Int J Biol Med Res. 2025; 16(3): 8125-8128

Contents lists available at BioMedSciDirect Publications

International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com

Original Article

Oral Cancer Incidence and Treatment Challenges in the North-Eastern States of India

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ARTICLEINFO

Keywords:
Eastern India,
oral malignancies,
tobacco, healthcare,
public health,
rural healthcare deficiency,
cancer precursors

ABSTRACT

Background: Oral cancer is among the most common causes of cancer mortality in India, particularly in the Northeastern states where there is lower incidence and poor outcomes due to sociocultural practices like tobacco and betel nut chewing, limited healthcare, and late healthcare seeking. This study sought to assess the incidence of oral cancer, public awareness, and barriers to its treatment in Assam, Nagaland, Manipur, and Meghalaya. Methods: A cross-sectional mixed-methods study was conducted with 300 oral cancer patients and a 300-patient sample from the general population. Multiple sampling was used to select participants, and data was collected through questionnaires, semi-structured interviews, and focus group discussions. Quantitative data were analyzed using descriptive statistics, chi-square tests, and logistic regression. The qualitative data were systematically coded to capture the patient journey and other structural barriers. Results: Oral cancer patients had high tobacco use, with 80% consuming smokeless tobacco and 66.7% smoking. Half had used tobacco for more than two decades. Patients had better awareness of the symptoms compared to the general population, but there was low awareness of the need for early screening in both groups. Notable barriers to care were lack of awareness (50–60%), limited funds (33.3-50%), cultural backlash (16.7-30%), and geographic remoteness (26.7-33.3%). Conclusion: The high-risk behaviors and infrastructural challenges compound for the Eastern states, resulting in an increased incidence of oral cancer. Public health initiatives should focus on the most effective measure, which is reducing tobacco use along with early diagnosis, better access to healthcare services, and aiding areas that are devoid of access, such as the countryside and underpopulated regions.

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Introduction

As noted by [1], oral cancer is responsible for a large share of cancer-related mortality in India, which has one of the highest incidences of oral cancer in the world. Factors contributing to the high incidence of oral cancers include heavy use of tobacco, betel nut, and other forms of smokeless tobacco in cultural practices of Northeastern states like Assam, Nagaland, Manipur, and Meghalaya [2]. The combination of these habits with inadequate healthcare infrastructure and late-stage diagnosis results in a high incidence of oral cancer as well as significant challenges in treatment effectiveness.

[3] identifies efforts in raising awareness and improving screening in some regions of the country; however, the Northeastern states continue to struggle with limited accessible and qualified healthcare, deficient socio-economic resources, and poorly developed healthcare systems. Combined with a lack of resistant survival strategies, the advanced-stage diagnosis common in the region leads to markedly decreased survival rates. Moreover, the region's unique practices with tobacco and betel nut use complicate the process of reducing oral cancer risk factors.

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The main focus of this research is to investigate the prevalence of oral cancer, the challenges associated with its treatment, and what exists in the North-Eastern regions of India. The study will evaluate the consumption of tobacco and betel nuts, knowledge of oral cancer symptoms, hindrances to early diagnosis and treatment, and the effectiveness of the healthcare system. The study's findings will assist in developing strategic public health initiatives and policies that address the oral cancer problem in these regions.

Methodology

Study Design

This study used a cross-sectional design to evaluate the number of cases of oral cancer and treatment difficulties in the North-Eastern states of India. The design reflected the overall picture of awareness, treatment, and challenges related to oral cancer in the area. Quantitative and qualitative research data were collected to assess the level of tobacco and betel nut consumption, knowledge of oral cancer, screening, and treatment level availability, and socio-economic factors hindering access to care.

Study Population

These two groups formed the basis of the study population.

1.Oral Cancer Patients (Cases): For this category, 300 oral cancer patients were selected (150 males and 150 females) from various hospitals and cancer treatment centers in the North Eastern states of Assam, Nagaland, Manipur, and Meghalaya. These patients were sampled purposely from urban and rural healthcare facilities that had been diagnosed with oral cancer within the last three years. These participants were recruited from urban and rural healthcare facilities.

2.General Public (Controls): With the same distribution as the states, 300 persons were drawn from the general population as controls, comprising 150 males and 150 females. These subjects had no prior history of oral cancer or other cancers associated with tobacco usage. A stratified random sampling method was applied to form the control group so that there was adequate representation from different age cohorts, socio-economic strata, and geographical locations (urban and rural areas).

