

Prevalence of halitosis and related factors in North Indian population- A hospital based cross-sectional study

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Abstract

Objective: The Halitosis is also known as 'bad breath'. It is a symptom in which a noticeably unpleasant odour is present in the breath. This study is conducted to evaluate the age and sex related prevalence of halitosis, perception of halitosis, smoking and halitosis.

Materials and Method: A total of 1045 patients were screened from OPD of Department of Oral Medicine and Radiology. Out of all patients, 353 were male and 692 were female. Organoleptic scoring system was used to detect the grade of halitosis. Complete dental checkup of the patients were performed to find out the possible cause of malodor.

Results: The perception of halitosis is co-related with age groups and it was found that majority of study subjects were perceiving halitosis in each age group however the association of perceiving halitosis with age groups was statistically non significant ($p > 0.05$). Majority of study subjects were perceiving halitosis in males and females. However this association was also statistically non-significant ($p > 0.05$). However there was no significant association between perceiving halitosis with age groups for smoking status ($p > 0.05$). No significant ($p > 0.05$) association is found between perceiving halitosis with gender for smoking status (smokers and non smokers).

Conclusion: Halitosis is major health problem In India. The timely diagnosis and intervention by specialists, professional therapy, plaque control methods, education and awareness by professionals can help in prevention and management of Halitosis.

Keywords: Dental plaque, Tongue coating, Bad breath, Prevalence.

Introduction

Unpleasant odour emitted from an individual's oral cavity is referred to as halitosis. The other common terminologies that are used to denote halitosis are fetor oris, oral malodor, or bad breath. Halitosis is an oral health condition characterized by consistently emanating odorous breath and may be caused by several agents including poor oral hygiene, improper cleaning of dentures, decreased salivary flow rate, use of tobacco in any form or certain systemic conditions.¹

Humans emit a variety of volatile and non-volatile molecules that are influenced by genetics, diet, stress and disease. The term 'Halitosis' is derived from the Latin word 'halitus' which means a complaint analogous to body odor² and is used to describe any disagreeable odour in the breath. It's aetiology could be attributed to both intraoral or extra oral factors. However intra-oral reasons contribute about 90% of the cases being deep carious lesions, periodontal disease, peri implant disease, mucosal ulcers, food debris, reduced salivary flow rates or tongue coating.³ Among the listed intra oral causes for halitosis, tongue coating is the most common reason in otherwise healthy individuals with the odor arising from the dorso-posterior aspect of the tongue.⁴ The main compounds that lead to bad breath emanating from the oral cavity are the volatile sulfide compounds especially hydrogen sulfide, methyl mercapta and dimethylsulfide.⁵ These compounds are produced by the anaerobic gram negative microorganisms such as *Treponema denticola*,

Porphyromonas gingivalis, *Porphyromonas endodontalis*, *Prevotella intermedia*, *Bacteroides loescheii*, *Enterobacteriaceae*, *Tannerella forsythensis*, *Centipeda periodontii*, *Eikenella corrodens* and *Fusobacterium nucleatum* that inhabit the oral cavity.⁶ The microorganisms interact with the sulphur containing substances that are present in saliva, gingival crevicular fluid, blood and cells leading to the production of odiferous products.⁷

The number of epidemiological researches on halitosis is limited probably because of the difference in cultural and racial appreciation of the bad breath as for patients as well as for investigators and also because there is no uniformity in evaluation methods and diagnosis.⁸ Owing to different methodologies, the prevalence of halitosis is unclear and there are only a few community based studies evaluating the prevalence.⁹ However extensive studies on halitosis are necessary because it can be considered as a factor that influences the quality of life of patients which is preventable as oral hygiene is considered as responsible.¹⁰

Halitosis frequently causes embarrassment, impaired interpersonal social communication¹¹ and has also become an important market for the pharmacological and cosmetic. Oral malodor may rank behind only dental caries and periodontal disease as the reason for patients visiting the dentist. The perception of halitosis being different in culturally diverse populations.¹² The true prevalence of halitosis is

unknown and some reports are difficult to evaluate unless they specify the classification, terminology and methodology used. Currently available epidemiological data are difficult to evaluate as they are mainly based on subjective self-estimation of malodor which is well known to be limited by inaccuracy and low sensitivity.

