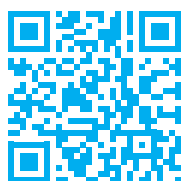


AWARENESS AND KNOWLEDGE OF HALITOSIS AMONG GENERAL POPULATION – A CROSS-SECTIONAL STUDY

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ABSTRACT

BACKGROUND: Halitosis or Oral malodor is defined as an unpleasant breath odor and it is an important dental problem in which the affected are not conscious of it, and it also causes individuals to lose self-confidence and thus affecting their social life. It can also be because of underlying systemic condition but most prominently it is due to improper maintenance of oral hygiene.

AIM: The study aims at assessing awareness and knowledge of halitosis among general population and their perception of it.

METHODS AND MATERIALS: A descriptive cross-sectional study was conducted among 512 individuals of age 18-70 years through online forums due to COVID 19 pandemic situation. A pre-validated questionnaire with 22 closed ended question on Google forms were circulated on social media platforms like WhatsApp, Messenger and Instagram. The collected data was subjected to statistical analysis.

RESULTS: It was observed that 66% believed that halitosis was related to oral hygiene and 68% believed that smoking and alcohol consumption caused bad breath and 60% agreed that tongue coating and food lodgment caused halitosis. About 64.6% stated that bad breath affected their social life by reducing their self-confidence.

CONCLUSION: Halitosis is the one of the unattractive aspects affecting psychosocial interaction and relationship, it needs multiple approach to treat. The result of the study indicates that awareness of halitosis among general population is very high whereas knowledge on prevention of halitosis is comparatively less.

KEY WORDS: Halitosis, Bad breath, oral hygiene measures, oral malodor, social life

INTRODUCTION:

Halitosis is the term used to define an unpleasant or offensive odour in expired air, regardless of whether it originates from oral or non-oral sources¹. Microbial degradation in the oral cavity is the main cause of oral malodour². Oral malodour or halitosis refers to unpleasant breath³

Halitosis result from the release of volatile sulfur compound (vsc_s) through putrefactive activities of predominantly anaerobic gram-negative oral organisms⁽³⁾. In 90% of the cases, the causative factor is located in the mouth such as deep caries lesion, periodontal disease, oral infection, pericoronitis, mucosal ulceration, food impaction, reduced salivary flow, coated tongue and systemic diseases like diabetic mellitus⁴. Oral manifestation of diabetes includes periodontal diseases, oral candidiasis and dry mouth. Extraoral causes of halitosis could be disturbances in upper and lower respiratory tract, metabolic diseases, medications, carcinoma, etc.⁵

Halitosis can cause major social impact on those who suffer from it affecting their daily life causing embarrassment, reduced employment and decreasing quality of life⁶. Also, habits like smoking, tobacco use, alcohol, etc can trigger halitosis⁷.

A number of methods have been used to detect the presence of halitosis either directly or indirectly. Direct tests are organoleptic, gas chromatography and indirectly it can be assessed by odour producing microorganism or assessing their byproducts invitro⁷ and the BANA (N-benzoyl-DL-arginine-2-naphthylamide) test which uses of chemical sensors⁶. Oral breath can be improved by scaling and root planing and rinsing with chlorhexidine, essential oils, chlordioxide, triclosan, amine-fluoride, H₂O₂, toothpaste containing stannous fluoride, zinc or triclosan².

The aim and purpose of this study was to access the awareness and knowledge of halitosis and individuals' attitude towards it.

MATERIALS AND METHODS:

STUDY SAMPLES:

A cross sectional study was conducted among individuals aged 18 years and above in India. Due to COVID-19 pandemic situation the study was conducted using online platforms. A self-administered pre-validated questionnaire was used to assess the

knowledge and awareness about halitosis. A pilot study was conducted to validate the questionnaire using 20 samples from the study population. The internal consistency of the questionnaire was adequate (Cronbach's alpha = 0.70) and reliability was assessed by test-retest and Kappa statistic and the agreement was good (0.80). The face and content validity of the questionnaire was carried out by a panel of experts who assessed whether the questionnaire items are adequately measuring the concept intended to assess, and whether the items are adequate to measure the domain of interest. The first part of the questionnaire collected demographic data of participants including socio economic status. The second part of the questionnaire consisted of substantive questions exploring respondent's self-perception and awareness of halitosis along with their knowledge about causes and management of halitosis. The questionnaire was prepared on Google forms and circulated through social media applications such as WhatsApp, Messenger and Instagram. The rationale and purpose of the study was explained as an introductory paragraph on the Google forms and the participants were assured that the data identifying the individual will be kept confidential and the collected data will be used only for research purpose. The total time taken by the participants to complete the questionnaire was 5-6 minutes approximately. The link was kept open for a period of 2 months, starting from 19th May 2020 to 18th July 2020 and Google form limiter was used to avoid multiple responses by an individual. All the individuals who responded the forms were included in the study.

