

# Prevalence And Risk Factors For Oral Potentially Malignant Disorders Amongst Konkan Population Of Maharashtra, India: An Cross Sectional Study

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## Abstract

**Background:** Oral potentially malignant disorders (OPMDs) are characterised by suspicious alteration in oral mucosa that turn out into the malignancy. It is general consensus that OPMDs shows higher risk of malignant changes within the first few years of diagnosis, if not promptly treated. Early detection is of critical importance, it markedly improve survival rates when identified at early stage. So, investigating the prevalence and risk factors will prevent malignant transformations. So, in our study we attempted to observe the prevalence and risk factors for oral potentially malignant disorders amongst Konkan population of Maharashtra, India.

**Method:** The cross sectional study was undertaken for a period of 6 month (September 2022 to February 2023) and we reported with 1149 patients. The patient were examined and data was recorded and the recorded data were clubbed for statistical analysis using SPSS version 26.0.

**Results:** The prevalence of different potential malignant disorders among patients were maximum with tobacco pouch keratosis 581 (50.6%) patients, followed by 178 (15.5%) with oral speckled leukoplakia, 121 (10.5%) with oral lichen planus, and 119 (10.4%) with oral leukoplakia. The prevalence of oral sub mucous fibrosis and erythroplakia was less than 10%.

**Conclusion:** This article made an update to provide the knowledge about oral potentially malignant disorders to health care providers in order to early detection and treatment and reduces the mortality rate of oral cancer amongst Indian population.

**Key words:** Potentially malignant disorders, tobacco pouch keratosis, oral speckled leukoplakia, oral lichen planus, oral leukoplakia, oral sub mucous fibrosis, erythroplakia

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## I. Introduction

Oral cancer is a major concern which is increasing considerably around the globe. Oral cancer sometimes has predisposing factors which shows clinical manifestations. Initially they are categorized into premalignant condition and/or lesion. The malignant transformation of these oro-mucosal lesion is well known fact<sup>1</sup>. It has been well established by researchers that virtually all oral cancer are preceded by visible clinical changes in the oral mucosa usually in the form of white or red patch. The WHO collaborating centre for Oral cancer Workshop in 2020 defined oral potentially malignant disorder (OPMDs) as “any oral mucosal abnormality that is associated with a statistically increased risk of developing oral cancer<sup>3</sup>.”

The consumption of tobacco in smoking and nonsmoking form is relatively high among Indian subcontinent. Usage of tobacco in any form such as cigarettes, gutkha, beedi, etc remains the major etiological factor in the development of OPMDs. Muthukrisjnanan A, Warnakulasuriya S stated that smokeless tobacco predisposes to increased risk of malignancy and OPMDs development in an individual. Along with these products systemic health of the patient also have a significant role in the progress of OPMD<sup>4,5,6</sup>.

So, considering the importance of prevention and updating the knowledge of health care practitioner we planned to conducted a study on assessment of prevalence and risk factor for oral potentially malignant disorders amongst Konkan population of Maharashtra, India

## II. Material And Methods

After getting the approval from institutional ethics committee (IEC) this cross sectional study was undertaken for a period of 6 month (September 2022 to February 2023) and we reported with total 1149 patients. Prior to examination of patient duly signed consent form was taken. Considering patient inclusion and exclusion

criteria patient personal information as well as clinical findings about habits, systemic diseases, risk factors and affected areas for oral potentially malignant disorders (OPMDs) were recorded.

**Study design:** Cross sectional observational study

**Study location:** This study was conducted in department of Oral Medicine, Diagnosis and Radiology, Yogita Dental College and Hospital, Khed, Dist-Ratnagiri.

**Study Duration:** September 2022 to February 2023

**Inclusion criteria**

- 1) Patients with history of consumption of tobacco and non-tobacco products like alcohol.
- 2) Patients with history of any systemic diseases such as diabetes and hypertension or any other.
- 3) Patients with any oral premalignant lesions and premalignant conditions.

**Exclusion criteria**

- 1) Patients without history of consumption of tobacco and non-tobacco products like alcohol.
- 2) Patients without any oral premalignant lesions and premalignant conditions.

**Statistical analysis**

The baseline characteristics (variables) of patients were summarized as per the scale of measurement. The continuous variables were expressed as mean, standard deviation and range, while discrete variables were presented as frequencies and percentages. The prevalence of various potential malignant disorders (PMD) was obtained in terms of percentages. The association between PMD and type of habit was determined through correspondence analysis. The analysis provides the association between and within two attributes based on the frequencies in the contingency table. Here, PMD and type of habit are the two attributes each with six and seven labels respectively. A chi-square distance measure was used on the contingency table along with symmetrical normalization to obtain scores on first two dimensions corresponding to labels of habit and PMD. The contribution of each dimension to the inertia of each label of the attributes was determined. A biplot was obtained as a visualization of association between each habit and the malignant disorder (PMD). The angle formed by each habit label with that of each PMD label at the origin was determined. The smaller angle between two attribute labels indicate some association, while an angle of 90° indicates no relation and angles above 90° and close to 180° indicate negative associations. Further, larger the length of line connecting a habit label with origin, more likely that it is highly associated with one or more PMD labels, and vice-a-versa. These criteria were used to determine the associations between two attributes in patients with and without systemic disorders separately. The strength of various associations were compared through visual representation. All the analyses were performed using SPSS version 26.0 (IBM Corp, ARMONK USA) and the statistical significance was evaluated at 5% level.

