# Ethiopian Journal of Health and Biomedical Sciences

**Original article**                                                  **Open access**

## Oral Cancer Awareness among Patients Visiting Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia

*Feven Abera[1], Gelana Garoma[1], Demerew Dejene[1*]*

[1] *Department of Oral and Maxillofacial Surgery, College of Health Science, Addis Ababa University, Addis Ababa, Ethiopia*

*\*Correspondence: demewelela@gmail.com*

## ABSTRACT

**Background**: Despite oral cancer being largely preventable and early detection significantly improving treatment outcomes, public awareness of its risk factors, early signs, and symptoms remains low, particularly in low-resource settings. In Ethiopia, late presentation is common, contributing to poor prognosis and increased morbidity. However, there is limited evidence regarding patients' knowledge and awareness of oral cancer in Addis Ababa. This gap in information hinders the development of targeted educational and preventive strategies.

**Objectives:** To assess the awareness and knowledge of oral cancer among patients visiting Tikur Anbessa Specialized Hospital (TASH) to inform community education programs and early detection initiatives.

**Methods:** An institution-based cross-sectional study was conducted among 221 adult patients attending the Department of Dentistry and Oral and Maxillofacial Surgery at TASH from May to June 2023. Data were collected using a structured interviewer-administered questionnaire assessing awareness and knowledge of oral cancer, including risk factors, signs, symptoms, and preventive measures. Knowledge was measured using a composite score, and participants scoring ≥ the mean (2.11) were classified as having good knowledge. Associations between socio-demographic factors and knowledge were first explored using Chi-square tests, followed by multivariable logistic regression to identify independent predictors of good knowledge, with $p < 0.05$ considered statistically significant.

**Results:** Among participants (mean age 37.1 ± 13.8 years; 60.2% female), 75.1% (n = 166) had never heard of oral cancer. Among those aware (24.9%, n = 55), the primary sources of information were media (58.2%, n = 32), while only 18.2% (n = 10) received information from health professionals. Cigarette smoking (69.2%) and alcohol consumption (55.2%) were the most recognized risk factors, whereas family history (38.4%), poor oral hygiene (46.6%), and advanced age (36.2%) were less frequently identified. Awareness of signs and symptoms was low, with less than 40% identifying non-healing ulcers (38.9%) or abnormal swelling (33.0%). Overall, knowledge was poor among most participants. Urban residence (p = 0.0008) and higher education (p = 0.001) were significantly associated with better knowledge; gender was not.

**Conclusion:** Awareness and knowledge of oral cancer were low, highlighting the need for targeted community education, patient counseling by health professionals, and integration of oral cancer information into routine dental care to improve early detection and reduce disease burden.

*Keywords:* Oral cancer, Awareness, Knowledge, Risk factors, Signs and symptoms, Ethiopia

# INTRODUCTION

Oral cancer (OC) is a malignant tumour affecting the anatomical structures of the oral cavity, including the lips, tongue, and other oral components (1). According to the American Joint Committee on Cancer (AJCC), the oral cavity is classified into seven sub-sites: lips, alveolar ridges, floor of the mouth, oral tongue (anterior two-thirds), retromolar trigone, and hard palate. Understanding these sub-sites is important for determining incidence patterns and lymphatic drainage. The prognosis of oral cancer varies depending on the anatomical site (2).

Globally, and particularly in developing countries, oral cancer contributes significantly to morbidity and mortality. Approximately 1.4 million new cases and 300,000 deaths (2.1% of all cancer-related deaths) are reported annually worldwide (3,4). Oral cancer is the eleventh most common malignancy globally (5).

