

Community-based Screening of Oral Cancer in Selected Districts of Nepal: A Cross-Sectional Study

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Abstract

Objective: Oral cancer screening plays a vital role in the prevention and control of oral cancer. This study aimed to determine the prevalence of oral potentially malignant disorders (OPMDs) in the Nepalese community. **Methods:** A cross-sectional study was conducted in six purposively selected districts in Nepal from May to December 2019. It utilized a camp-based approach, where a standardized questionnaire was administered through face-to-face interviews. Screening of oral cancer was performed by direct visualization and palpation. The study included adults aged 18 years and above, while those already diagnosed with oral cancer were excluded. Logistic regression was used to find out the association between OPMDs and the related variables. **Results:** A total of 1930 participants with a mean age of 44.3 years (SD=15.1) underwent oral cancer screening. Among them, 32% were current tobacco users, 2% were ex-users, and 11% were alcohol consumers. OPMDs, including suspected cancer, were identified in 139 (7.2%, 95% CI=6.1-8.4) participants. The most common lesion detected was leukoplakia (4.2%), followed by submucous fibrosis (1.5%), erythroplakia (0.9%), and palatal changes due to reverse smoking (0.1%). Additionally, 10 participants were suspected of having oral cancer. Older age group (AOR=7.00; 95% CI=2.76-17.77), male gender (AOR=2.52; 95% CI=1.58-4.02), tobacco chewers (AOR = 14.30; 95% CI=8.82-23.19), and smokers (AOR=4.67; 95% CI=2.88-7.57) were identified as predictors of OPMDs. **Conclusion:** This study revealed a high prevalence of OPMDs in Nepal, highlighting the need for oral cancer screening. The findings emphasize the importance of developing strategies to reduce tobacco use and implementing tobacco cessation intervention programs in Nepal to alleviate the burden of oral cancer.

Keywords: Oral cancer- precancerous- early detection- Nepal

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Introduction

Oral cancer ranks as the 16th most common cancer in the world in 2020, with Asian countries contributing two-thirds of all cases (International Agency for Research on Cancer, 2020a). In the same year, oral cancer accounted for 844 new cases (ranking sixth) and 446 deaths (ranking seventh) in Nepal (International Agency for Research on Cancer, 2020b). The oral potentially malignant disorders (OPMDs) such as oral leukoplakia, oral submucous fibrosis, and oral erythroplakia, take years to progress into oral cancer. Effective detection of these OPMDs through visual inspection or palpation by healthcare professionals can prevent the development of oral cancer (Bouvard et al., 2022; Petersen, 2009; Sankaranarayanan et al., 2015). Various studies have demonstrated the efficacy of visual inspection of the oral cavity in reducing mortality from oral cancer, (Fedele, 2009; Sankaranarayanan et al., 2015)

with a sensitivity of 50 to 99% and specificity of 75 to 99% (Walsh et al., 2021).

Screening plays a crucial role in the early detection of OPMDs. While screening services are primarily available at hospitals, there is a scarcity of screening services at the community level. Therefore, this study aims to determine the prevalence of OPMDs through visual inspection in selected districts of Nepal.

Materials and Methods

A cross-sectional study was conducted from May 2019 to December 2019 in six purposively selected districts of Nepal viz. Chitwan, Makwanpur, Kapilvastu, Jhapa, Dhanusha and Kaski (Figure 1). Two oral cancer camps were organized in two different municipalities of the selected districts, led by B.P Koirala Memorial Hospital (BPKMCH), Chitwan, in close coordination with the

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District Public Health Office and the local municipality.

Data was collected using a standardized questionnaire via face-to-face interviews. The questionnaire consisted of sociodemographic characteristics, family history of cancer, tobacco use, alcohol consumption, oral cavity-related complaints, and oral cancer screening form. Trained medical professionals with at least two years of experience conducted the visual inspection and palpation of the oral cavity. The study included adults aged 18 years and above, excluding those who had already been diagnosed with oral cancer. However, every participant in the camp received counseling, and screening, regardless of the study criteria. Pretesting of the questionnaire was carried out on 10% of the sample size among visitors at BPKMCH, who were not included in this study.

