

Awareness and Perception about Oral Cancer among the Rural Population at Chengalpattu District, Tamil Nadu, India: A Cross-sectional Study

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ABSTRACT

Introduction: The prevalence of oral cancer is extremely high in India, contributing significantly to morbidity and mortality. Public awareness of oral cancer may aid in the prevention and early detection of the disease. To achieve successful prevention, it is essential to analyse the level of awareness among the rural Indian population, who often lacks access to healthcare.

Aim: To assess the awareness and perception of oral cancer, including its signs, symptoms and treatment options in the rural population.

Materials and Methods: This cross-sectional study was conducted in the Department of Oral and Maxillofacial Surgery, Karpaga Vinayaga Institute of Dental Sciences, Madhuranthagam, Tamil Nadu, India over a period of eight months (September 2022 to April 2023) among 350 participants who visited the Dental and Medical College, Outpatient Department (OPD) from the rural population of Chengalpattu district, Tamil Nadu, India. A pretested, self-administered questionnaire consisting of 15 questions was distributed. These questions addressed knowledge and awareness of the signs and symptoms of oral cancer, various aetiological factors, risk factors associated with tobacco use, treatment options, and the quality of life of patients after receiving treatment. Responses were collected

and tabulated for data analysis. Statistical analysis was performed using the IBM Corp. Statistical Package for the Social Sciences (SPSS) software for Windows, version 22.0 (Armonk, NY). The Chi-square test with Yates correction was used to compare the associations between males and females regarding awareness and perception of oral cancer. A p-value of <0.05 was considered significant.

Results: The mean age of the participants was approximately 38 years. Among the total of 350 participants, 190 (54.2%) were males and 160 (45.8%) were females. Among the participants, 80.6% (36.8% males and 43.8% females) believed that smoking and tobacco chewing were causative factors for oral cancer. Additionally, 66.3% of males and 70% of females were aware of the treatment options available after the confirmation of oral cancer. Furthermore, 42.6% of males and 43.1% of females stated that they were aware of the role of oral and maxillofacial surgeons in the treatment of oral cancer.

Conclusion: Out of all participants, only 79.1% of the rural population was familiar with the term "oral cancer," and 45.5% knew that a persistent, non healing ulcer is the most typical sign of oral cancer. Prevention and early identification of oral cancer, along with associated health education, are critical public health issues that require continued and heightened focus in the medical field.

Keywords: Aetiological factors, Awareness, Mouth neoplasm, Risk factors

INTRODUCTION

The cancer epidemic is spreading rapidly around the world, and healthcare systems worldwide are facing formidable obstacles in addressing this issue. Given that India's population of 1.3 billion people is dispersed among 29 states and seven union territories, with varying degrees of population genetics, environment, and lifestyle, there is a heterogeneous distribution of disease burden [1]. In 2020, the Global Cancer Observatory (GLOBOCAN) estimated that there were 19.3 million new cancer cases worldwide. In terms of oral cancer incidence, India ranks third, following China and the United States. GLOBOCAN projected that 2.08 million cancer cases would be diagnosed in India by 2040, representing a 57.5 percent increase from 2020 [2]. Additionally, in 2020, GLOBOCAN estimates indicated that the annual number of new cases of cancer in the lip and oral cavity exceeded 100,000 in India [3]. The concern about oral cancer in India is significantly higher than in the West, with approximately 70% of cases recorded at advanced stages (American Joint Committee on Cancer, Stage III-IV). Due to late identification, the chances of a cure are extremely low, nearly non-existent [4].

Oral Squamous Cell Carcinoma (OSCC) commonly occurs as an ulceroproiferative lesion of the oral mucosa. Cancer may arise in any specific site within the oral cavity and is divided into seven subsites.

OSCC often presents as an indurated ulcer, an exophytic growth, an indurated non ulcerative patch (endophytic), or a combination of these appearances in subsites, including the lips, cheeks, tongue, hard and soft palate, and the base of the mouth that extends to the oropharynx [5].