However the available evidence suggests that halitosis is common and can affect people of all age groups. The prevalence of persistent oral malodor in a recent Brazilian study was reported to be 15%, was nearly three times higher in men than in women (regardless of age) and the risk was slightly more than three times higher in people over 20 years of age compared with those aged 20 years or under controlling for gender.¹² The large majority of studies report that about 30% of people have halitosis¹³⁻¹⁵ but some studies estimate that more than 50% of the population have halitosis.¹⁶ The precise prevalence of halitosis is still uncertain¹⁷ due to limited number of studies and even lesser number of studies with large samples.¹⁸ It could also be due to the difficulty in evaluating some studies available that have no specification on classification, diagnosis or methodology used.¹⁷ The prevalence of halitosis according to the studies published is between 2% and 44% and this disparity is justified by the subjectivity of the diagnostic criteria, assessment methods and sampling techniques.¹⁹ Although the prevalence of halitosis has been studied in various populations in different parts of the world, different assessments and cut off points were presented. Therefore a precise estimate of the prevalence of halitosis is not possible to obtain.²⁰

Many young adults complain of halitosis. It is estimated that 30% of the world population suffers with this problem regularly.²¹ A study²² conducted in a group of 2672 Japanese workers showed a prevalence of 14% of halitosis in the morning, 23% in the late morning, 6% in the afternoon and 16% at night. An observational study²³ conducted in a sample of 99 volunteers measured halitosis with gas chromatography and found a prevalence of 49%. A French study²⁴ showed about 22% of self reported halitosis. According to another study²⁵ nearly more than 50% of the general population has halitosis. In a Swedish²⁶ study conducted in 840 men halitosis was reported to be around 2% of the population. Studies based on a questionnaire of 1551 subjects in Kuwait²⁷ reported 23% and 254 healthy elderly subjects²⁸ reported 28% prevalence of halitosis in study population. Another study²⁹ with 1052 subjects in Italy showed 19% of self reported halitosis. Our study reports the prevalence rate of halitosis in males and females in north Indian population.

Materials and Method

All the study subjects enrolled for study were asked to sign the informed consent form for the study designed. Nature of study was explained to the patients. A total of 1045 subjects were selected from the OPD of

Department of Oral Medicine and Radiology. Out of all 1045 subjects, 353 were male and 692 were female. The study subjects who have undergone periodontal therapy, any systemic disease and female patients who are pregnant and lactating were excluded from the study. Organoleptic score were recorded for detection of the halitosis (Table 1).

Table 1: Grading of halitosis according to severity

S. No.	Rating	Intensity
1.	No halitosis	Grade 0
2	Barely noticeable odour	Grade 1
3	Slight odour	Grade 2
4	Moderate odour	Grade 3
5	Strong offensive	Grade 4
6	Extremely offensive	Grade 5

Oral hygiene index taken for detection of debris and calculus (Green and Vermilion), Periodontal status was checked by Extent and Severity index (Carlos JP, Wolf MD). Complete dental checkup of the study subjects were performed to find out the possible cause of malodor. Presence of gingivitis and periodontitis, tongue coating, presence or absence of suppuration, deep caries, pericoronitis, brushing frequency and tobacco habit was noted.

Statistical tools

Categorical variables will be presented in number and percentage (%). Qualitative variables will be compared using Chi-Square test /Fisher's exact test as appropriate. A p value of <0.05 will be considered statistically significant. The data is entered in MS Excel spreadsheet and analysis will be done using Statistical Package for Social Sciences (SPSS) version 21.0.