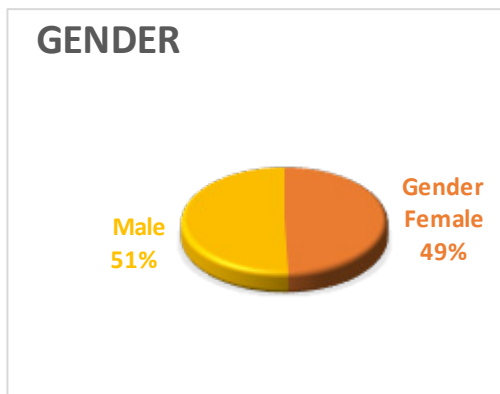
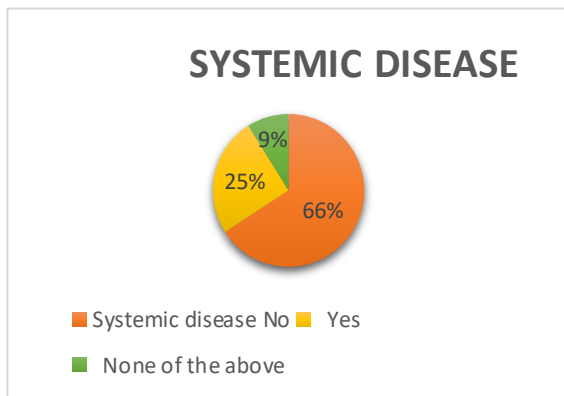
STATISTICAL ANALYSIS:

The data was analyzed using Statistical Package for Social Sciences, IBM Corporation, SPSS Inc., Chicago, IL, USA version 21 software package (SPSS). Descriptive statistics with frequency, percentage, mean and standard deviation was computed. Pearson chi-square test was used to assess the statistical significance between genders and the $p \leq 0.05$ is set as stastically significant.

RESULTS:

This study was conducted to evaluate the awareness of halitosis among general population to determine their knowledge. A total of 512 individuals

had responded to the questionnaire during the study period.



The age of the participants ranged from 18 to 70 years (Mean-36.94±8.436) and 253 (49.4%) were females and 259 (50.6%) were males. About 66% of the participants had stated that they had no systemic diseases, and about 59 (11.5%) and 67 (13.1%) had the habit of smoking and alcohol consumption, respectively.

When asked about “whether bad breath was related to oral hygiene”, 66 % believed that it was related to oral hygiene and 63.7 % of the participants

believed that proper brushing and mouthwash will reduce bad breath. When questioned about “whether smoking and alcohol consumption can cause bad breath”, most of the participants responded positively and about 68.2 % believed that those habits may cause bad breath. Most of the participants, 61.7% agreed that systemic diseases can cause bad breath.

Among the participants, 62.1 % of the participants thought food lodgments in teeth could cause bad breath and 58.2 % of participants believed food particles coating on tongue caused bad breath.

Majority of the participants, 52.9% responded that all of the mentioned options (i.e. oral infection, dry mouth, medication) can cause halitosis followed by oral infection (20.9 %), Dry mouth (14.3%) medication (11.1%). Regarding the association of halitosis to stomach problems and dental caries, about 52.5 % and 55.1 % respectively, responded positively.

Almost 64.6 % of the participants responded that bad breath reduced their confidence level in public, and about 60.7 % of the participants were aware that uncleaned denture may also cause bad breath. Among 63.3 % of the participants responded to “I will advise them to have proper oral hygiene” to the people experiencing halitosis.