**III. Result**

There were 1149 patients with a mean age of 38.76 ± 11.83 years, which ranged between 21 to 71 years. There was male preponderance with 73.3% as compared to female with only 26.7%. The participating patients were mostly from lower middle socio-economic class (39.4%). There were 46.7% patients who consumed tobacco in the smokeless form, while 52.3% consumed in both smokeless and smoked form. Regarding systemic disease, there were 22.9% patients with hypertension, while 8.7% with only diabetes. Both the disease types were present in 6.1% patients, while majority i.e. 62.3% patient had no systemic illness (Table 1).

**Table No.1:** Descriptive statistics for characteristics of patients at baseline

<b>Characteristics</b>	<b>Statistics</b>
Age in years	38.76 ± 11.83; 36; 21-71
Sex	
Male	842 (73.3%)
Female	307 (26.7%)
Socio-economic status	
Lower middle	453 (39.4%)
Upper middle	200 (17.4%)
Upper lower	229 (19.9%)
Upper class	267 (23.2%)
Form of tobacco	
Smokeless form	537 (46.7%)
Smoked form	12 (1.0%)
Both	600 (52.3%)
Systemic disease	
Diabetes Mellitus	100 (8.7%)

Hypertension	264 (22.9%)
Both of these	70 (6.1%)
None of these	715 (62.3%)

The Majority of the patients had a habit of consuming pan (82.7%), followed by tobacco (78.7%). There were 50% of the patients with the habit of using Khaini, and 60.1% had a habit of alcohol consumption. Among bidi smokers, 71.3% had a habit of smoking more than 2 times a day. There were 76.9% cigarette smokers with frequency of at least twice a day. Among tobacco chewers, about 92.3% had a frequency of consuming at least two times a day, while among pan eaters, majority i.e. 59.3% had a frequency of once daily. Gutakha was consumed once daily by 86.7% of the users, while khaini was consumed by 69.5% of the users at least two times a day (Table 2).

**Table No 2:** Number of patients according to habit and frequency

Status	Habit						
	Bidi	Cigarette	Tobacco	Pan	Gutakha	Khaini	Alcohol
No	881 (76.7%)	755 (65.7%)	245 (21.3%)	199 (17.3%)	953 (82.9%)	575 (50.0%)	459 (39.9%)
Yes	268 (23.3%)	394 (34.3%)	904 (78.7%)	950 (82.7%)	196 (17.1%)	574 (50.0%)	690 (60.1%)
Once daily	30 (11.2%)	91 (23.1%)	70 (7.7%)	563 (59.3%)	170 (86.7%)	175 (30.5%)	
Two times a day	47 (17.5%)	211 (53.6%)	689 (76.2%)	288 (30.3%)	17 (8.7%)	378 (65.9%)	
More than 2 times a day	191 (71.3%)	92 (23.3%)	145 (16.1%)	99 (10.4%)	9 (4.6%)	21 (3.6%)	

There were maximum 581 (50.6%) patients with tobacco pouch keratosis, followed by 178 (15.5%) with oral speckled leukoplakia, 121 (10.5%) with oral lichen planus, and 119 (10.4%) with oral leukoplakia. The prevalence of oral sub mucous fibrosis and erythroplakia was less than 10% (Table 3).

**Table No 3:** Distribution of patients according to potential malignant disorder [N=1149]

Potential malignant disorder	n (%)
Tobacco pouch Keratosis	581 (50.6)
Oral speckled leukoplakia	178 (15.5)
Oral lichen planus	121 (10.5)
Oral leukoplakia	119 (10.4)
Oral sub mucous fibrosis	109 (9.5)
Oral erythroplakia	41 (3.6)

The 548 (47.7%) patients had affected left buccal mucosa, while 226 (19.7%) had affected right buccal mucosa. There were 263 (22.9%) patients with both left and right buccal mucosa affected. Buccal and labial mucosa was affected in 67 (5.8%) of the patients, and 38 (3.3%) patients had all the sites affected (Table 4).