Results

A total 1045 study subjects has been screened for halitosis. The minimum age of study subjects were 15 years with a maximum age of 79 years (Table 1). Out of 1045 study subjects 353 were male (33.8%) and 692(66.2%) were females (Table 2). The perception of Halitosis is co-related with age groups and it was found that majority of study subjects were perceiving halitosis in each age group however the association of perceiving halitosis with age groups was statistically non significant ($p>0.05$) (Table 3). The perception of Halitosis is compared with sex of study subjects. It was found that majority of study subjects were perceiving halitosis in male and females group of study population (Table 4). However this association was also statistically non-significant($p>0.05$). Table 5 shows association of age groups and perceiving halitosis status according to their smoking status (smoker vs nonsmoker). It shows that majority of the study subjects were perceiving halitosis in smokers than non-smokers irrespective of age groups (Table 5). However there was no significant association between perceiving

halitosis with age groups for smoking status ($p>0.05$). The association of gender and perceiving halitosis status according to their smoking status (smoker vs nonsmoker) is studied in the population. It was found that majority of study subjects perceiving halitosis were

smokers in both male and female group. However no significant ($p>0.05$) association is found between perceiving halitosis with gender for smoking status (smokers and non smokers) (Table 6).

Table 1: Showing the mean age in study population

	N	Minimum	Maximum	Mean	Std. Deviation
Age	1045	15.00	79.00	48.0679	15.38024

Table 2: Showing the sex wise distribution of study population

Gender	Frequency	Percent
Male	353	33.8
Female	692	66.2
Total	1045	100.0

Table 3: Showing the prevalence of Halitosis in age groups

Perceiving Halitosis	Age intervals					Total
	Below 18yr	18 to 35yr	36 to 50yrs	51 to 65yrs	Above 65yrs	
Yes	16	177	236	235	101	765
	88.9%	78.0%	71.3%	72.8%	69.2%	73.2%
No	2	50	95	88	45	280
	11.1%	22.0%	28.7%	27.2%	30.8%	26.8%
Total	18	227	331	323	146	1045
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4: Showing the prevalence of Halitosis in Male and Female of study population

Perceiving Halitosis		Gender			Total
		Male	Female		
Yes	Count	262	503	765	
	% within Gender	74.2%	72.7%	73.2%	
No	Count	91	189	280	
	% within Gender	25.8%	27.3%	26.8%	
Total	Count	353	692	1045	
	% within Gender	100.0%	100.0%	100.0%	

Table 5: Showing the relation between age groups, smoking habit and Halitosis

Age Intervals			Smoking Status		Total	P value
	Perceiving Halitosis		Present	Absent		
Below 18yr	Yes	Yes	16		16	NA
		No	88.9%			
	No	Yes	2		2	
		No	11.1%		11.1%	
Total			18		18	
			100.0%		100.0%	
18 to 35yr	Yes	Yes	18	159	177	.277
		No	85.7%	77.2%	78.0%	
	No	Yes	3	47	50	
		No	14.3%	22.8%	22.0%	
Total			21	206	227	
			100.0%	100.0%	100.0%	
36 to 50yrs	Yes	Yes	40	196	236	.125
		No	64.5%	72.9%	71.3%	

		No	22	73	95	
			35.5%	27.1%	28.7%	
	Total		62	269	331	
			100.0%	100.0%	100.0%	
51 to 65yrs	Perceiving Halitosis	Yes	59	176	235	.387
			74.7%	72.1%	72.8%	
	No	20	68	88		
		25.3%	27.9%	27.2%		
Total		79	244	323		
		100.0%	100.0%	100.0%		
Above 65yrs	Perceiving Halitosis	Yes	33	68	101	.506
			70.2%	68.7%	69.2%	
	No	14	31	45		
		29.8%	31.3%	30.8%		
Total		47	99	146		
		100.0%	100.0%	100.0%		