Sampling Method

For the study, oral cancer patients from hospitals, clinics, and cancer centers in the selected North-Eastern states were purposefully sampled. This approach was selected to guarantee that study participants had a confirmed oral cancer diagnosis, which aligned with the research aims. The controls were selected from various demographic categories (age, gender, and location) using stratified random sampling. This ensured that the sample of the general population was balanced about their socio-economic status and accessibility to healthcare services.

Methods of Gathering Information

Information was collected through structured questionnaires, interviews, and medical record reviews. The combination of qualitative and quantitative methods provided rich data on the patient's and provider's perspectives and a broader scope of data regarding the numerous documented experiences.

1.Structured Questionnaires

General Public (Controls): A structured questionnaire was designed to evaluate knowledge regarding symptoms of oral cancer, tobacco, and betel nut consumption, awareness of prevention and treatment, and socioeconomic factors like education and income level.

Oral Cancer Patients (Cases): A separate questionnaire obtained data regarding diagnosis (stage, type of cancer), treatment history, tobacco and betel nut consumption, and socio-economic background for case participants.

2.Semi-structured Interviews:

Oral Cancer Patients (Cases): A sample of 30 oral cancer patients (15 males and 15 females) were selected to participate in semi-structured interviews to explore their experiences related to diagnosis and treatment, including caregiver seeking delays, treatment accessibility, and any challenges encountered throughout the treatment.

Healthcare Providers: Twenty healthcare providers (oncologists, dentists, and community health workers) from the states of interest were interviewed semi-structured to discuss the existing barriers to timely and accurate diagnosis and treatment of oral cancer and the impact of public health education and campaigns.

3.Focus Group Discussions (FGDs):

Two FGDs were held with community health practitioners, local stakeholders, and participants involved in tobacco control. These discussions addressed community-level issues pertaining to tobacco and betel nut use, oral cancer stigma, and the effectiveness of the current prevention and awareness campaign.

Data Analysis

For data analysis, SPSS Statistics (Version 26) was used for quantitative data, and NVivo was used for qualitative data. The data I collected underwent the following analysis:

1.Descriptive Statistics: To characterize the demographics of tobacco and betel nut usage amongst the general population and oral cancer patients.

2.Chi-Square Test: This test was used to investigate relationships between tobacco and betel nut consumption, socio-demographic variables (age, gender, education), and oral cancer occurrence. It was also used to check for significant differences between groups (cases and controls) concerning risk factors.

3.Thematic Analysis: The qualitative data obtained from interviews and FGDs were thematically analyzed to highlight key themes regarding the obstacles to early diagnosis and treatment, cultural practices surrounding tobacco use, and the difficulties experienced by healthcare providers in managing oral cancer in rural and urban settings.

4.Multivariate Logistic Regression: In evaluating the probability of receiving an oral cancer diagnosis, especially while considering various socio-demographic and tobacco-related factors, this analysis adjusted for other possible age, gender, and smoking history confounders.

Ethical Considerations

The study was conducted using human subjects' principles [4]. All participants provided consent before participating in the research and received a complete briefing of the research aims, risks, and advantages. The study maintained the confidentiality of participants' data and ensured personal identifiers were removed before analysis.

Results

This section presents the findings from the study on oral cancer incidence and treatment challenges in the North-Eastern states of India, including Assam, Nagaland, Manipur, and Meghalaya. Data were collected from 300 oral cancer patients and 300 individuals from the general public. The results are organized into four main areas: demographic characteristics, tobacco and betel nut consumption patterns, knowledge of oral cancer symptoms and prevention, and treatment challenges faced by oral cancer patients in these regions.

Demographic Characteristics of Participants

Table 1: Demographic Characteristics of Participants

Variable	Oral Cancer Patients (n=300)	General Public (n=300)
Age Group		
18-30	20 (6.7%)	45 (15%)
31-45	80 (26.7%)	100 (33.3%)
46-60	120 (40%)	110 (36.7%)
60+	80 (26.7%)	45 (15%)
Gender		
Male	180 (60%)	150 (50%)
Female	120 (40%)	150 (50%)
Education Level		
Primary or Below	180 (60%)	140 (46.7%)
Secondary or Higher	120 (40%)	160 (53.3%)
Occupation		
Laborer/Farmer	150 (50%)	90 (30%)
White-Collar Worker	50 (16.7%)	100 (33.3%)
Self-Employed	100 (33.3%)	110 (36.7%)

The general public and oral cancer patients had a similar gender distribution, with 60% of oral cancer patients being male and 50% of the general public being male. The majority of oral cancer patients were aged

46-60 years (40%), and 60% of them had a low education level (primary or below). Most oral cancer patients were laborers or farmers (50%), while 33.3% were self-employed. The control group had a higher proportion of individuals with secondary or higher education (53.3%).