Major risk factors for oral cancer include tobacco use, alcohol consumption, and human papillomavirus (HPV) infection. Other contributing factors are lifestyle behaviours, age, poor diet low in fruits and vegetables, and lack of physical activity (6-8). The signs and symptoms of oral cancer vary widely, ranging from early manifestations such as white and red patches on the oral mucosa to advanced symptoms, including persistent neck pain and voice changes. Intraoral findings may include non-healing ulcers, swellings, loosening of teeth, bleeding, and jaw pain. Functional impairments can include difficulty or pain during swallowing, speech difficulties, and reduced tongue mobility. Other manifestations include numbness of the tongue or lips, unexplained bleeding, neck swelling, fetor oris, altered dental occlusion, and sore throat (9).

The TNM staging system has historically provided clinicians with a reliable framework for prognostic assessment and management decisions in oral cancer (10). Additional pathological parameters, including histopathological grading according to WHO, presence of vascular and perineural invasion, extracapsular spread, and positive surgical margins, are also important prognostic indicators (11, 12). Surgery remains the mainstay of treatment for oral cancer, while primary and adjuvant radiotherapy and chemotherapy play significant roles in comprehensive management (13).

Although individuals can perform self-examinations of the oral cavity to detect lesions, and dentists are well-placed to identify early signs, evidence supporting the effectiveness of such assessments in reducing oral cancer mortality is limited. Nevertheless, it is recommended that dentists remain vigilant for potentially malignant disorders (PMDs) and oral cancer during routine clinical practice (14,15).

Enhancing public understanding of oral cancer risk factors, signs, and symptoms is critical for effective prevention. Increased awareness can lead to early detection and diagnosis, improving patient outcomes and prognosis. By reducing exposure to risk factors and recognizing early clinical signs, the prevalence and severity of oral cancer can be minimized (16,17).

Despite oral cancer being largely preventable and early detection playing a crucial role in improving prognosis and survival, public awareness of its risk factors, warning signs, and symptoms remains inadequate in many low- and middle-income countries. In Ethiopia, oral cancer is often diagnosed at advanced stages, contributing to poor treatment outcomes and increased morbidity and mortality. Limited public knowledge regarding major risk factors such as tobacco use, alcohol consumption, human papillomavirus infection, and delayed recognition of early lesions may hinder timely healthcare-seeking behavior. However, there is scarce evidence regarding patients' awareness and understanding of oral cancer in Addis Ababa. This knowledge gap makes it challenging to design targeted educational interventions and effective prevention strategies. Therefore, this study aims to assess the level of awareness and knowledge of oral cancer among patients visiting Tikur Anbessa Specialized Hospital, generating evidence to inform community education programs, early detection initiatives, and health policy measures to reduce the burden of oral cancer in Ethiopia.

## MATERIALS AND METHODS

### Study Design and Setting

An institution-based cross-sectional study was conducted at the Department of Dentistry and Oral and Maxillofacial Surgery (OMFS) Clinic, Tikur Anbessa Specialized Hospital (TASH), Addis Ababa, Ethiopia, from May to June 2023. Tikur Anbessa is the largest referral hospital in Ethiopia, serving a diverse population from both urban and rural areas.

This study aimed to assess patients' awareness and knowledge of oral cancer, including risk factors, signs, and symptoms, and to explore associations with socio-demographic characteristics.

## Study Population

The study population included all adult patients (≥18 years) attending the Dentistry and OMFS Clinic during the study period. Patients who were critically ill, unable to communicate, or unwilling to participate were excluded.

## Sample Size Determination

The sample size was calculated using the single population proportion formula:

$$n = \frac{Z^2 \cdot p \cdot (1 - p)}{d^2}$$

Where:

$n$ = required sample size

$Z$ = standard normal value at 95% confidence interval (1.96)

$p$ = estimated proportion of patients with adequate knowledge of oral cancer. Since no prior data were available in Addis Ababa, we assumed $p = 50\%$ to maximize sample size.

$d$ = margin of error (5%)

Considering the finite population of patients attending the clinic during the study period (approximately 400), the sample size was adjusted using the finite population correction formula:

$$n_{adj} = \frac{n}{1 + (n/N)} = \frac{384}{1 + (384/400)} \approx 196$$

Adding 10% for non-response, the final sample size was approximately 216 participants. A total of 221 patients were ultimately recruited, meeting the calculated sample size.

