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Prevalence of Oral Premalignant and Malignant Lesions in Tertiary Care Center at Uttara Kannada District

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ABSTRACT

Background: Oral premalignant and malignant lesions represent a significant public health concern, particularly in developing countries due to the high prevalence of tobacco, areca nut, and gutkha consumption. Early detection of oral potentially malignant disorders (OPMDs) is crucial for preventing progression to oral squamous cell carcinoma.

Aim: To assess the prevalence of oral premalignant and malignant lesions and to evaluate their association with demographic variables and risk factors in the study population.

Materials and Methods: A hospital-based observational study was conducted in the Department of Dentistry, Karwar Institute of Medical Sciences and Hospital, Karwar, Karnataka, over a period of six years (January 2020–December 2025). A total of 51,840 patients attending the dental outpatient department were screened clinically for oral premalignant and malignant lesions using WHO diagnostic criteria. Demographic data, oral habits, and clinical findings were recorded. Statistical analysis was performed using IBM SPSS version 27.0, and associations were assessed using the Chi-square or Fisher's exact test, with $p < 0.05$ considered statistically significant.

Results: Among the screened population, 85 patients (0.16%) were diagnosed with oral premalignant lesions and 97 patients (0.19%) with oral malignant lesions. The mean age of affected individuals was 50.1 ± 14 years, with the highest prevalence observed in the 50–60-year age group. A statistically significant association was found between age and lesion status ($p < 0.001$). Male predominance was observed (75.8%), and malignancy status showed a significant association with gender ($p = 0.009$). Oral submucous fibrosis was the most common premalignant lesion (69.4%). Buccal mucosa was the most frequently involved site for malignant lesions (52.5%). Smokeless tobacco use, gutka, and pan with tobacco showed a strong and statistically significant association with both premalignant and malignant lesions ($p < 0.001$).

Conclusion: The prevalence of oral premalignant and malignant lesions in this study population was found to be 0.16% and 0.19%, respectively. The study highlights a low but notable prevalence of oral premalignant and malignant lesions, with significant associations with age, male gender, and smokeless tobacco and areca

nut consumption. These findings emphasize the need for routine oral screening, early diagnosis, and targeted public health interventions aimed at reducing high-risk habits to prevent malignant transformation.

Keywords: Premalignant, Malignant, leukoplakia, erythroplakia, lichen planus, OSMF and actinic cheilitis

INTRODUCTION

Oral premalignant and malignant lesions constitute a significant global health burden, particularly in developing countries where risk factors such as tobacco use, gutkha usage, alcohol consumption, betel quid chewing, and human papillomavirus infection are prevalent. Oral cancer accounts for a substantial proportion of head and neck malignancies, with oral squamous cell carcinoma (OSCC) representing over 90% of cases[1]. Despite advances in diagnostic and therapeutic modalities, the prognosis of oral cancer remains poor, largely due to late-stage diagnosis[2].

Oral premalignant lesions, also referred to as oral potentially malignant disorders (OPMDs), are clinical entities that carry an increased risk of malignant transformation[3]. Common OPMDs include leukoplakia, erythroplakia, oral submucous fibrosis, oral lichen planus, and actinic cheilitis[4]. These lesions often present with subtle clinical features and may remain asymptomatic for extended periods, underscoring the importance of early detection and regular oral screening[5]. Histopathological assessment, particularly the presence and degree of epithelial dysplasia, remains the gold standard for evaluating malignant potential[6].

Malignant lesions of the oral cavity are characterized by uncontrolled cellular proliferation, invasion of adjacent tissues, and the potential for regional and distant metastasis[7]. OSCC typically arises from pre-existing premalignant changes, following a multistep process of genetic and epigenetic alterations[8]. Early-stage oral cancers may be benign or premalignant conditions, posing diagnostic challenges for clinicians[9]. Aim of our study was to assess the prevalence of premalignant and malignant lesion in the oral cavity. Objective of our study was to correlation risk factors with premalignant and malignant lesion in the oral cavity and association of the same with age and sex.

