



## Original Research Article

# A descriptive cross-sectional study evaluating the knowledge, attitudes, and practices regarding halitosis among ENT specialists in Andhra Pradesh, India

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## Abstract

**Aim and Objective:** The aim of this study was to assess the Knowledge, Attitudes, and Practices of ENT specialists towards oral malodour, with a focus on its connection to ENT conditions.

**Materials and Methods:** A cross-sectional study was conducted between February and June 2018, involving 155 ENT specialists, including academicians, practitioners, and postgraduate students. Data were gathered using a combination of open-ended and structured questionnaires designed to assess their knowledge, attitudes, and practices regarding oral malodour. The validity of the questionnaire was established through expert validation and a pilot study, ensuring its reliability and appropriateness for the target population.

**Results:** The study found that 91.6% of ENT specialists use structured source of information with textbooks and journals being the most common (20.6%), followed by continuing education programs (15.5%). Significant differences were observed in examination and referral practices 84.5% of specialists with over 10 years of experience examined oral malodour, compared to 15.5% with less than 10 years ( $p < 0.001$ ), and all specialists with >10 years referred patients to a dentist, while none with <10 years did ( $p < 0.001$ ). Additionally, 58.6% of specialists with more than 10 years of experience identified intra-oral causes of malodour, compared to 38.5% with fewer years of experience ( $p = 0.35$ ). No significant differences were observed regarding the relationship between oral and nasal or ear pathologies.

**Conclusion:** Despite the study's limitations, the findings suggest that ENT specialists are well-informed about the link between oral health and ENT disorders and show a positive approach towards oral malodour to dental professionals for treatment.

**Keywords:** Halitosis, Oral malodour, Knowledge, Attitude, Practice, Ear, Nose and throat (ENT), Volatile sulphur compounds.

**Received:** 18-03-2025; **Accepted:** 09-04-2025; **Available Online:** 29-04-2025

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## 1. Introduction

The Subgingival periodontal microbiota plays a crucial role in producing various compounds, particularly volatile sulfur compounds (VSCs), which are the main contributors to oral malodour.<sup>1</sup> Among these, hydrogen sulfide (H<sub>2</sub>S), methyl mercaptan (CH<sub>3</sub>SH) and dimethyl sulphide (CH<sub>3</sub>2s) are especially significant due to their strong odour and high toxicity.<sup>2,3</sup> In general, intraoral conditions such as poor dental hygiene, periodontal disease, and tongue coating are considered the most significant causes of oral malodour, accounting for approximately 85% of cases.<sup>4</sup>

Periodontal infections are marked by a significant rise in Gram-negative bacteria that produce volatile sulfur compounds (VSCs), which are key contributors to oral

malodor. Additionally, diamines like putrescine and cadaverine play a crucial role in bad breath.<sup>5,6</sup> As the depth of periodontal pockets increases, oxygen levels decrease, creating an environment with lower pH. This acidic environment activates the decarboxylation of amino acids, leading to the production of these foul-smelling diamines.<sup>2</sup>

Other factors that contributes to oral infections includes, the accumulation of food debris in carious lesions, wide interdental spaces, misaligned teeth, defective restorations, exposed necrotic pulp, prolonged use of acrylic dentures at night and wound infections at extraction sites. Additionally, reduced saliva production or salivary hypofunction can lead to an increase in Gram-negative bacteria, which in turn raises the production of Volatile Sulfur Compounds (VSCs).<sup>7</sup>

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Dentists and periodontists are often the first-line professionals to address this issue and they must be well-versed in identifying the origin, diagnosing, and, most importantly, treating halitosis. Additionally, ENT (Ear, Nose, and Throat) disorders such as tonsillitis, sinusitis and nasal congestion contribute to approximately 10% of oral malodor cases. Gastrointestinal conditions, such as gastroesophageal reflux disease (GERD), gastric carcinoma, and esophageal diverticulum, may contribute to halitosis, accounting for approximately 5% of cases.<sup>8</sup>

Delanghe and colleagues described the establishment of a multidisciplinary malodour clinic, which involves collaboration among oral healthcare professionals, ENT surgeons, and psychologists.<sup>9</sup> This integrated approach appears to be an effective model for the specialized management of oral malodour.