## Sampling Technique

A systematic random sampling method was employed. The expected number of adult patients visiting the clinic during the study period was estimated from the hospital registry. The sampling interval $k$ was calculated as:

$$k = \frac{N}{n} = \frac{400}{221} \approx 2$$

The first participant was selected randomly from the first two patients, and every second patient thereafter was included until the required sample size was achieved. Patients meeting the inclusion criteria but unwilling to participate were skipped, and the next eligible patient was selected.

## Data Collection Instrument and Procedure

Data were collected using a structured interviewer-administered questionnaire developed from previous studies and international guidelines on oral cancer awareness (18–20). The questionnaire had four main sections: socio-demographic characteristics, substance use habits, awareness and sources of information, and knowledge of oral cancer risk factors and signs/symptoms. The instrument was pre-tested on 10% of the sample at a different clinic, and minor modifications were made to improve clarity.

## Measurement of Knowledge

Knowledge of oral cancer was assessed using a composite scoring system. Correct responses for risk factors and signs/symptoms were summed. Participants scoring greater than or equal to the mean (2.11) were classified as having good knowledge, while those scoring below the mean were classified as having poor knowledge.

## Data Management and Analysis

Data were coded, entered, and analyzed using SPSS version 26.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize socio-demographic characteristics, substance use habits, and awareness and knowledge of oral cancer.

Associations between socio-demographic factors and knowledge of oral cancer were first assessed using Chi-square tests. Factors with p < 0.2 in bivariate analysis were further included in a multivariable logistic regression model to identify independent predictors of good knowledge. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported. Statistical significance was set at p < 0.05.

## Ethical Considerations

Ethical approval was obtained from the Addis Ababa University, College of Health Sciences Institutional Review Board. Written informed consent was obtained from all participants. Confidentiality and privacy were maintained throughout the study, and participation was voluntary.

# RESULTS

## Socio-demographic Characteristics

A total of 221 patients participated in the study, with a mean age of 37.1 ± 13.8 years. The majority were female (60.2%,

n = 133), resulting in a female-to-male ratio of 1.51:1. The largest age group was 18–30 years (38.9%, n = 86), followed by 31–40 years (29.0%, n = 64), 41–50 years (17.6%, n = 39), 51–60 years (9.5%, n = 21), and >60 years (5.0%, n = 11).

Most participants resided in urban areas (86.4%, n = 191). Regarding occupation, 57.9% (n = 128) were employed, 25.8% (n = 57) were unemployed, and 16.3% (n = 36) were students. In terms of education, 52.0% (n = 115) had primary or secondary education, 40.7% (n = 90) had higher education, and 7.2% (n = 16) were unable to read or write (Table 1).

**Table 1:** Socio-demographic characteristics of patients who visited the Dentistry and OMFS Clinic at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, May–June 2023 (n = 221)

| Characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age groups (years)*** | | |
| 18-30 | 86 | 38.9 |
| 31-40 | 64 | 29.0 |
| 41-50 | 39 | 17.6 |
| 51-60 | 21 | 9.5 |
| > 60 | 11 | 5.0 |
| **Gender** | | |
| Male | 88 | 39.8 |
| Female | 133 | 60.2 |
| **Residence** | | |
| Urban | 191 | 86.4 |
| Rural | 30 | 13.6 |
| **Education** | | |
| Unschooled | 16 | 7.2 |
| Primary & secondary | 115 | 52.0 |
| University | 90 | 40.7 |
| **Occupation** | | |
| Unemployed | 57 | 25.8 |
| Employed | 128 | 57.9 |
| Student | 36 | 16.3 |

*Mean age = 37.1 ± 13.8 years.*

**Substance Use and Sources of Information**

Regarding substance use habits, the majority of participants, 65.2% (n = 144), reported no history of substance use. Among users, 10.0% (n = 22) were khat chewers, 6.3% (n = 14) were cigarette smokers, 14.0% (n = 31) were alcohol consumers, 0.9% (n = 2) were shisha smokers, and 3.6% (n = 8) reported using multiple substances.

