Int J Biol Med Res. 2025; 16(4): 8270-8273

Contents lists available at BioMedSciDirect Publications

International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com

Original Article

Oral Cancer Awareness and Prevention in Rural Southern India: A Focus on Tamil Nadu

[1]Atul Khajuria, [2]Aric Kwasi Elliason, [3]Atephen Monday, [4]J. Samuel Kamanda

[1]Director, Faculty of Allied Health Sciences, Desh Bhagat University, India
[2]Teaching Assistant, Faculty of Allied Health Sciences, Desh Bhagat University, India
[3]Teaching Assistant, Faculty of Allied Health Sciences, Desh Bhagat University, India
[4]Teahing Assistant, Faculty of Allied Health Sciences, Desh Bhagat University, India.

ARTICLEINFO

Keywords:
Oral cancer,
early detection,
tobacco use,
public health intervention,
screening barriers,
cancer awareness

ABSTRACT

Background: Tamil Nadu bears a disproportionate burden of oral cancer in India, mainly due to high rates of tobacco and betel nut consumption, limited awareness, and constrained access to screening and treatment. This study assesses the effectiveness of public health interventions targeting oral cancer prevention, awareness, behavioral change, and screening participation in high-risk populations across the state. Methods: A quasi-experimental design was employed with pre- and post-intervention assessments among 800 community participants and 50 healthcare providers. Stratified random and purposive sampling methods were used. Data were collected through structured questionnaires, semi-structured interviews, and focus group discussions. Quantitative data were analyzed using SPSS (version 26) for descriptive statistics, chi-square tests, and paired t-tests, while qualitative data underwent thematic analysis via NVivo. Results: Post-intervention screening participation increased significantly from 12.5% to 37.5% ($p < 0.001$), and provider recommendations rose from 18.8% to 43.8%. Despite improvements, public awareness remained low—only 18.8% of participants recognized red or white patches as warning signs, and just 12.5% were aware of early screening options. Financial barriers (50%), limited knowledge (37.5%), and cultural stigma (25%) were reported as significant obstacles. Healthcare providers demonstrated greater knowledge and proactive screening behavior than the general public. Conclusion: Public health interventions improved provider engagement and community participation in screening programs. However, persistent gaps in awareness, access, and socio-cultural barriers hinder early detection efforts. Ongoing community education, subsidized screening initiatives, and outreach in underserved areas are critical to reducing oral cancer incidence in Tamil Nadu.

© Copyright 2025 BioMedSciDirect Publications IJBMR -ISSN: 0976:6685.

Introduction

[1] report that oral cancer accounts for a significant public health challenge in India, where more than a third of the global incidence is reported. The prevalence of tobacco use and other forms of oral cancers, particularly chewing tobacco and betel quid, has contributed to this problem in Southern India. Renewed concern has recently been noted regarding rising cases of oral cancer in Tamil Nadu, which is largely attributable to rampant consumption of smokeless tobacco and betel nut [2]. Notably, despite the overwhelming burden of oral cancer in the state, little is known about its prevention, early diagnosis, and treatment services, especially in rural settings.

Corresponding author:

Prof (Dr.) Atul Khajuria

Director, Faculty of Allied Health Sciences,
Desh Bhagat University, India

Email id -atulkhajuria83@gmail.com
MOB-7780865638

© Copyright 2025 BioMedSciDirect Publications IJBMR -ISSN: 0976:6685.

Lack of health care facilities and infrastructural support, coupled with inadequate literacy and public awareness, pose significant challenges in accessing oral cancer care for the rural population of Tamil Nadu. The absence of early detection programs and low awareness regarding preventive measures for oral cancer contributes to high mortality rates in these regions. Though public health campaigns focusing on oral cancer prevention have been sparse, programmatic research aimed at improving awareness, promoting early screening, and reducing tobacco use is urgently necessary.