The intersection of periodontists and ENT care is an often overlooked but significant aspect of healthcare. Despite growing evidence of the connection between oral health and ENT diseases, there is limited understanding among ENT specialists about the intra-oral causes of malodour, gum disease, and other dental problems.<sup>10</sup> Periodontal diseases, which are common yet often asymptomatic in their early stages, can also impact the overall health of the upper airway, leading to more severe ENT conditions if left untreated.<sup>11</sup> Given the overlap of these two specialties, ENT specialists' awareness of periodontal conditions and their integration into ENT care could greatly enhance patient outcomes. ENT specialists often focus primarily on managing conditions like sinusitis, tonsillitis, or hearing loss, without fully addressing the potential contributions of oral diseases to these problems.<sup>5,12</sup>

Additionally, there is a growing recognition that oral health is integral to overall systemic health, influencing everything from cardiovascular disease to diabetes.<sup>14</sup> The interconnection between the oral cavity and the ENT region highlights the need for collaboration between ENT specialists and dental professionals to provide comprehensive care to patients.

This study explores the relationship between oral malodour and ENT specialists, focusing on their knowledge, practices, and approach to treating or referring patients with oral issues, we aim to bridge the gap between these two fields and improve the holistic care provided to patients.

## 2. Materials and Methods

### 2.1. Study design

A self-administered, structured questionnaire was used to conduct the study. The study participant's data were collected from Andhra Pradesh ENT Society in association with Indian Medical Association (IMA), Andhra Pradesh, India, between February 2018 and July 2018. The study received approval

from the institutional ethics committee of Narayana Dental College and Hospital (NDC/PG-2018/EC/2018).

### 2.2. Inclusion criteria

ENT professionals working in the private and public healthcare services and willing to give written consent for participation.

### 2.3. Exclusion criteria

Lack of willingness to participate and not want to provide written consent.

### 2.4. Study participants

All ENT specialists in the study participated voluntarily, and verbal informed consent was obtained after a clear explanation of the study's purpose, objectives, and potential impact to ensure participants were fully informed before agreeing to participate. A total of 155 ENT specialists practicing in urban and rural areas, academicians and postgraduate students in the Department of ENT at Andhra Pradesh were included in the study.

### 2.5. Questionnaire development and distribution

The questionnaire used in this study was developed based on the framework established by Bin Mubayrik A, et al.,<sup>14</sup> ensuring its relevance and alignment with current practices in assessing knowledge, attitudes, and practices regarding halitosis among ENT specialists. The questionnaire consisted of two sections containing inquiries related to demographic information, as well as knowledge, attitudes, and practices. The Section-A comprising of 5 questions, aimed to evaluate demographic information of the respondents-age, gender, qualification, years of professional experience, and type of practitioner. Section- B comprised of 13 statements focussed on knowledge, attitude and practice-based questions regarding diseases of periodontium and the relationship between ear nose and throat diseases.

Participants in the study were selected through a random sampling strategy. To ensure accessibility, the principal investigator and co-investigators distributed the questionnaire to participants via Google Forms. To ensure clarity and relevance, the questionnaire was first piloted with a sample of 15 participants, content validity was assessed using content validity index with Davis criteria<sup>15</sup> and responses recorded were assessed by using item and scale content validity index score was 1.0 and 0.9 and scale content validity score.<sup>16</sup> The reliability of the questionnaire was evaluated using Cronbach's alpha, which resulted a value of 0.9. Whose feedback was used to refine the questions. This pre-testing phase helped to eliminate ambiguities and improve the overall comprehensibility and easy understanding.

## 2.6. Data analysis

The data collected were analysed using descriptive statistics, frequencies and percentages, were used to summarize socio-demographic characteristics, perceptions of oral malodour, and practices among ENT specialists. Fishers exact test were employed to examine associations between the variables.

**Table 1.** The table provides details such as age, gender, years of experience, and practice settings (public, private, postgraduate, or teaching institutions). These characteristics give insight into the professional backgrounds of the participants and help contextualize their responses.

All 100% ENT specialists with over 1-10 years of experience believed there is a connection between oral and throat pathologies. However, among specialists with less than 10 years of experience, 84.5% agreed, while 15.5% disagreed. The difference was statistically significant ( $p < 0.001$ ).

