INTRODUCTION

Oral malodor commonly known as bad breath is termed as Halitosis. As one can understand, it is a major social stigma. It however goes unreported generally by patients as patients use temporary remedies like cosmetic mouthwashes, chewing gums and breath sprays. Self awareness of patient about the halitosis is a statement in itself about patient’s knowledge, aptitude and practice of oral hygiene practices. Halitosis is also one of the indicators of gingival and periodontal diseases. The causes for Halitosis are multifactorial. It may arise from dental deposits, deep periodontal pockets, tongue, sinuses, post nasal drip and seldom gastrointestinal tract. Dental prostheses such as acrylic dentures can also produce a typical smell associated with candidiasis. Although halitosis can originate from oral and non-oral sites, about 85% are generally related to an oral cause. Non-oral causes for halitosis include medical problems such as renal failure, liver cirrhosis, and diabetes mellitus.

Halitosis is a very common complaint by patients visiting dental clinics however; it is not given much attention by patients unless it is pointed out by someone else they know. Even if the patient is aware about the halitosis, it is seldom reported due to social restrictions (male to female conversation) or less awareness or less botheration of the oral hygiene. Also it is uncomfortable for patients to mention about oral malodor. Previous studies have reported that about 30% to 50% of the population has experienced the problem of halitosis.

The majority of studies suggest that moderate halitosis affects about one third of individuals, whereas severe halitosis affects less than 5% of the population. Several studies were conducted to evaluate self-reported halitosis among the population. The prevalence of self-reported halitosis in Kuwait was found to be 23.3% among adults, 19.4% among Italian subjects aged 15–65 years, 32% among subjects from the city of Bern, Switzerland, 61.1% among Thai dental patients, and 62.8% among patients visiting periodontal clinics in China.

In India, data on self-reported halitosis is limited. Few studies carried out, have given data on self-reported halitosis in dental students. There have been very few studies about associating socio-economic status and self-reported halitosis. This is necessary in order to assess the depth of the problem, necessity of oral health awareness and magnitude of oral health practices.

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Hence, the aim of the study was to assess self perceived halitosis and its relation with socioeconomic status in Indian adults.

MATERIALS AND METHODS

The reporting of the study has followed the STROBE (Strengthening The Reporting of Observational Studies in Epidemiology) guidelines. The study was carried out in The Department of Periodontology, Sinhgad Dental College and Hospital, Pune, Maharashtra, India from July 2017 to September 2017. Prior to start of the study, all the necessary permissions were taken from Head of the department, Principal of the institute and Institutional Research Board. Ethical clearance was also obtained from Institutional Ethical Committee. The study strictly followed the Declaration of Helsinki.

The participation in the study was kept anonymous and completely voluntary. Patients above 18 yrs of age and non tobacco users were included in the study. Intellectually challenged patients, patients with history of systemic disease, patients unwilling to participate were excluded from the study.

The present study is a cross sectional descriptive study. Sample size of the study was determined using simple proportional formula \( p \leq 0.05 \). About 360 patients (207 males, 153 females) were asked the questionnaire and were rated on Kuppuswamy Socioeconomic status scale 2016 and the response to the questions was recorded.

The questionnaire evaluated self perception of halitosis, treatment (professional), oral hygiene practices (tooth brushing frequency, use of mouthwash, tongue cleaning etc). The questionnaire mainly assessed self perception of halitosis by asking about if the patients had ever felt the bad breath or had been told by people around them. Attitude of seeking the treatment was also assessed by asking if they had taken any professional help for halitosis. Oral hygiene practices were assessed by recording response for daily practice of brushing twice, using mouthwash and use of tongue cleaner. Attitude towards oral hygiene was noted by asking if patient thinks they have decayed teeth (since dental caries is the most common finding), do they notice gum bleeding and do they realize they are having dry mouth. The questionnaire was filled by the investigator, by taking one to one interview of patients by explaining them the questions in local languages. Also, the education, occupation and family income in rupees per month were recorded.

**Statistical Methods**

The questionnaires were numbered serially and coded. The data was compiled in excel sheet. It was analyzed by using SPSS version 21.0 software (Statistical Package for the Social Sciences, IBM Corporation). \( p \leq 0.05 \) was considered as statistically significant with 95% confidence interval. Chi-square test was applied to obtain association between self perceived halitosis and socioeconomic status, gender.

**RESULTS**

There were total 360 patients taken face to face interview and recorded the responses. 207 males (57.5%) and 153 females (42.5%) were included. Patients from upper lower class were maximum 31.9% (115 out of 360). Only one patient was categorized in lower class (One out of 360) 0.3% followed by upper class patients (52 out of 360) 14.4%. This population varied from age 18 to 73 yrs.