Regarding awareness of oral cancer, 75.1% (n = 166) had never heard of it. Among those aware (24.9%, n = 55), the primary sources of information were media (58.2%, n = 32), including television, radio, the internet, social media, newspapers, and magazines. Only 18.2% (n = 10) obtained information through direct contact with health professionals, whereas the remaining 23.6% (n = 13) learned about oral cancer from other individuals including friends, family, and community.

**Knowledge of Oral Cancer Risk Factors and Signs and Symptoms**

Table 2 presents participants' awareness of oral cancer risk factors and signs and symptoms. Recognition of risk factors was variable. Cigarette smoking (69.2%) and alcohol consumption (55.2%) were most frequently correctly identified. Only 38.4% of respondents considered a family history of oral cancer to be a risk factor, while a comparable proportion (35.8%) did not believe it was associated. Excessive exposure to sunlight was identified as a risk factor by only 22.1% of participants. Similarly, 36.2% recognized advanced age as a risk factor, while 33.5% disagreed and the remainder were unsure. Poor oral hygiene was identified as a risk factor by 46.6% of respondents, and 38.4% considered chronic trauma a risk factor. Fewer participants recognized sedentary lifestyle (22.2%) and consumption of hot and spicy foods (17.6%) as potential risk factors. Notably, 13.1% of respondents believed that demonic attack could be a risk factor for oral cancer, although the majority (71.5%) correctly did not consider it a risk factor (**Table 2).**

Awareness of oral cancer signs and symptoms was generally low. Non-healing sores or ulcers that bleed were identified by 38.9%, abnormal swelling by 33.0%, neck lumps by 26.7%, continuous pain by 23.5%, white or red plaques by 24.9%, unexplained tooth loss by 19.9%, bleeding by 20.8%, loss of taste by 20.4%, burning sensation by 19.9%, numbness by 17.2%, and difficulty chewing or swallowing by 17.2% (**Table 2**).

**Table 2:** Awareness of oral cancer risk factors and signs and symptoms among patients who visited the Dentistry and OMFS Clinic at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, May–June 2023 (n = 221)

| Risk factors | Correctly identified (n) | % Correct |
|---|---|---|
| Cigarette smoking | 153 | 69.2% |
| Alcohol drinking | 122 | 55.2% |
| Family history of oral cancer | 85 | 38.4% |
| Excessive sunlight exposure | 49 | 22.1% |
| Advanced age | 80 | 36.2% |
| Poor oral hygiene | 103 | 46.6% |
| Chronic trauma | 85 | 38.4% |
| Sedentary lifestyle | 49 | 22.2% |
| Hot and Spicy foods | 39 | 17.6% |
| Demonic attack* | 29 | 13.1% |
| **Signs and symptoms** | | |
| Loss of taste | 45 | 20.4% |
| Bleeding | 46 | 20.8% |
| Burning Sensation | 44 | 19.9% |
| Numbness | 38 | 17.2% |
| Difficulty in chewing or swallowing | 55 | 24.9% |
| Abnormal swelling | 73 | 33.0% |
| Non-healing sore or ulcer that bleeds | 86 | 38.9% |
| Loosening or unexplained loss of teeth | 44 | 19.9% |
| Continuous pain | 52 | 23.5% |
| White or red patch | 55 | 24.9% |
| Thickening/ lump in the neck | 59 | 26.7% |

*Incorrect responses, such as demonic attack, are included to show misconceptions.

**Factors associated with Knowledge**

Overall, the majority of participants had poor knowledge of oral cancer. In bivariate and multivariable analysis, urban residence and higher education were significant independent predictors of good knowledge (p = 0.0008 and p = 0.001, respectively), while gender was not significantly associated. The highest proportion of participants with good knowledge was observed in the 18–30 years age group.