Both groups 84.5% for those with less than 10 years and 81.7% for those with more than 10 years believed there is a link between oral and nasal pathologies. However, no difference was observed between the two groups ( $p = 0.488$ ). Similar to the nasal pathologies, most specialists 84.5% with less than 10 years and 81.7% with over 10 years agreed on the link between oral and ear pathologies and the observed difference was not significant ( $p = 0.638$ ).

Most of the specialists with more than 10 years of experience 58.6% were aware of intra-oral causes of oral malodour, compared to 38.5% of those with less than 10 years of experience. However, this difference was not statistically significant ( $p = 0.35$ ).

A significant difference was observed in the likelihood of examining oral malodour 84.5% of ENT specialists with over 10 years of experience reported examining halitosis, compared to only 15.5% of those with fewer than 10 years of

SPSS software, version 21.0, was used to perform all statistical analyses.

## 3. Results

A total of 155 ENT specialists participated in the survey, and their socio-demographic characteristics are summarized in

experience, with this difference being statistically significant ( $p < 0.001$ ). Additionally, a majority of specialists with more than 10 years of experience 84.5% inquire about patient's salivary flow, in contrast to 15.5% of those with 1- 10 years of experience. The p-value of less than 0.001 indicates that this difference is statistically significant.

The response was fairly consistent across both groups, with 62% of specialists with over 10 years of experience examining tongue coatings, compared to 53.6% of those with fewer than 10 years. However this difference was not statistically significant ( $p = 0.29$ ).

A significant difference was observed in referral practices. None of the specialists with less than 10 years of experience referred patients to a dentist for halitosis, whereas all specialists with over 10 years of experience did so. This difference in referral practices between these two groups was statistically significant ( $p < 0.001$ ).

These findings suggest that many ENT specialists acknowledge the connection between oral and ENT conditions, along with the understanding and awareness of specific oral health factors like periodontitis, dental caries, and tongue coatings may influence throat infections. The distribution of knowledge and attitudes among participants regarding the relationships between various oral and ENT conditions is summarized in **Table 2**.

**Table 3** presents the sources of information 91.6% of specialists actively seek information from structured source, with textbooks and journals being the most common.

**Table 1:** Socio-demographic characteristics

Demographics	N (%)	
Type of practice	Private	84 (54.2%)
	Public	30 (19.4%)
	Working in a teaching institute	41 (26.5%)
Area	Rural	75 (48.4%)
	Urban	41 (26.5%)
	Teaching institute	39 (25.2%)
Years of practice	≤ 10 years	84 (54.2%)
	>10 years	71 (45.8%)

**Table 2:** Comparison of knowledge, attitudes, and practices among ENT specialists based on years of practice

Questions	Options	No	Yes	P value
Do you think there is a link between oral and throat pathologies?	<10 years	71(84.5)	13(15.5)	<0.001*
	>10 years	71(100)	0	
Do you think there is a link between oral and nasal pathologies	<10 years	71(84.5)	13(15.5)	0.488(NS)
	>10 years	57(80.3)	14(19.7)	
Do you think there is a link between oral and ear pathologies	<10 years	71(84.5)	13(15.5)	0.638(NS)
	>10 years	58(81.7)	13(18.3)	
Are you aware about intra-oral causes of oral-malodour	<10 years	26(31)	58(69)	0.35(NS)
	>10 years	27(38)	44(62)	
Do you examine/enquire about oral-malodour in patients	<10 years	13(15)	71(84.5)	0.488(NS)
	>10 years	14(19.7)	57(80.3)	
Do you enquire about patients salivary flow	<10 years	13(15.5)	71(84.5)	0.001*
	>10 years	27(38)	44(62)	
Do you examine for tongue coatings	<10 years	45(53.6)	39(46.4)	0.29(NS)
	>10 years	44(62)	27(38)	
What do you do if oral-malodour is not an ENT cause:	<10 years	13(15.5)	71(84.5)	0.488(NS)
	>10 years	14(19.7)	57(80.3)	
Do you think gum disease /periodontal disease is a concern for ENT prolems	<10 years	71(84.5)	13(15.5)	0.001*
	>10 years	44(62)	27(38)	
Do you refer your patients to a dentist regarding oral-malodour	<10 years	0(0)	84(100)	<0.001*
	>10 years	14(19.7)	57(80.3)	
Do you enquire about your patients dental treatments in their next visit	<10 years	13(15.5)	71(84.5)	<0.001*
	>10 years	0(0)	71(100)	

\*Statistically significant (p<0.05); NS: not significant; fishers exact test was used.