This research intends to appraise the knowledge regarding oral cancer prevention and care in rural Tamil Nadu, assess the knowledge of its early detection, and identify the obstacles to seeking care for oral cancer in the established regions. This research will be useful in planning public health interventions to control oral cancer in relation to rural population outcomes and the burden of disease.

Methodology

Study Design

Understanding oral cancer prevention in rural Tamil Nadu was assessed using a cross-sectional survey design. This method created an opportunity for a comprehensive evaluation of the knowledge and practices regarding the disease's prevention while simultaneously providing insights into the existing gaps for early intervention. The study used qualitative aspects to better understand the underlying attitude factors towards oral cancer care and prevention, particularly in rural areas.

Study Population

The study sample was made up of two participant groups:

1. General Public (Rural Participants): The sample included 600 participants (300 males and 300 females) aged 18 years and older from the rural regions of Tamil Nadu. This included people of all education and socio-economic levels. Participants were selected by means of cluster sampling, where each cluster was a distinct rural block within Tamil Nadu (Coimbatore, Thanjavur, and Tiruvannamalai). This sampling strategy provided coverage in terms of geographic diversity as well as socio-economic level.

2.Healthcare Providers: This study sampled 50 healthcare providers consisting of physicians, nurses, and community health workers from rural care centers, which include primary health centers (PHCs), district hospitals, and NGO clinics. These healthcare providers were sampled purposively due to their direct engagement with cancer services education or community education programs.

Sampling Method

Participants from the rural population were selected using a cluster sampling approach. This involved selecting rural blocks in Tamil Nadu and approaching the people in these blocks for participation. This enabled obtaining a sample from rural Tamil Nadu, encompassing peri-urban and remote locations. Six hundred individuals (300 male, 300 female) were surveyed.

Healthcare providers were sampled through purposive sampling from rural health centers providing services to the population within the identified clusters. They were selected for their specialization in oral health, cancer control, and community health education.

Data Collection Methods

Data was collected using structured questionnaires, semi-structured interviews, and focus group discussions (FGDs) to capture different perspectives. Both qualitative and quantitative methods were used to ensure comprehensive capturing of oral cancer awareness and prevention.

1. Structured Questionnaires:

o General Public: A questionnaire was designed to evaluate the understanding of the signs and symptoms of oral cancer, patterns of tobacco usage, knowledge of preventive measures (like quitting tobacco), and the general attitudes toward oral cancer treatment seeking. The questionnaire contained both categorical questions and questions designed to quantify awareness and health behavior using the Likert scale and open-ended responses.

Healthcare Providers

A different questionnaire was developed for healthcare providers, which sought information on their knowledge regarding oral cancer prevention, screened them on their habits about recommending screening, and asked them about their role as educators in public health regarding oral cancer. Other questions included the obstacles these providers encounter in advocating for oral cancer prevention in rural areas.

2. Semi-structured Interviews

General Public

Semi-structured interviews were conducted with a sample of thirty participants (15 males and 15 females) to explore their attitudes toward oral cancer and tobacco use and barriers to seeking care. These interviews also examined the influences of socio-cultural and economic factors on health-seeking behavior related to oral cancer.

Healthcare Providers

These were interviews conducted with ten healthcare providers at focus with the intention of gathering qualitative insight on their experiences in the rural healthcare context and their efforts to foster oral cancer awareness at the community level.

3.Focus Group Discussions (FGDs):

Two FGDs were conducted with community health workers and local leaders to plan strategies for raising awareness for oral cancer and prevention in rural Tamil Nadu. The discussions emphasized community-level action, the impact of existing health campaigns, and ways to broaden the outreach.

Data Analysis

The gathered data was analyzed based on their natures, using SPSS Statistics (Version 26) for quantitative data and NVivo software for qualitative data. The following analyses were conducted:

1.Descriptive Statistics: Summarize the demographics of the general public and the healthcare providers alongside their oral cancer prevention awareness and practice.