When experience of bad breath was compared between males and females, it was observed that males had experienced bad breadth significantly more often than females, (p=0.33) and significantly a greater number of males had approached dentists for treating bad breadth. It was observed that significantly a greater number of females responded

TABLE 1: Distribution of participants according to knowledge and attitude towards halitosis

QUESTION	OPTION	FREQUENCY	PERCENT
Have you ever experienced bad breath?	Yes	203	39.6
	No	192	37.5
	Sometimes	117	22.9

Do you think BAD BREATH is related to oral hygiene?	Yes	338	66.0
	No	65	12.7
	Maybe	107	20.9
Do you think proper brushing and usage of mouth wash will reduce BAD BREATH?	Yes	326	63.7
	No	76	14.8
	Maybe	110	21.5
Do you think smoking /alcohol consumption can cause bad breath?	Yes	349	68.2
	No	73	14.3
	Maybe	90	17.6
Do you think BAD BREATH can occur due to systemic diseases like diabetes, liver disorder, gastric problem, etc?	Yes	316	61.7
	No	61	11.9
	Maybe	135	26.4
Do you think food lodgement in teeth can cause BAD BREATH?	Yes	318	62.1
	No	85	16.6
	Maybe	109	21.3
Do you think food particles coating on tongue can cause BAD BREATH?	Yes	298	58.2
	No	73	14.3
	Maybe	137	26.8

According to you, BAD BREATH can be due to	Dry mouth	73	14.3
	Improper digestion	1	.2
	Internal infection in throat or somewhere	1	.2
	Medication	57	11.1
	Normal	1	.2
	Oral infection	107	20.9
	Spicy foods and ulcers	1	.2
	All of the above	271	52.9
	Do you think BAD BREATH predominantly occurs among elderly persons?	Yes	245
No		112	21.9
Maybe		148	28.9
Do you think BAD BREATH can be caused from stomach problems?	Yes	269	52.5
	No	102	19.9
	Maybe	141	27.5
Do you think BAD BREATH can occur due to dental caries?	Yes	282	55.1
	No	98	19.1
	Maybe	135	25.8
Do you think drinking plenty of water can reduce BAD BREATH?	Yes	271	52.9
	No	89	17.4
	Maybe	152	52.9

Do you think BAD BREATH can occur in a healthy individual also?	Yes	283	55.3
	No	91	17.8
	Maybe	129	25.2
According to you, what measures can prevent BAD BREATH?	Brush	70	13.7
	Floss	51	10.0
	Mouthwash and mouth fresheners	133	26.0
	All of the above	258	50.4
Have you ever approached a dentist for treating BAD BREATH?	Yes	166	32.4
	No	261	51.0
	Maybe	74	14.5
Do you think BAD BREATH can decrease confidence level in the individual?	Yes	331	64.6
	No	76	14.8
	Maybe	105	20.5
Do you think having good nutrition can reduce BAD BREATH?	Yes	277	54.1
	No	73	14.3
	Maybe	153	29.9
According to you, at what interval can an individual experience BAD BREATH?	Daily	117	22.9
	Early morning	157	30.7
	Once in a week	89	17.4
	No idea	149	29.1

Do you think BAD BREATH might be due to gum disease?	Yes	243	47.5
	No	108	21.1
	Maybe	161	31.4
Are you aware of any device to measure BAD BREATH?	Yes	205	40.0
	No	197	38.5
	Maybe	104	20.3
Do you think that Uncleaned dentures can cause BAD BREATH?	Maybe	311	60.7
	No	83	16.2
	Yes	118	23.0
What is your opinion of people with BAD BREATH?	I will advise them to have proper oral hygiene	324	63.3
	I will continue to be friendly with them	72	14.1
	I will ignore them	66	12.9
	None of the above	50	9.8

Table 2. Comparison of gender according to knowledge and attitude towards halitosis

QUESTION	OPTION	Gender		p-value*
		Male	Female	
Have you ever experienced bad breath?	Yes	110(21.5%)	93(18.2%)	0.033
	No	83(16.2%)	109(21.3%)	
	Maybe	66(12.9%)	51(10.0%)	
Have you ever approached a dentist for treating BAD BREATH?	Yes	91(17.8%)	75(14.6%)	0.000
	No	114(22.3%)	147(28.7%)	
	Maybe	51(10.0%)	23(4.5%)	
What is your opinion of people with BAD BREATH	I will advise them to have proper oral hygiene	145(28.3%)	179(35.0%)	0.003
	I will continue to be friendly with them	39(7.6%)	33(6.4%)	
	I will ignore them	44(8.6%)	22(4.3%)	
	None of the above	31(6.1%)	19(3.7%)	

that they would advise a person with halitosis to have proper oral hygiene.

DISCUSSION:

Oral malodour is a very common problem among entire population. Self-assessment and perception are the most important factor in both controlling and diagnosing of bad breath⁹. This study was undertaken to assess the knowledge and awareness of halitosis among general population.