**Table 3:** Sources of information for ENT specialists

Source of information	CDE	Internet	Text book	Training in medical school	P value
<10 years	24(28.5)	41(48.8)	19(22.6)	0(0)	<0.001*
>10 years	13(18.3)	32(45.1)	13(18.3)	0(0)	

\*Statistically significant (p<0.05); fishers exact test was used.

CDE: Continuing Dental Education

**4. Discussion**

The results of this study highlight several key insights into the practices and information sources of ENT specialists. A significant number of specialists with over 10 years of experience (100%) recognized the connection between oral and throat pathologies, which contrasts with the 15.5% disagreement among those with less than 10 years of experience. This discrepancy suggests that more experienced specialists may have a greater awareness of the interdisciplinary relationship between oral health and ENT conditions, possibly due to more extensive clinical exposure over time.<sup>17</sup>

Interestingly, both groups regardless of their years of experience, showed strong agreement on the connection between oral and nasal pathologies (84.5% for <10 years, 81.7% for >10 years), indicating general consensus within the field regarding this connection. Similarly, the majority of specialists, regardless of experience, agreed on the link between oral and ear pathologies, though the difference was not statistically significant. This indicates that while there may be some differences in perception based on experience, ENT specialists agree on the potential interrelationship between oral health and other ENT conditions.<sup>18,19</sup>

Specialists with over 10 years of experience were more likely to identify intra-oral causes of oral malodour (58.6%)

compared to their less experienced (38.5%). This indicates a possible gap in awareness, suggesting the need for targeted educational initiatives to enhance the recognition of the link between oral health and ENT conditions, especially among those with fewer years of practice.<sup>20,21</sup>

A significant finding from the study is that ENT specialists with over 10 years of experience were considerably more likely to assess oral malodour (84.5%) compared to those with fewer than 10 years of experience (15.5%). This emphasizes the importance of incorporating oral health evaluations into ENT practice. Additionally, the difference in assessing salivary flow further underscores that more experienced specialists tend to conduct more thorough oral health assessments, highlighting the value of experience in providing comprehensive patient care.<sup>14,22</sup>

In the present study, referral practices showed a stark contrast between the two groups. All specialists with over 10 years of experience referred patients to a dentist for oral malodour, whereas none of the specialists with less than 10 years did. This suggests that professionals are more likely to adopt a multidisciplinary approach for patients care, recognizing the importance of involving specialists from other fields when addressing complex conditions like halitosis.<sup>23,24</sup>

The data also revealed that a significant majority, 91.6% of ENT specialists rely on structured sources of information, with textbooks and journals being the most common (20.6%), followed by continuing educational programs (15.5%). This suggests that ENT specialists are staying updated on the current practices and advancements in their field. Although a gap in self-directed learning and internet resources may present opportunities for further professional development.<sup>25</sup>

## 5. Conclusions

In conclusion, the findings highlights experience plays a crucial role in the awareness and practices of ENT specialists, particularly in integrating oral health into ENT care. Targeted educational initiatives for less experienced specialists, along with continued emphasis on interdisciplinary collaboration, could help bridge these gaps and improve overall patient support.

This study has several limitations. The sample of 155 ENT specialists from Andhra Pradesh may not represent those from other regions, limiting the generalizability of the findings. The cross-sectional design captures data at single point in time, preventing establishment of causal relationship. Furthermore, relying on self-reported practices may not fully represent actual clinical behaviour, and objective assessments would provide more precise data. Finally, since the study was conducted in one region, the results may not account for variations in practices across different areas or healthcare settings.

## 6. Source of Funding

None.

## 7. Conflict of Interest

There are no conflicts of interest.

## 8. Acknowledgements

I would like to express my sincere gratitude to the participants of this study for their valuable co-operation and contribution.

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**Cite this article:** Vanditha D. A descriptive cross-sectional study evaluating the knowledge, attitudes, and practices regarding halitosis among ENT specialists in Andhra Pradesh, India. *Int J Oral Health Dent.* 2025;11(1):51–56.