MATERIALS & METHODS

The present study was conducted in the Department of Dentistry at Karwar Institute of Medical Sciences and Hospital, Karwar, Karnataka. Ethical approval for the study was obtained from the Institutional Ethics Committee. The study was carried out over a period of six years, from January 2020 to December 2025.

Study Population

All patients attending the Dental Outpatient Department (OPD) during the study period were screened for the presence of oral premalignant and malignant lesions.

Inclusion Criteria

Patients aged 18 years and above.

Exclusion Criteria

- Patients unwilling to undergo oral screening.
- Patients who had previously undergone surgery or any form of treatment for oral malignancy.
- Patients with a history of immunocompromised conditions.
- Patients with recurrence of primary lesions or with multiple oral and/or head and neck lesions.

Clinical Examination and Data Collection

Prior to examination, informed consent was obtained from all participants. Oral screening was performed using a mouth mirror and probe under adequate illumination. Visual examination was employed as the primary screening method, as it is non-invasive, painless, cost-effective, and socially acceptable[10].

Clinical diagnosis of oral premalignant and malignant lesions was made based on the

World Health Organization (WHO) guidelines as described by Warnakulasuriya et al.[3] on oral potentially malignant disorders: nomenclature and classification. The type of lesion and its anatomical site were recorded during the screening.

Demographic details of the participants, including age and gender, were documented. Information regarding exposure to various risk factors such as smokeless tobacco use, smoking, gutka chewing, pan chewing with or without tobacco, and the presence of clinically sharp teeth in the oral cavity was also recorded.

Statistical Analysis

Data collected was compiled using MS-Excel and was analysed using IBM SPSS Statistics for windows, version 27.0. All categorical variables are expressed in terms of number and percentages. Association between the variables were found using Chi-square test and p-value <0.05 was considered to be statistically significant.

RESULT

A total of 51,840 patients were screened over a period of six years. Among them, 85 patients were diagnosed with oral premalignant lesions and 97 patients with oral malignant lesions (Table No. 1). The prevalence of oral premalignant and malignant lesions in the study population was found to be 0.16% and 0.19%, respectively.

Table No.-1: Basic Characteristics of the study participants

Study parameters		Frequency (N=182)	Percent
Age (years)	20 – 30	17	9.3
	30 – 40	24	13.2
	40 – 50	41	22.5
	50 – 60	47	25.8
	> 60	53	29.1
Gender	Female	44	24.2
	Male	138	75.8
Malignancy	Malignant	97	53.3
	Pre-malignant	85	46.7

The age of the study participants ranged from 20 to 80 years, with a mean age of 50.1 ± 14 years. The presence of oral premalignant and malignant lesions showed a statistically significant association with age ($p < 0.001$) (Table No.2) (Graph 1). The highest frequency of these lesions was observed in the 50–60-year age group.

Table No.-2: Association of Oral Premalignancy and Malignancy with age, gender & sharp tooth of the study participants.