Among the seven subsites, the Gingivobuccal Sulcus (GBS) of the mandible, followed by the tongue and floor of the mouth, are the most common locations for OSCC [5]. The classical Indian oral cancer is primarily caused by the tobacco-lime mixture placed and kept in the GBS of the mandible. Over the past three decades, pan masala has gained popularity in India due to its availability in pre-mixed packs. This substance can be chewed or retained in the mouth, particularly in the GBS, where its contents continuously irritate the oral mucosa. Persistent irritation leads to fibrosis, which can eventually develop into submucous fibrosis, converting a premalignant process into invasive carcinoma by damaging the epithelial layer, followed by the basement membrane and submucosa [5].

Various Premalignant Diseases (PMDs), such as inflammatory oral submucosa, fibrosis, erythroplakia, leukoplakia, candidal leukoplakia, dyskeratosis congenita, and lichen planus are signs of oral cancer in its early stages. However, many premalignant conditions can mimic the appearance of oral cancer [6].

The causes of Oral Premalignant Diseases (OPMD) and SCC are multifaceted and include factors such as smoking, chronic alcoholism, chewing Betel Quid (BQ), Human Papillomavirus (HPV) infection, malnutrition, immunodeficiency, and genetic conditions. Various materials contain different carcinogenic agents; for example, ethanol is present in alcohol, nitrosamines are found in BQ, and Tobacco-specific Nitrosamines (TSNAs) are present in tobacco [6].

The HPV has been associated with precancerous squamous intraepithelial neoplasia, which may lead to malignancy and facilitate the development of OSCC. There is also a correlation between an increased risk of oral carcinomas and inadequate nutrition, particularly in the consumption of plant foods and vitamin D. Additionally, exposure to dust and heavy metals such as arsenic, chromium, and nickel can cause chronic inflammation or serve as carriers for other oncogenic compounds, thereby increasing the incidence of oral cancer [6].

The progression from OPMDs to OSCC is a multifaceted process involving genetic and epigenetic changes, as well as alterations in the tumour microenvironment. Addressing these risk factors early on can be crucial in preventing the transition to malignancy [6]. A more conservative and therapeutic approach is possible with early cancer diagnosis, and the prognosis is better with quicker recovery [7].

The best way to improve early diagnosis and subsequently lower the prevalence of oral cancer is to better understand the factors that contribute to the delayed diagnosis of the disease [8]. The lack of awareness and knowledge among adults regarding potential risk factors and symptom identification has the greatest impact on the delayed diagnosis of oral cancer [1,9].

Therefore, the present study was designed with the aim of evaluating awareness about oral cancer, its various signs and symptoms, as well as the perception of oral cancer precautions and treatment options among the general rural population surrounding the private institute, as well as those visiting the OPD in dental and medical sciences.

MATERIALS AND METHODS

The present cross-sectional study was conducted in the Department of Oral and Maxillofacial Surgery, Karpaga Vinayaga Institute of Dental Sciences, Madhuranthagam, Tamil Nadu, India by the Department of Oral and Maxillofacial Surgery over a period of eight months (September 2022 to April 2023) with a total of 350 participants from the rural population who visited the OPD. Informed consent was obtained from all participants after providing them with an information sheet. The Ethical Committee of the Karpaga Vinayaga Institute of Dental Sciences approved the study, granting ethical clearance and permission to proceed (IEC NO: KIDS/IEC/2023/III/011). None of the participants included in the present study had cancer.

Inclusion criteria:

- Age group: 15 to 80 years
- Both males and females
- Outpatients who reported to the Department OPD at the Medical and Dental College, as well as the rural population in and around the college
- Mother tongue: Tamil

Exclusion criteria:

- Patients who were unable to read, write, and understand the local regional language (Tamil).

Based on convenience sampling, 350 patients who visited the OPD of the study Institute were recruited for the study from the rural population surrounding the college.