Out of 360 patients, 138 patients (38.3%) gave positive response when asked if they can smell their own breath. Only 19 people (5.3%) people had sought professional treatment for the problem, even when 53 patients(14.7%) had felt restrictions in social interaction due to the halitosis.(Table 1)

When distribution of responses was observed on the basis of gender, out of 207 males, 77 (37.1%) responded positively, while out of 153 females, 61 (39.8%) females responded positively when they were asked if they can smell their own breath which was not statistically significant \( p=0.544 \). Only 6 females (4% ) out of 153 had seek the treatment, and 13 (6.2%) out of 207 males had seek for the treatment with no statistical significance \( p=0.324 \).

When asked about hindrance due to halitosis with social interaction 35 out of 207 males (16.9%) while only 18 out of 153 females (11.7%) admitted about the same which however did not show much of statistically significant difference \( p=0.174 \). (Table 2)

While assessing routine oral hygiene practices, brushing twice daily was seen more in females (73 out of 153) while was seen in only 51 out of 207 males which was statistically significant \( p=0.000 \). Use of mouthwash was considerably less in females (12.4%) as it was almost half in males (6.2%) \( p=0.043 \) which is statistically significant.(Table 2)

In assessed self perception of oral health, bleeding gums were noticed more in females (72 out of 153, 47.0%) than males (73 out of 207, 35.2%) with \( p=0.024 \) which is statistically significant. (Table 2)
When assessed about self perception of halitosis, almost equal percentage of patients from different SES gave positive response which was in range of 34%-41%. However, when asked about if treated halitosis, 9% of upper class (5 out of 52) responded positively, while only 1% (1 out of 97) of upper middle class responded positively.

Lower middle class and upper lower class responses were in the range of 5%-7% with no statistical significance (p=0.751). However, 11% of upper middle class admitted that halitosis affected their social interaction and lower middle class and upper lower class had 17% people responding the same way which showed no statistical significance (p=0.111) (Table 3)

When oral hygiene practices were assessed, brushing twice daily was seen more common in upper and lower middle class which was 40.2% and 35.7% respectively while others were in the range of 28%-30% which was not statistically significant (p=0.671). Similarly, higher positive response was seen in upper and lower middle class when asked about regular use of mouthwash. It was 11.3% and 11.5% respectively, lesser than practice of brushing twice, but higher than other classes which were in the range 5%-7% with p=0.659 with no statistical significance. (Table 3)

When perception of oral hygiene was assessed, maximum response was positive for perception of decay in the teeth. 77% of upper class patients thought they had decayed teeth while lowest were 65% of Upper middle class. For bleeding gums, 45.2% of Lower middle class responded positively while the lowest were from Upper class which was 34.6%. (p=0.320) which was statistically insignificant. (Table 3)

Overall self perception of halitosis, perceived oral hygiene and its practices showed little relation with socioeconomic status whereas significant association was observed between gender and oral hygiene practices and perceived oral hygiene.

**Table 3** Distribution of responses according to the SES

<table>
<thead>
<tr>
<th>Question</th>
<th>Socio-economic status</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you smell your own breath?</td>
<td>UC</td>
<td>UMC</td>
</tr>
<tr>
<td>Yes</td>
<td>19</td>
<td>33</td>
</tr>
<tr>
<td>No</td>
<td>33</td>
<td>64</td>
</tr>
<tr>
<td>Any treatment for the same</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>No</td>
<td>47</td>
<td>96</td>
</tr>
<tr>
<td>Interference with social interaction.</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>No</td>
<td>47</td>
<td>86</td>
</tr>
<tr>
<td>Brushing twice daily</td>
<td>Yes</td>
<td>15</td>
</tr>
<tr>
<td>No</td>
<td>37</td>
<td>58</td>
</tr>
<tr>
<td>Using mouthwash daily</td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>No</td>
<td>49</td>
<td>86</td>
</tr>
<tr>
<td>Do you think you’ve decay in your teeth?</td>
<td>Yes</td>
<td>40</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td>Do you have bleeding gums?</td>
<td>Yes</td>
<td>18</td>
</tr>
<tr>
<td>No</td>
<td>34</td>
<td>61</td>
</tr>
<tr>
<td>Do you feel dryness in your mouth?</td>
<td>Yes</td>
<td>10</td>
</tr>
<tr>
<td>No</td>
<td>42</td>
<td>73</td>
</tr>
<tr>
<td>Using tongue cleaner daily</td>
<td>Yes</td>
<td>12</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>87</td>
</tr>
</tbody>
</table>