Data were entered into Microsoft Excel 2007 and analyzed using the Statistical Package for Social Sciences (SPSS), version 17. The dependent variable was the presence of OPMDs, and the independent variables were sociodemographic characteristics, family history of cancer, current oral problems, tobacco use, and alcohol consumption. Descriptive statistics were used to present the data in the form of frequency, percentage, mean, and standard deviation. Unconditional logistic regression was applied to calculate crude and adjusted odds ratios, along with 95% confidence intervals (CIs), to determine the strength of the association between dependent and independent variables.

This study was approved by the Ethical Review Committee, Nepal Health Research Council (Reg. no. 151/2019). Participants were provided with a clear explanation of the study objectives and procedure, and informed consent was obtained before their inclusion.

Results

A total of 1930 participants, with a mean age of 44.3 years (SD=15.1), were included in this study. The majority of the participants fell in the 31-45 years age group (35.2%), followed by the 45-60 years. Females were more than males (61.2% vs. 38.8%). The majority of participants were farmers (32.8%), followed by homemakers (28.4%). Only 0.4% of the participants had a history of cancer unrelated to head and neck cancer, while 2.7% reported a history of cancer in the family. Among the participants, 32.2% were current tobacco users, and 1.9% were ex-users. Of the current tobacco users, 65.0% were tobacco chewers, 26.0% were smokers and the rest used both forms. Approximately 10.6% were alcohol consumers (Table 1). The common presenting complaints were sore throat (15.0%), followed by denture or gum problems (12.4%), and earache (4.3%). Only 2.5% of the participants reported red or white patches in the mouth (Table 2).

OPMDs, including suspected cancerous lesions, were detected in a total of 139 participants (7.2%, 95% CI=6.1-8.4). The most common lesion observed was leukoplakia (4.2%), followed by submucous fibrosis (1.5%), erythroplakia (0.9%), and palatal changes due to reverse smoking (0.1%). Additionally, 10 participants were suspected of having oral cancer (Table 3). The

Table 1. Demographic and Personal History of Participants Screened for Oral Cancer in Selected Districts of Nepal (n=1930).

Variables	Categories	n	%	
Age (in years)	18-30	412	21.3	
	31-45	680	35.2	
	45-60	530	27.5	
	>60	308	16.0	
Gender	Male	749	38.8	
	Female	1181	61.2	
Occupation	Farmer	632	32.8	
	Homemaker	548	28.4	
	Business	238	12.3	
	Skilled/Service	238	12.3	
	Student	141	7.8	
	Retired	38	2.1	
	Labour	31	1.6	
Past history of cancer	Yes	8	0.4	
	No	1922	99.6	
	Family history of Cancer	Yes	53	2.7
		No	1877	97.3
Tobacco use	None	1271	65.9	
	Current user	622	32.2	
	Ex-user	37	1.9	
Type of tobacco among current users (n=622)	Tobacco chewing	404	65.0	
	Smoking	162	26.0	
	Both	56	9.0	
Alcohol consumption	Yes	205	10.6	
	No	1725	89.4	

majority of OPMDs were located on the buccal mucosa (73.4%), followed by the gum (22.3%), gingival buccal sulcus (20.1%), and tongue (10.8%) (Table 4).

The prevalence of OPMDs was found to increase with age. Compared to the younger age group of 16-30 years,

Table 2. Presenting Complaints of Participants Screened for Oral Cancer in Selected Districts of Nepal (n=1930).

Oral cavity complaints*	n	%
Sore throat	289	15.0
Denture or gum problems	240	12.4
Earache	83	4.3
Difficulty in swallowing	53	2.8
Change in voice	51	2.6
Red or white patched in mouth	48	2.5
Sore in mouth	45	2.3
Bleeding from oral cavity	21	1.1
Swelling in head and neck	19	1.0
Lump in throat	15	0.8
Growth in neck	14	0.7

*includes multiple complaints

Table 3. Type of Oral Potentially Malignant Disorders Detected among the Participants Screened for Oral Cancer in the Selected Districts of Nepal (n=1930)