Sample size calculation: Based on the previous literature by Konduru R et al., sample size was calculated by using the formula of $4pq/L^2$ [10].

P- Prevalence 43.80%

Q-1-p, so $100-43.80=56.20$.

L allowable error-5 to 20% prevalence,

Hence, $4 \times 43.80 \times 56.20 / 30 = 324$ (Hence rounded off to 350)

Study Procedure

The questionnaire was developed using a standard method that comprised item development, content validation, and pilot testing. A self-administered questionnaire was created in English, which was then translated into the local language, Tamil, in a standardised manner, using evidence from previous literature by Konduru R et al., [10].

The questionnaire consisted of 15 closed questions, including awareness and perception regarding oral cancer, its signs and symptoms, various aetiological factors, risk factors associated with tobacco use, different treatment options, and the quality of life of patients after receiving treatment.

These questions were divided into two domains. The first domain focuses on awareness of the risk factors and signs and symptoms of oral cancer, which includes seven questions. The second domain addresses attitude and perception of oral cancer, which includes eight questions.

The questionnaire was validated by professionals in the field. A pre-test of the questionnaire was conducted with ten randomly chosen participants. A pilot study with ten individuals was performed to assess the questionnaire's internal consistency and reliability. Cronbach's alpha ($\alpha=0.80$) indicated good reliability and consistency. This self-administered questionnaire was distributed to the participants, and their responses were collected and stored.

STATISTICAL ANALYSIS

Statistical analysis was performed using a personal computer with IBM Corp.'s SPSS software for Windows, version 22.0 (Armonk, NY). To determine the statistical significance of the acquired results, a data comparison was conducted using various statistical tests. Detailed descriptive statistics were calculated, and a simple frequency distribution table was created. The Chi-square test with Yates' correction was used to compare the association between males and females regarding their awareness and perception of oral cancer. A p-value of <0.05 was considered significant.

RESULTS

Among the 350 participants represented in the present study, 190 (54.2%) were male and 160 (45.8%) were female. The mean age of the participants was approximately 38 years, and most of the participants belonged to lower middle and lower socio-economic status [Table/Fig-1].

Variables		n (%)
Gender	Male	190 (54.2)
	Female	160 (45.8)
Age (years)	Male	
	<30	21 (11.1)
	30-50	81 (42.6)
	>50	88 (46.3)
	Female	
	<30	18 (11.2)
	30-50	68 (42.4)
	>50	74 (46.4)
Socio-economic status	Upper	24 (6.9)
	Upper middle	66 (18.9)
	Lower middle	77 (22)
	Upper lower	133 (38)
	Lower	50 (14.3)

[Table/Fig-1]: Demographic details of the included participants.

Awareness of the signs, symptoms, and risk factors associated with oral cancer is presented in [Table/Fig-2]. Among the total participants, 147 males (77.4%) and 130 females (81.3%) had heard of the term "oral cancer." Among the 190 male participants, 70 males (36.8%) identified smoking, and 88 participants (46.3%) identified tobacco chewing as causative factors for the occurrence of oral cancer. In females, 70 participants (43.8%) identified smoking as a causative factor, while 59 participants (36.9%) identified tobacco chewing as a causative factor. Non-healing ulcers persisting for a longer period were considered the major sign of oral cancer by 86 (45.3%) males and 80 (50%) females. There was no statistically significant difference between males and females regarding awareness of the risk factors for oral cancer [Table/Fig-2].

Perceptions regarding precautions, various treatment options, and the role of oral surgeons in oral cancer treatment are shown in [Table/Fig-3]. In terms of perception regarding the treatment of oral cancer, 135 (71.1%) males and 116 (72.5%) females believed that oral cancer is curable. Among them, 126 (66.3%) males and 112 (70%) females were aware of the treatment options available after the confirmation of oral cancer. Among the total 350 participants, about 119 (50%) participants (males=68 and females=51) knew about surgical treatment options. Additionally, 81 (42.6%) males and 69 (43.1%) females were aware that once oral cancer is confirmed, they should report to an oral and maxillofacial surgeon for treatment. There was no statistically significant difference between males and females regarding perceptions of undergoing treatment for oral cancer with a specialist [Table/Fig-3].