Among male participants, 18.1% (n = 40) demonstrated good knowledge, while 21.7% (n = 48) had poor knowledge. Among females, 27.1% (n = 60) had good knowledge and 33.0% (n = 73) had poor knowledge. The difference in knowledge by gender was not statistically significant (P = 0.96). Of participants residing in urban areas, 35.3% (n = 78) had good knowledge, whereas 51.1% (n = 113) had poor knowledge. Among rural residents, 9.9% (n = 22) showed good knowledge, and 3.6% (n = 8) had poor knowledge. This association was statistically significant (P = 0.0008). The highest proportion of participants with good knowledge was in the 18–30 years age group (19%), followed by 31–40 years (13.1%), 41–50 years (6.3%), 51–60 years (4.1%), and >60 years (1.8%). Among those with poor knowledge, 19.9% were aged 18–30 years, 15.8% were 31–40 years, 11.3% were 41–50 years, 5.4% were 51–60 years, and 3.2% were >60 years. Among participants with good knowledge, 5.9% were unschooled, 26.7% had primary or secondary education, and 12.7% had higher education. In contrast, among those with poor knowledge, 1.4% were unschooled, 25.3% had primary or secondary education, and 28.1% had higher education. The association between education level and knowledge was statistically significant (P = 0.001).

## DISCUSSION

This study was conducted at Addis Ababa University, College of Health Sciences, Tikur Anbessa Specialized Hospital (TASH), Addis Ababa, Ethiopia. To the best of our knowledge, this is the first institution-based study in Ethiopia assessing awareness of oral cancer risk factors, signs, and symptoms among dental patients. Oral cancer remains a significant global public health problem, with increasing incidence in many regions worldwide (4,8). Despite advances in diagnosis and treatment, the five-year survival rate remains approximately 50%, largely due to late-stage presentation and delayed diagnosis (2,18). Early detection and preventive strategies in dental practice are therefore essential for improving outcomes (1,14).

In the present study, females constituted 60.2% of participants, and the largest age group was 18–30 years (38.9%). A similar female predominance has been reported in studies conducted in India and other regions (19, 20), although age distribution varies across populations. Differences in demographic structure may be attributed to variations in healthcare-seeking behavior, study design, and sampling methods.

Most participants (86.4%) were urban residents, which reflects the hospital's location in the capital city. Educational attainment was relatively high, yet awareness of oral cancer was low. Notably, 75.1% of respondents had never heard of oral cancer. Comparable low awareness levels have been reported in Yemen, Portugal, and Tehran, Iran (21-23). These findings suggest that formal education alone does not necessarily translate into disease-specific awareness, highlighting gaps in public health communication.

Substance use is a major modifiable risk factor for oral cancer. Cigarette smoking was identified as a risk factor by 69.2% of participants. Although lower than the awareness reported in Sudan (24), this finding is higher than reports from Beijing, China (25). Tobacco use is a well-established etiological factor for oral and oropharyngeal cancers (6,26). However, public perception often associates smoking primarily with lung cancer rather than oral malignancies. Public health strategies such as taxation, advertising restrictions, and anti-smoking campaigns remain crucial in reducing tobacco-related cancers (27).

Alcohol consumption was identified as a risk factor by 55.2% of participants, consistent with findings from Australian dental patients (28). Alcohol acts synergistically with tobacco to increase oral cancer risk (5,29). However, awareness of other risk factors such as chronic trauma, advanced age, and sun exposure was relatively low, indicating incomplete understanding of multifactorial etiology.

Awareness of early signs and symptoms was also limited. Only 38.9% recognized a non-healing ulcer as a warning sign, and fewer than one-quarter identified red or white patches as potential indicators of malignancy. Similar findings have been reported in Brazil and Malaysia (30,31). Given that many oral cancers arise from potentially malignant disorders such as leukoplakia and erythroplakia (9,12), limited recognition of early symptoms may contribute to delayed healthcare seeking and poor prognosis.