2.Chi-Square Test

This test was used to examine the variation in different demographic group awareness levels and determine the relationship between socio-demographic characteristics (like age, gender, and education) and knowledge about the symptoms, prevention, and treatment of oral cancer.

3.Thematic Analysis

Thematic analysis was conducted to explore the qualitative interviews and FGDs for the most predominant themes about the barriers of oral cancer preventive measures within the community knowledge gaps and those that can be proposed to improve public health campaigns. This analysis also examines the barriers healthcare providers encounter in attempting to raise awareness for oral cancer in rural regions.

4.Logistic Regression

Evaluate predictors relating to oral cancer awareness and preventive actions, like smoking cessation or practicing early detection measures. This analysis adjusted for socio-demographics and healthcare access.

Ethical Considerations

This study was conducted in accordance with the ethical standards set out for studies involving human subjects [3].All participants provided informed consent, meaning they were fully aware of the study's purpose and their right to withdraw at any time without consequence. Participants' data was kept confidential by masking specific information, and for the purposes of this study, it will only be utilized for research purposes.

Results

Demographic Characteristics of Participants

Table 1: Demographic Characteristics of Participants

Variable	General Public (n=600)	Healthcare Providers (n=50)
Age Group		
18-30	100 (16.7%)	0 (0%)
31-45	250 (41.7%)	20 (40%)
46-60	200 (33.3%)	25 (50%)
60+	50 (8.3%)	5 (10%)
Gender		
Male	300 (50%)	35 (70%)
Female	300 (50%)	15 (30%)
Education Level		
Primary or Below	250 (41.7%)	0 (0%)
Secondary or Higher	350 (58.3%)	50 (100%)
Occupation		
Laborer/Farmer	220 (36.7%)	10 (20%)
White-Collar Worker	130 (21.7%)	25 (50%)
Self-Employed	250 (41.7%)	15 (30%)

Both male and female individuals were equally represented in the general public sample (i.e., 50% of each gender), and the largest age group among participants was 31-45 years old (41.7%). Most participants had achieved secondary education or higher (58.3%), and a considerable number were classified as either laborers or farmers (36.7%). The remaining healthcare providers were male (70%) and had at least secondary education (100%). Their vocational qualifications were varied: half were employed in blue-collar occupations (50%).

Tobacco Consumption Patterns

Table 2: Tobacco Consumption Patterns in Participants

Tobacco Use	General Public (n=600)	Healthcare Providers (n=50)
Type of Tobacco		
Smokeless Tobacco (Gutka, Pan Masala)	380 (63.3%)	5 (10%)
Smoking (Cigarettes/Beedis)	320 (53.3%)	10 (20%)
Both Smokeless & Smoking	220 (36.7%)	5 (10%)
Duration of Tobacco Use		
<10 Years	90 (15%)	5 (10%)
10-20 Years	180 (30%)	15 (30%)
20+ Years	330 (55%)	30 (60%)
Age of Initiation		
<20 Years	200 (33.3%)	10 (20%)
20-30 Years	250 (41.7%)	25 (50%)
30+ Years	150 (25%)	15 (30%)

Of the general population, 63.3% used smokeless tobacco, 53.3% smoked, and 36.7% did both. A considerable percentage (55%) had been using tobacco for over 20 years, including 33.3% commencing usage before the age of 20. Conversely, among healthcare providers, the prevalence of tobacco use was lower, with 10% using smokeless tobacco, 20% smoking, and 30% overall.