S. No.	Questions	Options	Male 190 (54.2%) n (%)	Female 160 (45.8%) n (%)	Total (n=350) N (%)	p-value
1.	Have you ever heard about oral cancer?	Yes	147 (77.4)	130 (81.3)	277 (79.1)	0.373
		No	43 (22.6)	30 (18.7)	73 (20.9)	
2.	Is anyone from your family members or any known person been affected by oral cancer before?	Yes	47 (24.7)	42 (26.3)	89 (25.4)	0.746
		No	143 (75.3)	118 (73.8)	261 (74.6)	
3.	What could cause oral cancer from the following?	Smoking	70 (36.8)	70 (43.8)	140 (40)	0.063
		Tobacco chewing	88 (46.3)	59 (36.9)	147 (42)	
		Alcohol consumption	17 (8.9)	24(15)	41 (11.7)	
		Sharp tooth	15 (7.9)	7 (4.4)	22 (6.3)	
4.	What could be the reason for the above mentioned habits?	Work pressure	44 (23.2)	36 (22.5)	80 (22.8)	0.412
		Family situation	27 (14.2)	19 (11.9)	46 (13.2)	
		Mental stress	71 (37.4)	73 (45.6)	144 (41.2)	
		Social drinking	48 (25.3)	32 (20)	80 (22.8)	
5.	How long do you think the above mentioned habits could lead to cancer?	5 years	41 (21.6)	42 (26.3)	83 (23.7)	0.007*
		10 years	62 (32.6)	28 (17.5)	90 (25.7)	
		15 years	35 (18.4)	26 (16.3)	61 (17.4)	
		More than 15 years	52 (27.4)	64 (40)	116 (33.2)	
6.	What do you think will be the signs to detect oral cancer?	Non healing ulcer for a long period	86 (45.3)	80 (50)	166 (47.5)	0.280
		Excessive growth in gums	20 (10.5)	14 (8.8)	34 (9.7)	
		Burning sensation in oral cavity	45 (23.7)	26 (16.3)	71 (20.3)	
		Being ignorant	39 (20.5)	40 (25)	79 (22.5)	
7.	Do you think that oral cancer is a communicable disease?	Yes	65 (34.2)	57 (35.6)	122 (34.8)	0.541
		No	125 (65.8)	103 (64.4)	228 (65.2)	

[Table/Fig-2]: Awareness about oral cancer among participants.

S. No.	Questions	Options	Male 190 (54.2%) n (%)	Female 160 (45.8%) n (%)	Total (n=350) N %	p-value
1.	What are the precautions to be taken to avoid oral cancer?	Withdrawal of those habits	91 (47.9)	67 (41.9)	158 (45.2)	0.604
		Periodic oral hygiene consultation	33 (17.4)	29 (18.1)	62 (17.7)	
		Consulting a Doctor immediately with appearance of above symptoms	48 (25.3)	43 (26.9)	91 (26)	
		Being ignorant	18 (9.5)	21 (13.1)	39 (11.1)	
2.	Do you think Oral Cancer can be cured?	Yes	135 (71.1)	116 (72.5)	251 (71.3)	0.765
		No	55 (28.9)	44 (27.5)	99 (28.2)	
3.	Are you aware of the treatment options available after confirmation of Oral Cancer?	Yes	126 (66.3)	112 (70)	238 (68)	0.391
		No	64 (33.7)	48 (30)	112 (32)	
4.	If yes, are you aware of treatment options mentioned below?	Surgery	68 (53.9)	51 (45.5)	119 (50)	0.179
		Chemotherapy	17 (13.5)	9 (8)	26 (11)	
		Radiation therapy	9 (7.2)	16 (14.3)	25 (10.5)	
		Being ignorant	32 (25.4)	36 (32.2)	68 (28.5)	
5.	Whom do you think you have to report for treatment after confirming it is oral cancer?	A dentist	63 (33.2)	54 (33.8)	117 (33.4)	0.823
		A surgery specialist	33 (17.4)	23 (14.4)	56 (16)	
		A general physician	13 (6.8)	14 (8.8)	27 (7.8)	
		Oral and maxillofacial surgeon	81 (42.6)	69 (43.1)	150 (42.8)	