Mass media was the primary source of information (66.7%), consistent with evidence that media-based interventions can improve cancer awareness (24,25). However, only 6.2% reported receiving information from healthcare professionals. Considering the critical role of dentists in early detection and opportunistic screening (14,15), these finding highlights missed opportunities for patient education within clinical settings.

Socio-demographic factors influenced knowledge levels. Education and residence were significantly associated with good knowledge (P = 0.001 and P = 0.0008, respectively). Similar associations have been observed in Malaysia and Iran (32,33). Younger participants demonstrated relatively better awareness, which may reflect greater exposure to digital and social media platforms. Gender differences were not statistically significant in this study, although other studies have reported higher awareness among females (34-38).

Overall, the findings demonstrate persistently low awareness of oral cancer despite its preventable nature. Since early detection significantly improves survival outcomes (7,18), strengthening public education and integrating routine oral cancer screening into dental practice are imperative.

**Strength and Limitations**

This study has several limitations. First, it was conducted in a single tertiary referral hospital in an urban setting, which may limit generalizability to rural populations and the broader Ethiopian community. Second, the cross-sectional design

precludes establishing causal relationships between socio-demographic factors and knowledge levels. Third, self-reported responses may be subject to recall bias or social desirability bias. Finally, the use of a mean score to dichotomize knowledge may not fully capture the complexity of awareness levels.

Despite these limitations, the study provides important baseline data for Ethiopia and highlights critical gaps in oral cancer awareness.

## CONCLUSION AND RECOMMENDATIONS

This study revealed a generally low level of awareness regarding oral cancer among patients attending the Dentistry and Oral and Maxillofacial Surgery Clinic at Tikur Anbessa Specialized Hospital. Knowledge of major risk factors, such as tobacco and alcohol use, was moderate; however, awareness of other important risk factors and early warning signs was limited. A substantial proportion of participants had never heard of oral cancer, which may contribute to delayed health-seeking behavior and late-stage diagnosis. Educational status and place of residence were significantly associated with knowledge levels, highlighting disparities in access to health information. These findings indicate an urgent need for strengthened public health education and preventive strategies to improve early detection and reduce morbidity and mortality associated with oral cancer.

Based on the findings of this study, comprehensive public awareness initiatives should be implemented to improve knowledge of oral cancer risk factors and early signs. Mass media platforms, including television, radio, and social media, should be strategically utilized, as they were identified as the primary source of information among participants. In addition, healthcare professionals, particularly dentists and physicians, should actively incorporate oral cancer education and routine opportunistic screening into daily clinical practice. Community-based health education programs should be expanded, particularly targeting rural populations and individuals with lower educational attainment. Integrating oral cancer awareness into school health programs and university curricula may further promote early knowledge and preventive behaviors. Finally, further multicenter and community-based research is recommended to assess awareness levels across different regions of Ethiopia and to evaluate the effectiveness of educational interventions.

## REFERENCES

1. Early detection and prevention of oral cancer: a management strategy for dental practice. Occasional paper.

2. Montero PH, Patel SG. Cancer of the oral cavity. Surg Oncol Clin N Am. 2015;24(3):491–508.

3. McGuire S. World Cancer Report 2014. Geneva, Switzerland: World Health Organization, International Agency for Research on Cancer, WHO Press, 2015. Adv Nutr. 2016;7(2):418–419.

4. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer. 2015;136(5):E359–E386.

5. Ghantous Y, Abu Elnaaj I. Global incidence and risk factors of oral cancer. Harefuah. 2017;156(10):645–649.

6. IARC monographs on the evaluation of carcinogenic risks to humans. IARC Monogr Eval Carcinog Risks to Humans. 2010;93:9–38.