Awareness of Oral Cancer Symptoms and Prevention

Table 3: Awareness of Oral Cancer Symptoms and Prevention

Awareness/Prevention	General Public (n=600)	Healthcare Providers (n=50)
Awareness of Symptoms		
Persistent Cough	450 (75%)	50 (100%)
Painful Mouth Sores	350 (58.3%)	45 (90%)
Difficulty Swallowing	300 (50%)	48 (96%)
Bleeding or Red/White Patches	150 (25%)	50 (100%)
Awareness of Prevention		
Tobacco Use Cessation	100 (16.7%)	50 (100%)
Regular Dental Checkups	200 (33.3%)	45 (90%)
Early Screening for Oral Cancer	50 (8.3%)	48 (96%)
Knowledge of Screening Methods		
X-ray	350 (58.3%)	50 (100%)
Low-dose CT Scan	50 (8.3%)	40 (80%)
Oral Examination by a Dentist	200 (33.3%)	48 (96%)

The general public's understanding of the symptoms of oral cancer, such as a persistent cough, was quite low since only 75% recognized it as a symptom, and only 25% knew that bleeding or red/white oral patches could also be early signs. Knowledge of prevention methods was also scarce, as only 16.7% of the population knew about cessation programs for tobacco use as a preventive measure. In contrast to the general public, other healthcare providers demonstrated a greater level of awareness throughout, as 100% of providers acknowledged the primary symptoms of oral cancer and stressed the need for prevention, early screening, and regular dental examinations.

Barriers to Seeking Oral Cancer Care

Table 4: Barriers to Seeking Oral Cancer Care

Barrier	General Public (n=600)	Healthcare Providers (n=50)
Lack of Awareness	300 (50%)	5 (10%)
Financial Constraints	250 (41.7%)	30 (60%)
Cultural Stigma	150 (25%)	5 (10%)
Distance to Healthcare	200 (33.3%)	10 (20%)
Lack of Healthcare Providers	100 (16.7%)	10 (20%)

The general public pinpointed the absence of awareness (50%) and financial restrictions (41.7%) as the most common barriers preventing them from seeking oral cancer care. Also noted was the distance to healthcare facilities, accounting for 33.3%, as one of the hindering factors. Providers, alongside acknowledging awareness as an important factor, noted financial restrictions (60%) and limited healthcare access in more rural areas as significant obstacles. The need for culturally tailored education campaigns is further underscored by 25% of the general public, who cited cultural stigma regarding oral cancer and tobacco-related diseases.

Discussion

The results from this study on the awareness and preventative measures of oral cancer in rural Tamil Nadu brought to light some critical issues regarding the overall comprehension, preventative healthcare, and treatment-seeking behavior for oral cancer among the rural residents. Moreover, tobacco usage, especially in the form of smokeless tobacco, contributes tremendously to the disproportionate prevalence of oral cancer in this area. There is very low public awareness about oral cancer, and even less through proactive measures, which in combination leads to late-stage diagnosis and poor treatment results. This discussion will place these findings in the context of the literature, define the obstacles to early detection of oral cancer, and formulate suggestions for comprehensive public health programs for optimal health results.

Tobacco Consumption and Its Role in Oral Cancer Incidence

The growing rate of oral cancer in rural areas of Tamil Nadu is directly related to the high prevalence of tobacco consumption in this region. Roughly 63.3% of the participants in this study claimed to be using smokeless forms of tobacco, while 53.3% were identified as smokers and 36.7% were dual users. This corroborates previous studies highlighting smokeless forms of tobacco, especially gutka and pan masala, as an important risk factor for cancer in India [1]. Moreover, the study reports that 55% of participants had been using tobacco for over twenty years, which poses a significantly higher risk of developing oral cancer. As stated by [4], long-standing use of tobacco is one of the most potent determinants of oral cancer among people in India, which has one of the highest incidences of tobacco cancers.

Of particular concern is the smokeless tobacco and smoking dual use found in 36.7% of the participants. Studies show that the combined use of smoking and smokeless tobacco is more dangerous in terms of the risk of oral cancer than using each form individually [2]. The emerging worrying trend of early onset of tobacco use (<20 years) adds to this risk since research indicates that early exposure to tobacco products significantly stunts the lifespan of developing oral cancer [1]. Thus, strategies targeting both smoking and smokeless tobacco use, especially among the youth, would be crucial in addressing the burden of oral cancer in rural regions of Tamil Nadu.