Type of oral potentially malignant disorders	n	%
Leukoplakia	82	4.2
Submucous fibrosis	28	1.5
Erythroplakia	18	0.9
Suspected cancer	10	0.5
Palatal changes due to reverse smoking	1	0.1
Total OPMDs detected	139	7.2

participants aged 31-45 years had four times higher odds of having OPMDs (AOR=3.88; 95% CI=1.56-9.67), while those in the 45-60 years and over 60 years age groups had seven times higher odds (AOR=7.06; 95% CI= 2.86-17.46 and AOR=7.00; 95% CI=2.76-17.77). Males were more likely to have OPMDs than females (AOR=2.52; 95% CI=1.58-4.02). The odds of having OPMDs among

Table 4. Sites of Oral Potentially Malignant Disorders Detected among the Participants Screened for Oral Cancer in the Selected Districts of Nepal (n=139)

Sites*	n	%
Buccal mucosa	102	73.4
Gum	31	22.3
Gingival buccal sulcus	28	20.1
Tongue	15	10.8
Lip	9	6.5
Labial mucosa	8	5.6
Hard palate	7	5.0
Floor of mouth	6	4.3
Retromolar triangle	3	2.2
Soft palate	3	2.2

*multiple sites

the tobacco chewers were 14 times higher compared to the non-users (AOR = 14.30; 95% CI=8.82-23.19),

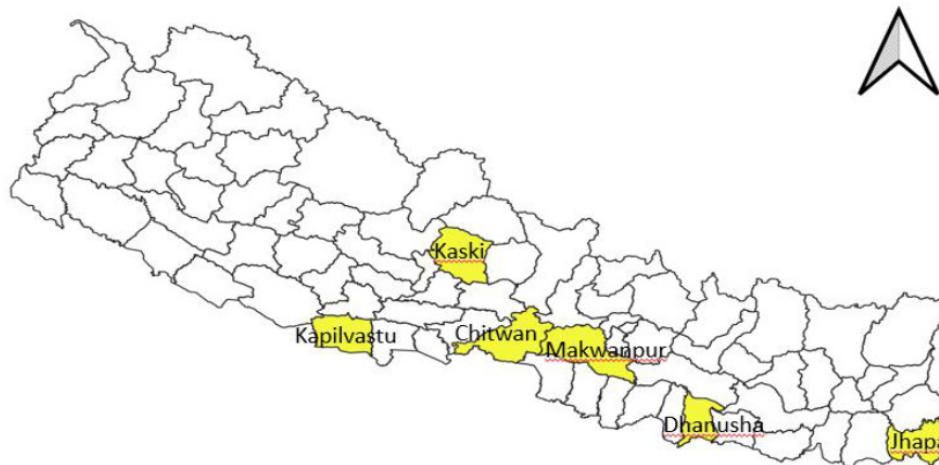


Figure 1. Map of Nepal Illustrating the Districts Selected in the Oral Cancer Screening Camps Conducted During the Study

Table 5. Association of Oral Potentially Malignant Disorders with Demographic and Personal History

Variables	Category	OPMDs		COR (95% CI)	AOR (95% CI)
		Present n (%)	Absent n (%)		
Age (in years)	16-30	6 (1.5)	406 (98.5)	Ref	Ref
	31-45	42 (6.2)	638 (93.8)	4.46 (1.89-10.57)	3.88 (1.56-9.67)
	45-60	54 (10.2)	476 (89.8)	7.68 (3.27-18.03)	7.06 (2.86-17.46)
	>60	37 (12.0)	271 (88.0)	9.24 (3.85-22.19)	7.00 (2.76-17.77)
Gender	Female	32 (2.7)	1149 (97.3)	Ref	Ref
	Male	107 (14.3)	642 (85.7)	5.98 (3.99-8.99)	2.52 (1.58-4.02)
Family history of cancer	No	134 (7.1)	1743 (92.9)	Ref	Ref
	Yes	5 (9.4)	48 (90.6)	1.36 (0.53-3.46)	1.11 (0.39-3.19)
Tobacco chewing	No	29 (2.0)	1441 (98.0)	Ref	Ref
	Yes	110 (23.9)	350 (76.1)	15.62 (10.21-23.90)	14.30 (8.82-23.19)
Smoking	No	94 (5.5)	1618 (94.5)	Ref	Ref
	Yes	45 (20.6)	173 (79.4)	4.48 (3.04-6.60)	4.67 (2.88-7.57)
Alcohol use	No	94 (5.4)	1631 (94.6)	Ref	Ref
	Yes	45 (22.0)	160 (78.0)	4.88 (3.30-7.21)	1.08 (0.68-1.72)