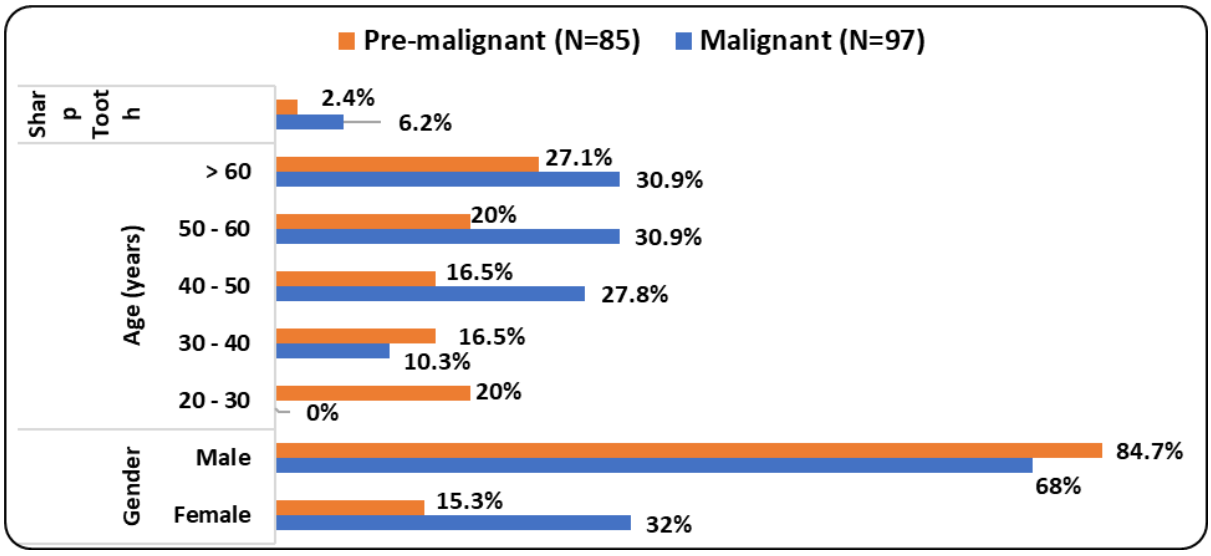
Study parameters	Malignant (N=97)	Pre-malignant (N=85)	Total (N=182)	p-value
Gender				**0.008*[#]**
Female	31	13	44	
Male	66	72	138	
Age (years)				**<0.001*[$]**
20–30	0	17	17	
30–40	10	14	24	
40–50	27	14	41	
50–60	30	17	47	
>60	30	23	53	
Sharp Tooth				0.273[#]
Yes	6	2	8	
No	91	83	174	

***Significant value. [#]Fisher's exact test, [$]Fisher–Freeman–Halton exact test.**

A statistically significant association was observed between gender and disease status (p = 0.008). Males constituted a higher proportion in the pre-malignant group (84.7%) compared to the malignant group (68.0%), whereas females were relatively more represented among malignant cases (32.0% vs 15.3%).

The distribution of cases across age groups showed a highly significant association with disease status (p <0.001). Notably, no malignant cases were observed in the 20–30 years age group, while pre-malignant lesions were relatively more frequent in younger individuals. In contrast, malignant cases were more commonly seen in older age groups, particularly above 40 years, suggesting a strong age-related progression pattern.

In contrast, the presence of a sharp tooth did not show a statistically significant association with disease status (p = 0.273). Although slightly more malignant cases were observed among individuals with sharp teeth, the difference was not statistically meaningful.



Graph No.-1 :Pre malignant lesion and malignant lesion in oral cavity in realtion to age group and gender

Sharp tooth was observed in 8 patients, among whom 6 patients presented with malignant lesions (carcinoma of the tongue) and 2 patients had oral premalignant lesions. The association between oral premalignant and malignant lesions and adverse oral habits is presented in (Table 3) (Graph No.2). Consumption of smokeless tobacco showed a significant association with oral premalignant and malignant lesions (p < 0.001). Additionally, the use of tobacco combined with areca nut in the form of pan or gutka was also significantly associated with both premalignant and malignant lesions (p < 0.001).

Table No.-3: Association of Oral Premalignancy and Malignancy with habits of the study participants.

Study parameters	Malignant (N=97)	Pre-malignant (N=85)	Total (N=182)	p-value
Alcohol consumption				0.108[a]
Yes	20	10	30	
No	77	75	152	
Tobacco consumption – Smokeless forms				**<0.001***[a]
Yes	70	20	90	
No	27	65	92	
Tobacco consumption – Smoking forms				0.305[a]
Yes	18	11	29	
No	79	74	153	

Tobacco with arecanut – Gutka				**<0.001*[a]**
Yes	6	57	63	
No	91	28	119	
Tobacco with arecanut – Pan				**<0.001*[b]**
Yes	68	3	71	
No	29	82	111	

***Significant value. [a]Chi-square test, [b]Fisher's exact test.**

Table 3 presents the association between various habit-related risk factors and the occurrence of oral malignancy and premalignancy among the study participants.

Alcohol consumption was reported in 30 participants, of whom 20 (66.7%) had malignant lesions and 10 (33.3%) had premalignant lesions. Among non-alcohol users, 77 (50.7%) were malignant and 75 (49.3%) were premalignant. The association between alcohol consumption and disease status was not statistically significant ($p = 0.108$), suggesting that alcohol intake alone did not show a meaningful relationship with malignancy in this cohort.