**DISCUSSION**

There is very limited data available on self perceived halitosis and it association with socio-economic status in general population in India. It is important as it is a common problem with many personal, professional and social effects. The prevalence if known would be definitely helpful for the professionals to help out patient in self assessment of oral health and other underlying problems also. There has been literature which reveals that around 50% of prevalence is seen in USA, 27.5% in China and 22% in France. It has been estimated that in the developed world perception of halitosis ranges from 8%-50% of people however, even if there are obviously higher and accurate options for dental clinician to diagnose halitosis, the percentage of individuals seeking professional help for halitosis still is to very minimal. Total of 38.3% of patients reported halitosis during this study which is contrast to study findings of Miyazaki et al in Japan which reported about 24% of self reported halitosis while it is similar to the study carried out by SalwaAbdulrahman in Riyadh where it showed about 33% of self reported halitosis in study group and almost equivocal with study done by Almas et al which showed 38% of self perceived halitosis. Gender association with self perceived halitosis which was dominated by females in studies by A Bosy, Al Ansari et al, Almas et al. In present study, similarly slight female domination in reporting self perceived halitosis (p>0.05).

There were only 5.3% (19 out of 360) of study population approached professionals and got treated which was very less than what was found in other studies carried out by Salwa Abdulrahman (25%) Out of which only 6 were females and 13 were males. This Gender predomination in treatment seeking is consistent with study carried out by Fernandez Carpes et al. There was higher perception rate for caries in teeth than bleeding gums or dry mouth in this study. This finding seems concurring with study carried out by B Ashwath which showed similar result.

Self perception of halitosis was observed to be similar amongst all classes (34-41%) with p>0.05 in this study which is contrast with a study carried out by Safalya et al in India, Bertoldi et al and Gundala R et al. There can be a reason found for awareness of halitosis in lower socioeconomic classes is the lack of oral hygiene, dry mouth, tobacco chewing habits etc. As there is higher response by lower class about feeling dry mouth (33%), there is higher chance of noticing one’s halitosis. Also, there is comparatively less oral hygiene practices carried out in the upper lower class compared to other classes, hence it can be observed that there is association in oral health practices and halitosis. This can be supported by few studies which resulted in the same carried out by settineri et al, Al Ansari et al, Lee et al 5,8,16 but is also contrary to finding of Liu et al 2006.

It was seen that same number from upper class 5 out of 52 patients from upper class admitted that the halitosis had interfered in their social interaction and same number of patients had seek the treatment for halitosis. Hence it can be safely stated that there is more awareness and social stigma in upper class regarding halitosis, however the percentage is very
less. While in other classes, 1 out of 11 in upper middle class had undergone treatment while 10 other had encountered restriction in social interaction due to halitosis. Similarly, for lower middle class and upper lower class, 5 out of 17 patients and 8 out of 20 patients respectively seek treatment. This finding points towards the social stigma of halitosis amongst the social strata.

Maintenance of oral hygiene showed clear difference between females and males as 73 out of 153 females reported to be brushing twice daily which was statistically significant \( (p=0.000) \) as well as indicates that females might have better perception of halitosis, awareness about oral health but they have less tendency to seek professional help for the same. Similarly, use of mouthwash was seen more in females than in males in this study. It can also be safely stated that females have better preventive approach than males.

It can also be seen that besides noticing decayed teeth or bleeding gums or experiencing dry mouth, there has been very less tendency of patients visiting dentists and seeking professional help. This shows the apathy of patients towards oral hygiene, inadequacy of dental health knowledge to layman, inapproachability of clinicians etc.

Limitations of study:

The study would have shown better results if it had been longitudinal rather than cross-sectional as it would have led us to definite causal factors and better prospect towards relation between Self perceived halitosis and socio-economic status. Also, since the patients were not examined and only were asked, there is definitely a response bias. Also, since the study asked questions which addressed a social stigma, there are chances of social desirability bias. Hence, there have been alterations in the outcome as the responses of the patient were not very significant in any result.

**CONCLUSION**

The study shows that there may exist a relation between socioeconomic status and self perceived halitosis. There is a need of wider study population to assess the significance of the same. The study presents lack of knowledge about oral health, treatment modalities and attitude of patients towards dental treatments irrespective of the socioeconomic status.

However, halitosis stands to be a major social stigma but the treatment available is still not reached till the lower strata of society and there still persists unawareness about basic oral prophylactic procedure. Hence, there seems to be a need of further study regarding intricate assessment of socioeconomic status, attitude towards dental treatment and availability of the same. It can be used further for fabrication of good, widely available clinical facility for each part of society.

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