10.1111/idh.12609>
- [11]. Bin Mubayrik A, Al Hamdan R, Hadlaq EM, AlBagieh H, AlAhmed D, Jaddoh H, Demyati M, Abu Shryei R. Self-perception, knowledge, and awareness of halitosis among female university students. Clin Cosmet Investig Dent. 2017;9:45-52 <https://doi.org/10.2147/CCIDE.S129679>
- [12]. Buunk-Werkhoven YA, Buls JG, Osinga E, Bruers JJ. Diagnosis and treatment of patients with halitosis by dental hygienists and dentists in the Netherlands. Int Dent J. 2015 Apr;65(2):65-70. doi: 10.1111/idj.12145. Epub 2014 Dec 8. PMID: 25487169.
- [13]. Bornstein M, Stocker B, Seemann R, Bürgin W, Lussi A. Prevalence of halitosis in young male adults: a study in Swiss army recruits comparing self-reported and clinical data. J Periodontol. 2009;80(1):24-31.
- [14]. Oliveira-Neto JM, Sato S, Pedrazzi V How to deal with morning bad breath: A randomized, crossover clinical trial. J Indian Soc Periodontol 2013;17:757-61
- [15]. Hasan, S M Mahmudul. (2019). Female are More Prone to Halitosis Due to the Changing of the Hormonal Balance-A Cross Sectional Study in Bangladesh. American Journal of Biomedical Science & Research. 3. 106-110. 10.34297/AJBSR.2019.03.000643.
- [16]. Casemiro, Luciana Assirati et al. "Effectiveness of a new toothbrush design versus a conventional tongue scraper in improving breath odor and reducing tongue microbiota." Journal of applied oral science : revista FOB vol. 16,4 (2008): 271-4. doi:10.1590/s1678-77572008000400008
- [17]. MLA Kayombo, C M, and E G Mumghamba. "Self-Reported Halitosis in relation to Oral Hygiene Practices, Oral Health Status, General Health Problems, and Multifactorial Characteristics among Workers in Ilala and Temeke Municipals, Tanzania." International journal of dentistry vol. 2017 (2017): 8682010. doi:10.1155/2017/8682010
- [18]. Gonçalves, Ana & Martins, Marisol & Paula, Bruna & Weckwerth, Paulo & Franzolin, Solange & Silveira, Elcia. (2019). A new technique for tongue brushing and halitosis reduction: the X technique. Journal of Applied Oral Science. 27. 10.1590/1678-7757-2018-0331.