Table 6: Showing the relation between gender, smoking habits and Halitosis

Gender			Smoking Status		Total	P value
			Present	Absent		
Male	Perceiving Halitosis	Yes	141	121	262	.165
			71.9%	77.1%	74.2%	
	No	55	36	91		
		28.1%	22.9%	25.8%		
Total		196	157	353		
		100.0%	100.0%	100.0%		
Female	Perceiving Halitosis	Yes	9	494	503	.494
			69.2%	72.8%	72.7%	
	No	4	185	189		
		30.8%	27.2%	27.3%		
Total		13	679	692		
		100.0%	100.0%	100.0%		

Discussion

The major aim of this cross-sectional study was to predispose the enlightenment and related determinants of halitosis in the patients coming in our OPD. Since oral malodor is an olfactory stimulus direct smelling of the exhaled air by judges is considered the most logical measurement approach.³⁰ The prevalence of halitosis has been studied in different populations all over the world with a variety of techniques and cut-offs but the prevalence of halitosis is still not well established. Most of the prevalence studies are based on self perceived breath odor and do not correlate well with other halitosis measurements.³¹ Bornstein et al³² stated that 32% of Swiss adults reported experiencing halitosis sometimes or often (N=419). Setia et al³³ reported that 45 % of Indian dental students (N=277) reported halitosis, with >80 % of them experiencing morning bad breath.

Zürcher et al³⁴ investigated that the prevalence of halitosis in the general Dutch population (N=1,002, >16 years old), and reported that almost 90 % of the population was regularly faced with a person having halitosis, 40 % at least once a week.

Miyazaki et al³⁵ with the help of VSC (Halimeter) reported that prevalence of moderate halitosis is (≥ 75 ppb) = 28%.

Loesche et al³⁶ stated that prevalence of self perception was 31% and prevalence of halitosis informed by others was 24%. Frexinós et al³⁷ stated that prevalence of self-reported halitosis was 22%. Söder et al³⁸ reported using organoleptic that prevalence of severe halitosis was 2.4%. Nalçaci et al³⁹ investigated using organoleptic that prevalence of halitosis was 14.5%. Saito et al⁴⁰ interviewed 33,427 persons \pm 15 years of age from all regions of Japan, and reported 14.5% problems with oral malodor. Hence this showed that the halitosis was the most important oral health concern for 70% of the questioned businessmen from Tokyo.

Liu et al⁴¹ found a higher prevalence in women only in the age group of 35–44 years old.

Miyazaki et al³⁵ and Nadanovsky et al⁴² stated that there was some association between halitosis and progression of age. on the other hand in our study we observed that majority of the patients were higher in perceiving halitosis present patients in all age groups

There was no significant association between age intervals with their perceiving halitosis ($p>0.05$).

The association of gender of patients and their perceiving halitosis shows that majority of the patients were higher in perceiving halitosis and in both males and females. There was no significant association between gender with their perceiving halitosis ($p>0.05$). The association of age groups and perceiving halitosis status according to their smoking status (smoker versus non smoker) showed that majority of the patients were higher in perceiving halitosis and present in smokers. There was no significant association between perceiving halitosis with age groups for smoking status ($p>0.05$).

So it was concluded that halitosis is boundless in the study population and is escorted by a low level of consciousness. Tongue coating and smoking are significantly associated with halitosis. Only Tooth brushing is not effective in solving this problem so tongue brushing should be part of daily oral hygiene and should be included in the oral hygiene instructions given to patients and the public. Health care providers including dentists and clinician should pay more attention to health education regarding halitosis since halitosis from an extra-oral origin can be the sign of an underlying systemic disease. The treatment of patients with halitosis should be performed according to a standardized scheme. Patients with extra-oral halitosis and halitophobia must be referred to appropriate specialists such as an otorhinolaryngologist, internist, psychologist, or psychiatrist.

Conclusion

Halitosis is an oral health condition characterized by consistently emanating odorous breath and may be caused by several agents including poor oral hygiene, improper cleaning of dentures, decreased salivary flow rate, use of tobacco in any form, or certain systemic conditions. Halitosis is major health problem In India. The timely diagnosis and intervention by specialist, professional therapy and plaque control methods and education and awareness by professionals can help in prevention and management of halitosis.

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