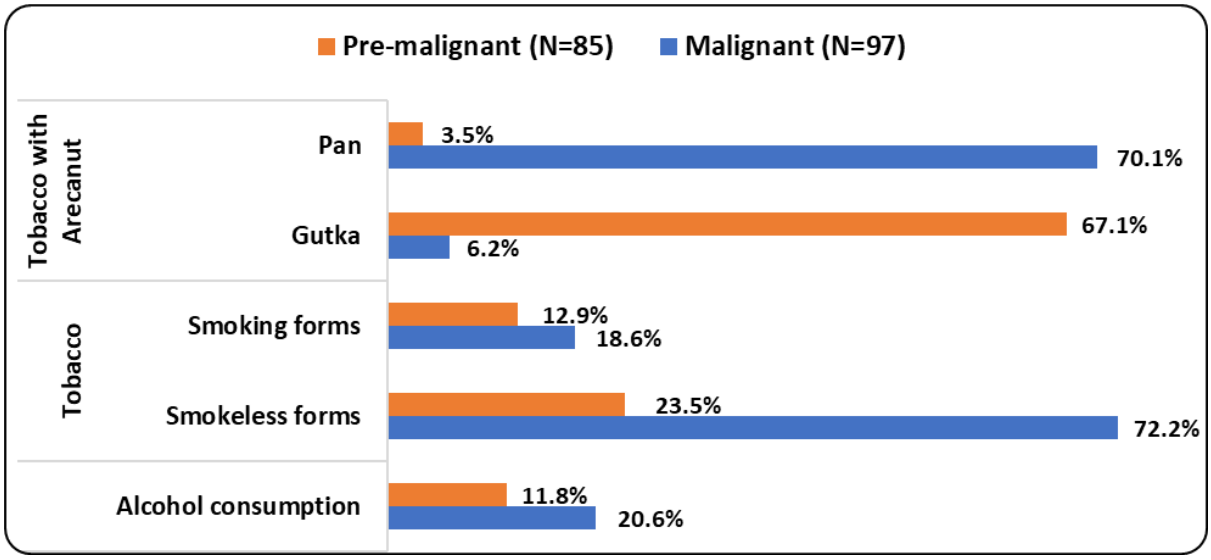
Smokeless tobacco consumption showed a strong and statistically significant association with disease status ($p < 0.001$). A large proportion of malignant cases (70/97; 72.2%) reported smokeless tobacco use compared to only 20/85 (23.5%) in the premalignant group. Conversely, non-users were predominantly found in the premalignant group (65/92; 70.7%). This indicates that smokeless tobacco is a significant risk factor for progression to malignancy.

For smoking forms of tobacco, 18 (62.1%) of users had malignant lesions and 11 (37.9%) had premalignant lesions. However, the association was not statistically significant ($p = 0.305$), suggesting that smoking alone did not demonstrate a significant effect on malignancy risk in this sample.

Gutka use (tobacco with arecanut) was significantly associated with disease status ($p < 0.001$). Interestingly, a higher proportion of gutka users were in the premalignant group (57/63; 90.5%), whereas most non-users were malignant (91/119; 76.5%). This pattern suggests that gutka consumption may be more strongly linked with premalignant conditions, potentially representing an earlier stage in the disease spectrum.

Pan consumption (tobacco with arecanut) demonstrated a highly significant association with disease status ($p < 0.001$). A substantial majority of pan users had malignant lesions (68/71; 95.8%), whereas non-users were predominantly premalignant (82/111; 73.9%). This indicates a strong relationship between pan use and oral malignancy.

In summary, smokeless tobacco and arecanut-containing products (gutka and pan) showed statistically significant associations with oral premalignant and malignant conditions. Among these, pan consumption demonstrated the strongest association with malignancy. In contrast, alcohol consumption and smoking forms of tobacco did not show statistically significant associations in this study. These findings highlight the critical role of specific chewing habits, particularly those involving arecanut and tobacco, in the pathogenesis and progression of oral cancer.