Tobacco and Betel Nut Consumption Patterns

Table 2: Tobacco and Betel Nut Consumption Patterns

Tobacco Use	Oral Cancer Patients (n=300)	General Public (n=300)
Type of Tobacco Used		
Smokeless Tobacco (Gutka, Pan Masala)	240 (80%)	160 (53.3%)
Smoking (Cigarettes/ Beedis)	200 (66.7%)	130 (43.3%)
Both Smokeless & Smoking	150 (50%)	90 (30%)
Duration of Tobacco Use		
<10 Years	50 (16.7%)	120 (40%)
10-20 Years	100 (33.3%)	100 (33.3%)
20+ Years	150 (50%)	80 (26.7%)
Age of Initiation		
<20 Years	120 (40%)	90 (30%)
20-30 Years	120 (40%)	120 (40%)
30+ Years	60 (20%)	90 (30%)

The vast majority of oral cancer patients (80%) used smokeless tobacco, and 66.7% smoked. Approximately 50% of patients used both smokeless tobacco and smoked. The duration of tobacco use was significantly high, with 50% of oral cancer patients having used tobacco for more than 20 years. Among the general public, 53.3% used smokeless tobacco, 43.3% smoked, and 30% used both forms of tobacco. A notable proportion of participants in both groups began using tobacco before the age of 20 (40% of oral cancer patients and 30% of the general public).

Knowledge of Oral Cancer Symptoms and Prevention

Table 3: Knowledge of Oral Cancer Symptoms and Prevention

Awareness/Prevention	Oral Cancer Patients (n=300)	General Public (n=300)
Awareness of Symptoms		
Persistent Cough	250 (83.3%)	150 (50%)
Painful Mouth Sores	230 (76.7%)	180 (60%)
Difficulty Swallowing	200 (66.7%)	140 (46.7%)
Bleeding or Red/White Patches	180 (60%)	100 (33.3%)
Awareness of Prevention		
Tobacco Use Cessation	120 (40%)	80 (26.7%)
Regular Dental Checkups	180 (60%)	120 (40%)
Early Screening for Oral Cancer	80 (26.7%)	50 (16.7%)

Oral cancer patients showed higher awareness of symptoms like persistent cough (83.3%) and painful mouth sores (76.7%) compared to the general public (50% and 60%, respectively). However, only 26.7% of oral cancer patients were aware of early screening for oral cancer, and 40% were aware of tobacco cessation as a preventive measure. The general public had lower awareness overall, particularly regarding early screening (16.7%).

Barriers to Oral Cancer Prevention and Care

Table 4: Barriers to Oral Cancer Prevention and Care

Barrier	Oral Cancer Patients (n=300)	General Public (n=300)
Lack of Awareness	150 (50%)	180 (60%)
Financial Constraints	100 (33.3%)	150 (50%)
Cultural Stigma	50 (16.7%)	90 (30%)
Distance to Healthcare Facilities	80 (26.7%)	100 (33.3%)

Both groups identified a lack of awareness (50% of patients and 60% of the general public) and financial constraints (33.3% of patients and 50% of the general public) as significant barriers to seeking oral cancer care. While less prevalent among patients (16.7%), cultural stigma was a barrier for 30% of the general public. Distance to healthcare facilities was another obstacle, particularly for rural residents, with 26.7% of patients and 33.3% of the general public citing it as a challenge.

Discussion

Tobacco and Betel Nut Consumption: Major Risk Factors

The results of this study indicate that the consumption of tobacco and betel nuts is markedly higher among oral cancer patients (80% reported using smokeless tobacco and 66.7% reported smoking) compared to the general population (with 53.3% using smokeless tobacco and 43.3% smoking). These results corroborate the literature that places tobacco use as the foremost risk factor for oral cancer, especially in India, where the consumption of smokeless tobacco (gutka and pan masala) is rampant [1]. The prevalence of dual tobacco use, as demonstrated by 50% of the oral cancer patients in this study, is extremely concerning because the combined use of smokeless tobacco and smoking is associated with an exponential increase in the risk for oral cancer compared to using either form of tobacco alone [2].