6.	What is the quality of life of your known person after cancer Treatment?	Worse than before	45 (23.7)	44 (27.5)	89 (25.4)	0.862
		Well Improved	66 (34.7)	51 (31.9)	117 (33.4)	
		Not aware about that	79 (41.6)	65 (40.6)	144 (41.2)	
7.	Does any of your known had recurrence even after the cancer treatment?	Yes	51 (26.8%)	41 (25.6)	92 (26.2)	0.224
		No	60 (31.6)	64 (40)	124 (35.4)	
		Not aware about that	79 (41.6)	55 (33.8)	134 (38.4)	
8.	If yes, what was the treatment provided earlier?	Surgical treatment	7 (13.7)	6 (14.6)	13 (14.1)	0.311
		Chemotherapy	6 (11.8)	6 (14.6)	12 (13.1)	
		Not aware about that	33 (64.7)	21(51.3)	54 (58.7)	
		Radiation therapy	5 (9.8)	8 (19.5)	13 (14.1)	

[Table/Fig-3]: Perception about preventions and precaution methods about oral cancer among participants.

Chi-square test; Yates correction; *p<0.05; Statistically significant

DISCUSSION

The present study was conducted to assess awareness about oral cancer, its risk factors, and perceptions about prevention among the rural population. Out of the total study participants, the majority (79.1%) were familiar with the term “oral cancer,” while 20.9% were not even aware of its existence. The study was conducted in a rural area, where literacy levels and the age of participants play significant roles in awareness. Most of those unaware of oral cancer belonged to the elderly group.

Since oral cancer is largely considered preventable, sustained public awareness and education may lead to a decline in the overall incidence of oral cancer in the community. It is logical that a population’s level of education regarding oral cancer is directly related to its prognosis. Oral cancer has an unsatisfactory long-term prognosis, with a 5-year survival rate typically below 50% [11]. Unfortunately, most oral cancers, even in leading countries, are diagnosed at advanced stages, and the lack of public knowledge and awareness about the signs and risk factors of oral cancer contributes to this issue.

Patients with advanced cancer have a poor prognosis even after receiving adjuvant therapies such as radiotherapy or chemoradiotherapy, which emphasises the importance of early detection and screening [12]. Limited awareness of cancer symptoms, such as burning sensations and ulcerations in specific subsites of the oral cavity, along with a lack of widespread screening programs, creates a critical gap in early detection. In this study, among the participants who were aware of oral cancer, tobacco chewing and smoking were equally perceived as risk factors for the disease, which is consistent with findings from studies conducted by Bhat PK et al., Konduru R et al., Firinciogullari M et al., [7,10,11]. Regarding the duration of risk factors, 52 (27.4%) of male participants believed that more than 15 years of these practices could lead to oral cancer, while 64 (40%) of female participants held the same belief.

Chronic Mechanical Irritation (CMI) is caused by persistent trauma from factors such as poor dentition, sharp edges of the teeth, and malocclusion. This persistent irritation can lead to chronic inflammation, which is known to be a risk factor for cancer. While CMI itself might not directly cause genetic mutations, the combination of CMI and tobacco use creates a more hostile environment for the oral mucosa. This synergy can lead to greater inflammatory responses and epigenetic changes. These changes can affect cellular processes such as Deoxyribonucleic Acid (DNA) repair and apoptosis, increasing the risk of genetic mutations and cancer development [13].