Graph No.-2 Oral pre malignant and malignant lesions in relation to risk factors

DISCUSSION

The present study evaluated the prevalence and associated risk factors of oral premalignant and malignant lesions in the study population. The prevalence of oral premalignant lesions was found to be 0.16%, while oral malignant lesions accounted for 0.19%, indicating a slightly higher prevalence of malignant lesions. This finding may be attributed to the fact that all patients with oral malignancies presented with overt clinical symptoms such as swelling or ulceration, prompting them to seek medical attention. In contrast, premalignant lesions are often asymptomatic and may remain undetected unless routine oral screening is performed.

The prevalence of oral premalignant lesions observed in the present study was lower compared to the findings of Kashid et al.[11], who reported a prevalence of 1.83%. This variation may be explained by differences in study population, sample size, geographic location, and exposure to risk factors such as tobacco consumption. Oral carcinoma continues to be a major global health concern, with increasing incidence and mortality. In the Indian subcontinent, oral cancer constitutes a substantial proportion of all malignancies, with reported incidence rates ranging from 30% to 40%, as documented by Parkin et al.[12].

In the present study, the age of affected individuals ranged from 20 to 80 years, with the highest prevalence of oral premalignant and malignant lesions observed in the 50–60-year age group. This finding is consistent with previous studies and may be attributed to prolonged exposure to etiological factors such as tobacco and areca nut consumption over time.

Among oral potentially malignant disorders, oral submucous fibrosis was the most frequently encountered lesion, accounting for 69.4% of cases. Other lesions included leukoplakia, erythroplakia, and atrophic lichen planus. These findings are in agreement with the study conducted by Burungale SU et al.[13], who reported a higher prevalence of oral submucous fibrosis compared to leukoplakia. The high prevalence of oral submucous fibrosis in the present study reflects the widespread use of areca nut–containing products such as gutka and pan with tobacco in the study population.

A male predominance was observed in relation to oral premalignant and malignant lesions, and a statistically significant association with gender was noted ($p = 0.009$). This finding may be due to higher exposure of males to risk factors such as tobacco and areca nut use. However, Kashid et al.[11] reported no significant association between gender and premalignant disorders,

suggesting that sociocultural and regional factors may influence gender-based differences in disease prevalence.

The present study demonstrated a significant association between oral premalignant and malignant lesions and the use of smokeless tobacco, gutka, and pan with tobacco. Smokeless tobacco use showed the strongest association, followed by pan with tobacco and gutka chewing, all of which were statistically significant ($p < 0.001$). These findings highlight the carcinogenic potential of smokeless tobacco products and their role in the development of oral lesions. In contrast, alcohol consumption and smoking forms of tobacco did not show a significant association in the present study. Similar observations have been reported in studies by A Narasannavar, where a majority of patients exhibited betel nut and tobacco chewing habits, and smokeless tobacco use was found to have a stronger association with leukoplakia compared to smoking[14].

Despite its findings, the present study has certain limitations, including its cross-sectional design and reliance on self-reported habits, which may be subject to recall bias. Nevertheless, the study underscores the importance of early detection and public health interventions targeting smokeless tobacco and areca nut use to reduce the burden of oral premalignant and malignant lesions.

CONCLUSION

The present study highlights a substantial burden of oral premalignant and malignant lesions, underscoring oral cancer as a significant public health concern. The prevalence of oral premalignant and malignant lesions in the study population was found to be 0.16% and 0.19%, respectively. The predominance of lesions among middle-aged and older individuals, along with their strong association with tobacco- and areca nut–related habits, emphasizes the critical role of preventable risk factors. Early identification of premalignant conditions offers a valuable opportunity to interrupt disease progression and improve patient outcomes. Routine oral screening, community-based awareness programs, and targeted habit-cessation initiatives should be strengthened, particularly in high-risk populations. Integrating regular oral examinations into primary healthcare services and promoting timely referral can facilitate early diagnosis and reduce morbidity and mortality associated with oral cancer. Further large-scale, longitudinal studies are recommended to better understand regional patterns and to guide effective preventive and control strategies.

Declaration by Authors

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