The finding is somewhat concerning that 50% of patients in the oral cancer group reported using tobacco for more than 20 years. This suggests an alarming prevalence of long-term tobacco use (more than 20 years) in this subgroup. An increased risk of oral cancer is known to be linked with long-term tobacco usage due to its carcinogenic effects [3].

It seems that public health initiatives focusing on decreasing the consumption of tobacco and betel nut, especially in the smokeless form, could be instrumental in lowering the prevalence of oral cancer in this area. The initiatives should also include more rigorous policies concerning the sponsorship and sale of tobacco products and particular cessation strategies aimed at long-term users.

Awareness of Symptoms and Prevention

This study discovered that oral cancer patients had greater awareness of specific symptoms, such as a persistent cough (83.3%) and mouth sores (76.7%), in comparison to the general populace (50% and 60%, respectively). Nonetheless, both groups demonstrated inadequate knowledge regarding the value of early detection and preventative strategies.

For instance, only 26.7% of oral cancer patients and 16.7% of the general population recognized the importance of early screening in preventing oral cancer. These results corroborate the findings of [5], which pointed out that in India, the overall awareness of oral cancer symptoms and screening techniques is alarmingly low, which leads to diagnoses at advanced stages and unfavorable prognoses.

The gap in insight concerning patients who have oral cancer as compared to the general population is alarming because, as with other forms of cancer, early identification significantly increases survival rates for patients who have oral cancer. Although oral cancer has a relatively high survival rate when it's diagnosed in its early stages, in India, the majority of the cases are diagnosed in the late stages [2]. There is an urgent need for health campaigns to raise and promote the need for active and early screening of oral cancer and regular dental examinations. Schools, offices, and community halls can be powerful tools for disseminating information on the primary prevention and early recognition of oral cancer for various audiences.

Barriers to Seeking Oral Cancer Care

This study revealed multiple gaps in oral cancer care in the Northeastern states, such as insufficient information, cultural stigma, financial difficulties, and geographic distance to healthcare services. Regarding financial hardship, 33.3% of oral cancer patients and 50% of the general population noted it as a critical barrier to treatment. [1] study supports this data as it highlighted the overwhelming treatment costs and lack of accessible healthcare as substantial barriers to oral cancer treatment in India, especially in rural settings where diagnostic tests, treatment, and subsequent care are often out of patients' financial reach.

Also, the cultural stigma associated, especially with tobacco and oral cancer, was another barrier noted by oral cancer patients (16.7%) and by the public(30%). [5] documented that the social stigma related to tobacco diseases in rural India is a barrier to prompt healthcare-seeking behavior and candid discussion about tobacco use. Most people living in communities that consider oral cancer a sensitive issue tend to postpone seeking medical help until the ailment is at an advanced stage.

Lack of access to healthcare facilities is often accompanied by poor transport infrastructure, as in rural settings where diagnostic and treatment centers are inaccessible. The North Eastern region is also lacking in specialized healthcare services, like cancer treatment centers, retarding potentially life-saving early diagnosis and intervention. According to [6], Indian rural regions suffer from severely lacking accessible cancer care owing to inadequate vertical and horizontal health infrastructure.

Such barriers will only be resolved by public health initiatives that raise alertness levels related to oral cancer while still working on the availability of care. Furthermore, the use of mobile cancer screening units and telemedicine may assist lower-regarded demographic groups, enabling better service provision. Moreover, the subsidization of treatment or screening for cancer should be offered to poor individuals and families to relieve them financially.

Conclusion

The outcome of this investigation stresses the importance of integrated public health initiatives aimed at the mitigation of oral cancer in the North Eastern states of India. The region is burdened with oral cancer owing to wide-ranging tobacco and betel nut usage, compounded by low levels of care awareness and high levels of care restrictions. In order to reduce this burden, public health efforts need to focus on overcoming cultural barriers to care, facilitating early detection, augmenting access to care, and advocating for comprehensive tobacco cessation. With these interventions, the region will have a reduced incidence of oral cancer and improved survival rates.

Funding: This research received no external funding.

Acknowledgments: None.

Conflicts of Interest: The authors declare no conflict of interest.

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