According to the results of the present study, participants mainly recognised the risks associated with smoking and chewing tobacco, but they demonstrated less awareness of the risks posed by sharp teeth, particularly among patients who did not have these habits, such as female patients. Early intervention to address these risk factors is crucial, as it can potentially prevent or slow down the progression from precancerous conditions to OSCC.

Thomas P et al., concluded in their study that specific site preferences within the oral cavity, notably the lateral border of the tongue, highlight the impact of chronic dental trauma and mechanical irritation as potential aetiological factors [13]. Among the participants, 166 (47.5%) identified non-healing ulcers as a symptom and indication of oral cancer. However, fewer participants were able to recognise tissue overgrowth 34 (9.7%) and the appearance of a continuous burning sensation 71 (20%) as indicators of oral cancer. This lack of recognition may result in delayed admissions of patients with oral cancer to medical and dental facilities, leading to unfavourable outcomes. A similar study conducted by Konduru R et al., found that 40.6% of participants were aware that non-healing ulcers are frequently indicative of malignancy [10].

Among the total participants, 71.3% of the population perceived that oral cancer is curable. This finding is similar to a study conducted by Monteiro LS et al., which stated that most participants (94.5%) agreed that detecting oral cancer in its early stages could increase the success of treatment [14].

In this study, 32% of the total population reported a lack of knowledge about oral cancer treatment and preventive aspects. Similar findings were reported by Bhat PK et al., who noted that 53.5% of participants were aware of oral cancer treatment options [7]. However, this contradicts research conducted by Ariyawardana A and Vithanaarachchi N which found that 5.9% of the population was unaware of treatment options and 5.4% believed there was no treatment available for oral cancer [15]. Additionally, this present study indicated that 42.6% of males (n=81) and 43.1% of females (n=69) stated that once oral cancer is confirmed, they would need to consult an oral and maxillofacial surgeon for further treatment.

Reducing tobacco use and enhancing public health have been demonstrated to be significant outcomes of enacting tobacco control laws, such as those found in the Cigarettes and Other Tobacco Products Act (COTPA). Examples of these initiatives include prohibiting smoking in public areas, raising taxes on tobacco products, requiring pictorial warnings on tobacco products, conducting public campaigns, and educating the public through mass media. The implementation of these comprehensive tobacco control measures—including legal restrictions, financial disincentives, educational efforts, and public awareness campaigns—has a proven track record of reducing tobacco consumption and improving public health.

The economic burden of tobacco-related oral cancers is significant and multifaceted. Addressing this issue involves understanding both the direct costs of treatment and the broader economic implications for healthcare systems, governments, and society.

Direct costs of diagnosing oral cancer typically involve clinical evaluations, biopsies, imaging studies, and consultations with specialists. Treatment often includes surgery, chemotherapy, and radiotherapy. Each of these interventions incurs substantial costs for medical procedures, hospital stays, medications, and follow-up care. Patients undergoing treatment may face prolonged periods

of disability or loss of productivity due to illness, which impacts their ability to work and earn income. Family members may also experience a loss of productivity due to caregiving responsibilities. Additionally, the quality of life is affected by issues such as pain, disfigurement, and functional impairments.

The economic benefits of early detection and comprehensive oral health screening leads to reduced treatment costs as cases are often managed with less aggressive interventions. Comprehensive oral health screening can identify precancerous lesions or early signs of cancer, allowing for prompt intervention that can prevent progression to more severe stages. Strategies for effective screening and prevention of oral cancer can be improved through the implementation of screening programs, public awareness campaigns, and policy support.

Limitation(s)

Only individuals who visited the Institute's Outpatient clinics were included in the present research, which presents a limitation. The generalisability of the study's results may be affected, and it would have been ideal to include a random sample of the population.

CONCLUSION(S)

Although the majority of the rural population has sufficient knowledge about oral cancer and its related risk factors, there is a lack of awareness regarding the availability of treatment for oral cancer. Therefore, oral cancer prevention and early detection, as well as education for health providers, are significant public health concerns that require increased and sustained attention in healthcare.

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