7. Wolff KD, Follmann M, Nast A. The diagnosis and treatment of oral cavity cancer. Dtsch Arztebl Int. 2012 Nov;109(48):829–35.

8. Soerjomataram I, Bray F. Planning for tomorrow: global cancer incidence and the role of prevention 2020-2070. Nat Rev Clin Oncol. 2021 Oct;18(10):663–72.

9. Bagan J, Sarrion G, Jimenez Y. Oral cancer: clinical features. Oral Oncol. 2010 Jun;46(6):414–7.

10. Sobin LH, Gospodarowicz MK, Wittekind C. TNM classification of malignant tumours. John Wiley & Sons; 2011.

11. Lin NC, Hsu JT, Tsai KY. Survival and clinicopathological characteristics of different histological grades of oral cavity squamous cell carcinoma: A single-center retrospective study. PLoS One. 2020;15(8):e0238103.

12. Kato MG, Baek CH, Chaturvedi P, Gallagher R, Kowalski LP, Leemans CR, et al. Update on oral and oropharyngeal cancer staging - International perspectives. World J Otorhinolaryngol - head neck Surg. 2020 Mar;6(1):66–75.

13. Miloro M, Ghali GE, Peter ·, Larsen E, Editors W. Peterson's Principles of Oral and Maxillofacial Surgery Fourth Edition.

14. Brocklehurst P, Kujan O, O'Malley LA, Ogden G, Shepherd S, Glenny AM. Screening programmes for the early detection and prevention of oral cancer. Cochrane database Syst Rev. 2013 Nov;2013(11):CD004150.

15. Walsh T, Liu JLY, Brocklehurst P, Glenny AM, Lingen M, Kerr AR, et al. Clinical assessment to screen for the detection of oral cavity cancer and potentially malignant disorders in apparently healthy adults. Cochrane database Syst Rev. 2013 Nov;2013(11):CD010173.

16. Sankaranarayanan R, Nair MK, Mathew B, Balaram P, Sebastian P, Dutt SC. Recent results of oral cancer research in Kerala, India. Head Neck. 1992;14(2):107–12.

17. Mangalath U, Aslam SA, Abdul Khadar AHK, Francis PG, Mikacha MSK, Kalathingal JH. Recent trends in prevention of oral cancer. J Int Soc Prev Community Dent. 2014 Dec;4(Suppl 3):S131-8.

18. Lima AM, Meira IA, Soares MS, Bonan PR, Mélo CB, Piagge CS. Delay in diagnosis of oral cancer: a systematic review. Med Oral Patol Oral Cir Bucal. 2021 Nov;26(6):e815–24.

19. Hassona Y, Scully C, Abu Ghosh M, Khoury Z, Jarrar S, Sawair F. Mouth cancer awareness and beliefs among dental patients. Int Dent J. 2015 Feb;65(1):15–21.

20. Anirudh PB, Ty S, A S, S R. Assessment of Knowledge of and Attitude Toward Oral Cancer Among the Outpatient Population in a Tertiary Care Rural Hospital. Cureus. 2023 Mar;15(3):e36637.

21. Lakra S, Kaur G, Mehta A, Kaushal V, Atri R, Sunder. Knowledge and awareness of oral cancer patients regarding its etiology, prevention, and treatment. Indian J Dent Res Off Publ Indian Soc Dent Res. 2020;31(4):625–8.

22. Macleod U, Mitchell ED, Burgess C, Macdonald S, Ramirez AJ. Risk factors for delayed presentation and referral of symptomatic cancer: evidence for common cancers. Br J Cancer. 2009 Dec;101 Suppl(Suppl 2):S92–101.

23. Al-Maweri SA, Addas A, Tarakji B, Abbas A, Al-Shamiri HM, Alaizari NA, et al. Public awareness and knowledge of oral cancer in Yemen. Asian Pac J Cancer Prev. 2014;15(24):10861–5.