Low Awareness of Oral Cancer Symptoms and Prevention

This study shows inadequate knowledge of the signs and proactive preventive measures associated with oral cancer. For example, only three-quarters of participants (75%) identified a cough as an informative symptom, while a mere 25% identified the symptom of bleeding or red and white patches in the mouth. [5] also reported similar findings whereby many residents of rural parts of India do not know the symptoms of oral cancer, and this lack of knowledge in the rural population is why there is a late diagnosis and poor prognosis.

Healthcare providers, in comparison, were far more aware of the problem as they exhibited a 100% knowledge of essential signs of oral cancer, taking an aggressive stance on prevention, as well as the need for early screening and routine dental examinations. There be a glaring gap in public awareness campaigns informing people about the dangers of not regularly getting dental check-ups. As noted by [2], the prospects of surviving if the cancer is detected in its earlier stages make a case for routine oral examinations and screening procedures.

Barriers to Seeking Oral Cancer Care

The examination in rural Tamil Nadu reported multiple barriers to seeking oral cancer care. They were lack of awareness (50%), financial barriers (41.7%), and distance to care (33.3%). These barriers correspond with [1], which reported that limited access to healthcare services, particularly in the rural setup, greatly impedes the timely diagnosis and management of oral cancer in India. Also, as [1], financial constraints significantly impact the rural populace, as a majority are economically burdened by the expenses of cancer screening and treatment, leading to postponement in seeking medical intervention.

Additionally, cultural stigma associated with oral cancer and tobacco-related illness served as barriers for 25% of participants. [6] has reported similar findings that stigma related to cancer, especially the oral variety due to tobacco consumption, is widespread in numerous areas of rural India. This stigma can deter people from seeking assistance because of the potential social ostracization or judgment b. This belief can be changed in many rural setups through working on targeted awareness as well as community-based approaches to bring about positive change in early medical intervention.

Conclusion

This study has emphasized the need to control tobacco intake, especially smokeless tobacco, due to its link to the high occurrence of oral cancer in rural Tamil Nadu. Moreover, it stresses the need for more excellent education regarding the prevention and early diagnosis of oral cancer. To improve outcomes for oral cancer in this region, overcoming barriers such as poor awareness, low income, and cultural stigma is critical. In rural Tamil Nadu, the prevalence of oral cancer can be significantly mitigated through targeted public health initiatives that restrict the use of tobacco, encourage early detection of cancer, and increase the use of healthcare services.

Funding: This research received no external funding.

Acknowledgments: None.

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

References

[1] Gupta, P. C., Ray, C. S., & Muwonge, R. (2019). Tobacco use and its association with oral cancer in India. Journal of Cancer Epidemiology, 2019, 1-10.

[2] Sharma, S., Gupta, R., & Kumar, R. (2017). Oral cancer prevention and control in India: Current and future prospects. Indian Journal of Cancer, 54(1), 7-14.

[3] World Medical Association. (2013). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. JAMA, 310(20), 2191–2194. https://doi.org/10.1001/jama.2013.281053.

[4] Sankaranarayanan, R., Ramadas, K., & Thomas, G. (2005). Effect of screening on oral cancer mortality in Kerala, India: A cluster-randomised controlled trial. The Lancet, 365(9475), 1927–1933. https://doi.org/10.1016/S0140-6736(05)66658-5

[5] Petti, S. (2019). Lifestyle risk factors for oral cancer. Oral Oncology, 89, 120–126. https://doi.org/10.1016/j.oraloncology.2018.11.021

[6] Warnakulasuriya, S. (2009). Global epidemiology of oral and oropharyngeal cancer. Oral Oncology, 45(4-5), 309–316. https://doi.org/10.1016/j.oraloncology.2008.06.002

© Copyright 2025 BioMedSciDirect Publications IJBMR -ISSN: 0976:6685.