COR, crude odds ratio; AOR, adjusted odds ratio

while smokers had seven times higher odds compared to non-smokers (AOR=4.67; 95% CI=2.88-7.57). The association between alcohol use and OPMDs, which was significant in bivariate analysis (COR=4.88, 95% CI=3.30-7.21), did not remain statistically significant in the multivariate analysis. A family history of cancer was not found to be significant in this study (Table 5).

Discussion

This study aimed to investigate the prevalence of OPMDs and associated factors among adults in Nepal. This study revealed an overall prevalence rate of 7.2% for OPMDs in the study population. Higher prevalence rates have been reported in a study conducted in Eastern Nepal and other studies conducted in India (Kumar et al., 2015; Kumbhalwar et al., 2022; Rimal et al., 2019). Conversely, lower prevalence rates have also been reported in other studies (Pahwa et al., 2018; Vinay et al., 2014). Among the identified OPMDs, leukoplakia was the most observed, followed by submucous fibrosis. Similar patterns were reported by other studies (Kumbhalwar et al., 2022; Mustafa et al., 2021). In contrast, other studies have reported a higher prevalence of oral submucous fibrosis (Kumbhalwar et al., 2022; Srivastava et al., 2020). The variation in prevalence and lesion patterns across different geographical regions may be attributed to cultural differences, location of data collection, dietary habits, environmental factors, and variations in tobacco and alcohol consumption in terms of frequency, duration, and type.

Sore throat and denture/gum problems were the most commonly reported presenting problems among participants, which may be attributed to the camp-based approach utilized in this study. Notably, 2.5% of the participants reported the presence of a white or red patch in their oral cavity, indicating a need to promote health-seeking behavior and encourage self-mouth examination as a cost-effective approach to reducing the burden of oral cancer.

Similar to other studies, a higher prevalence of OPMDs was observed among males compared to females (Kumbhalwar et al., 2022; Pahwa et al., 2018; Rimal et al., 2019; Vinay et al., 2014). This male predominance can be attributed to the higher prevalence of tobacco and alcohol consumption among males. In the largest cancer hospital in Nepal, the incidence of oral cancer is more in males than females (Shrestha et al., 2021).

Both tobacco chewing and smoking were identified as significant predictors of OPMDs. Numerous studies have reported a strong association between tobacco use in any form and OPMDs (Kumbhalwar et al., 2022; Pahwa et al., 2018; Srivastava et al., 2020). While alcohol consumption showed a significant association with OPMDs in bivariate analysis, this difference did not remain statistically significant after adjustment. This finding was consistent with a study in India (Pahwa et al., 2018).

Oral cancer screening through visual inspection is a simple procedure that is easily performed by trained primary health care workers. It is crucial to raise awareness about oral cancer and its risk factors. Implementing mass

screening programs for oral cancer can address the screening needs of the population, especially in rural areas. Additionally, this study emphasizes the urgent need for strategies to reduce tobacco consumption and implement tobacco cessation programs. However, it should be noted that the findings of this study are not generalizable due to the purposive selection of districts and the study population. Confirmation of the diagnosis of OPMDs and cancerous lesions was not undertaken, although patients were advised to follow up in BPKMCH.

In conclusion, the present study highlights a high prevalence of OPMDs in Nepal, emphasizing the urgent need for screening and early detection of oral cancers in the community. Efforts should be directed toward developing strategies to reduce tobacco use and implementing tobacco cessation intervention programs in Nepal.

Author Contribution Statement

GS, BS & RM conceived the study. GS, BS & RM contributed to the design of the study. Data collection was done by GS, DKG, BS & KKP. Data analysis was done by GS & RM. Preliminary report writing was performed by GS, DKG, BS & RM. Manuscript editing and review was done by GS & RM. All authors read and approved the final manuscript.

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Conflict of interests

The authors declare no conflict of interests.

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