24. Eadie D, MacKintosh AM, MacAskill S, Brown A. Development and evaluation of an early detection intervention for mouth cancer using a mass media approach. Br J Cancer. 2009 Dec;101 Suppl(Suppl 2):S73-9.

25. Saleh A, Yang YH, Wan Abd Ghani WMN, Abdullah N, Doss JG, Navonil R, et al. Promoting oral cancer awareness and early detection using a mass media approach. Asian Pac J Cancer Prev. 2012;13(4):1217–24.

26. Srikanth Reddy B, Doshi D, Padma Reddy M, Kulkarni S, Gaffar A, Ram Reddy V. Oral cancer awareness and knowledge among dental patients in South India. J cranio-maxillo-facial Surg Off Publ Eur Assoc Cranio-Maxillo-Facial Surg. 2012 Sep;40(6):521–4.

27. Villa A, Kreimer AR, Pasi M, Polimeni A, Cicciù D, Strohmenger L, et al. Oral cancer knowledge: a survey administered to patients in dental departments at large Italian hospitals. J cancer Educ Off J Am Assoc Cancer Educ. 2011 Sep;26(3):505–9.

28. Babiker TM, Osman KAA, Mohamed SA, Mohamed MA, Almahdi HM. Oral Cancer Awareness Among Dental Patients in Omdurman, Sudan: a cross-sectional Study. BMC Oral Health. 2017 Mar;17(1):69.

29. Zhou XH, Huang Y, Yuan C, Zheng SG, Zhang JG, Lv XM, et al. A survey of the awareness and knowledge of oral cancer among residents in Beijing. BMC Oral Health. 2022 Aug;22(1):367.

30. Warnakulasuriya S, Dietrich T, Bornstein MM, Casals Peidró E, Preshaw PM, Walter C, et al. Oral health risks of tobacco use and effects of cessation. Int Dent J. 2010 Feb;60(1):7–30.

31. Bader P, Boisclair D, Ferrence R. Effects of tobacco taxation and pricing on smoking behavior in high risk populations: a knowledge synthesis. Int J Environ Res Public Health. 2011 Nov;8(11):4118–39.

32. Zachar JJ, Huang B, Yates E. Awareness and knowledge of oral cancer amongst adult dental patients attending regional university clinics in New South Wales, Australia: a questionnaire-based study. Int Dent J [Internet]. 2020;70(2):93–9. Available from: https://www.sciencedirect.com/science/article/pii/S0020653920313782

33. Prado NS, Bonan RF, Leonel AC, Castro UF, Carvalho EJ, Silveira FM, et al. Awareness on oral cancer among patients attending dental school clinics in Brazil. Med Oral Patol Oral Cir Bucal. 2020 Jan;25(1):e89–95.

34. Ghani WMN, Doss JG, Jamaluddin M, Kamaruzaman D, Zain RB. Oral cancer awareness and its determinants among a selected Malaysian population. Asian Pac J Cancer Prev. 2013;14(3):1957–63.

35. Monteiro LS, Warnakulasuriya S, Cadilhe S, Sousa D, Trancoso PF, Antunes L, et al. Oral cancer awareness and knowledge among residents in the Oporto city, Portugal. J Investig Clin Dent. 2016 Aug;7(3):294–303.

36. Agrawal M, Pandey S, Jain S, Maitin S. Oral cancer awareness of the general public in Gorakhpur city, India. Asian Pac J Cancer Prev. 2012;13(10):5195–9.

37. Tadbir AA, Ebrahimi H, Pourshahidi S, Zeraatkar M. Evaluation of levels of knowledge about etiology and symptoms of oral cancer in southern Iran. Asian Pac J Cancer Prev. 2013;14(4):2217–20.

38. Azimi S, Ghorbani Z, Ghasemi E, Tennant M, Kruger E. Disparities in Oral Cancer Awareness: a Population Survey in Tehran, Iran. J cancer Educ Off J Am Assoc Cancer Educ. 2019 Jun;34(3):535–41.