According to the present study, prevalence and experience rate of bad breath was about 39.6% of participants which was higher compared to the study by Alshehri³ (39%) and lower when compared to the study by Fadhil et al¹² in which it was estimated to be around 50%.

Halitosis can be predominantly reduced by oral hygiene measures and in the current study overall 66% believed that bad breath was related to oral hygiene. On contrary it was lower when the present study was compared to study by Yoko et al¹¹ (78.4%); higher when compared to study by Settineri et al⁸ (29.6%). The difference might be because most of the individual in the present study were aware of oral hygiene measures.

It is advocated that regular brushing twice a day and mouth rinsing contributes to good oral hygiene. In present study, about 63.7% of the participants agreed to it. On the contrary, in a study conducted by Azizah et al¹⁰ a greater number of the subjects, 77% believed that oral hygiene measures prevented halitosis.

In the present study, 282 participants (55%) agreed that bad breath can occur due to dental caries and 107 (20.9%) of participants agreed that bad breath can occur due to oral infections. Whereas in the survey conducted by Bader et al⁶, in Saudi Arabia in 2017 revealed that 64.6% of participants agreed that presence of dental caries was one of the reasons for halitosis and 79.4% of participants agreed that halitosis was due to intra oral sources. The percentage of participants who agreed that halitosis was due to dental caries and oral infection was high compared to the present survey. This may be because the participants were more aware about factors leading to dental caries.

The status of having other medical problems was found to be significantly associated with occurrence of long-standing breath malodor¹⁵, with regards to this in the present study 61.7% of the respondents agreed that systemic diseases like diabetes, liver disorder and gastric problem contributed to bad breath.

In the present study, tongue coating causing bad breath was mentioned by about 58.2% of the respondents which was higher compared to study conducted by Azizah et al¹⁰ (34.4%) and similar to the study by Badar A⁶(57%). The possible explanation for this might be as pointed by De Boever and Loerche that uncleaned tongue is usually harbouring periodontal bacteria such as *prevotella intermedia*, *porphyromnas gingivalis* and *fusobacterium* that were responsible for producing volatile sulphur compounds that accounts for oral malodor from the mentioned¹⁵.

Among the participants, about 52.5% answered that stomach problem could also be the reason for halitosis which was in accordance with the study conducted by Nabila et al¹³ (59%) but lower from a study by Azizah et al(44.6%)¹⁰ Also, participants believed that medical condition such as dry mouth (14.3%) and medications (11.1%) could be the etiology and contributing factor. On the other hand, in the study by Azizah et al¹⁰, it was higher, 31.4% for dry mouth and in the study by Settineri et al⁸, 40% of the respondents answered that taking medications such as immunosuppressant's like cyclosporine, tacrolimus and calcium channel blockers like amlodipine, diltiazem could cause halitosis.

The participants approaching dentists for bad breath was 32.4% in the current study. On contrary, study findings by Nabila et al¹³ 82.4% of the respondents as agreed on seeking dentist opinion. This disparity may be due to lack of knowledge about treatment and prevention of halitosis in current study individuals.

Most of the participants in the present study i.e. about 64.6% agreed that bad breath reduced their social life, but in the study by Badar A et al⁽⁶⁾, only 36.3% responded so, whereas it was higher in a study by Nabila et al¹³ (71%). This implies that halitosis can psychologically affects individuals' social life.

Gum disease like bleeding gums while brushing and other periodontal problem like periodontal plaque and pocket also have impact on halitosis. In the present study, 47.5% of the participants agreed to it, and it was similar to a study by Rana et al⁹ where 47.78% of males agreed so.

The limitation of the present study is that it relies only on self-perceived data, and no clinical examination was performed to assess the actual presence of halitosis.

In this survey, the participants seem to have appropriate perception on causes of halitosis whereas the knowledge of precautionary measures to prevent it was comparatively low. This disparity can be overcome by more feasible methods to assess bad breath and imparting knowledge about ways to prevent it among the population.

CONCLUSION:

Halitosis is the one of the unattractive aspects affecting psychosocial interaction and relationships and it needs multiple approach to treat. Oral hygiene habits such as brushing the teeth twice daily, cleansing with mouthwash and usage of dental floss can reduce the prevalence of halitosis. The result of the study indicates that awareness of halitosis among general population was high whereas knowledge on prevention on halitosis was comparatively low. Thus, each individual in the population should be encouraged to gain knowledge about the prevention of halitosis.

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CONFLICTS OF INTEREST:

There are no conflicts of interest.

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