**Table 4:** Distribution of patients according to site

Site	n (%)
Left Buccal mucosa	548 (47.7)
Right Buccal mucosa	226 (19.7)
Both right and Left Buccal mucosa	263 (22.9)
Floor of mouth	7 (0.6)
Both Buccal and Labial Mucosa	67 (5.8)
All of these	38 (3.3)

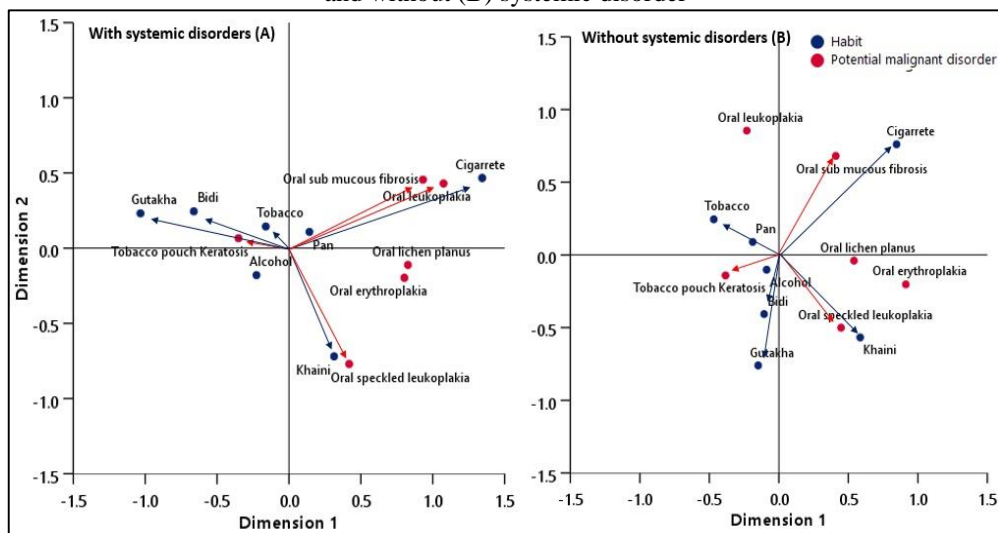
We also carried out the Correspondence analysis to find out the Association of systemic disease and type of habit. The analysis was performed separately in patients with (at least one) and without systemic disease. In patient group with systemic disease, there were 434 (37.8%) patients with at least one disease, while 715 (62.2%) had no disease. Figure 1(A-B) is a biplot showing graphical visualization of association of habits with the occurrence of disorder in two groups.

In the systemic disease group (Figure 1A), the association between the two attributes was statistically significant with a  $p < 0.0001$ . The first two dimensions could capture 95.1% of the inertia in the group. The contribution of dimension 1 on gutakha, bidi and tobacco was higher, while dimension 2 contributed more on

khaini. For malignant disorders, the contribution of dimension 1 on erythroplakia, leukoplakia, lichen planus, sub mucous fibrosis and tobacco pouch keratosis was higher, while both the dimensions contributed nearly same on speckled leukoplakia. The figure reveals a strong association between tobacco pouch keratosis and consumption of gutakha, tobacco and bidi smoking. Further, cigarette smoking was strongly associated with oral leukoplakia and oral sub mucous fibrosis. The consumption of khaini showed strong association with oral speckled leukoplakia.

Also, in the group without systemic disease (Figure 1B), the association between the two attributes continued to be statistically significant with a  $p < 0.0001$ . The first two dimensions captured 83.9% of the inertia in the group. The contribution of dimension 1 on tobacco and pan was higher, while contribution of dimension 2 on bidi and gutakha was higher. Both the dimensions contributed equally on cigarette and khaini. Regarding malignant disorders, dimension 1 had higher contribution to erythroplakia, lichen planus and tobacco pouch keratosis, while dimension 2 had higher contribution to leukoplakia and sub mucous fibrosis. Speckled leukoplakia was influenced by both the dimensions. The figure shows strong association of tobacco pouch keratosis with consumption of gutakha and tobacco, as well as bidi smoking. Cigarette smoking and oral sub mucous fibrosis showed a strong association. Khaini consumption showed a strong association with oral speckled leukoplakia. Oral leukoplakia and erythroplakia had weak associations with different habits.

**Figure 1:** Biplot showing the association of type of habit and potential malignant disorder in patients with (A) and without (B) systemic disorder



Thus, the overall pattern of associations between type of habit and the malignant disorder was nearly similar in both the study groups, the strength of association was stronger in systemic disease group as compared to non-disease group. This was obvious from the angles between different malignant disorders and the habits. In the disease group, the angles between Tobacco pouch keratosis and different habits were much smaller than that observed in the non-disease group. Smaller angles indicated stronger associations. The association of gutakha and bidi on tobacco pouch keratosis was much stronger in the disease group as compared to the non-disease group. Further, cigarette smoking had stronger association with oral sub mucous fibrosis in the disease group, as compared to the non-disease group. In the disease group, even oral leukoplakia showed a strong association with cigarette smoking, unlike the non-disease group. The consumption of khaini showed almost similar strength of association with oral speckled leukoplakia in both the groups. Oral lichen planus and oral erythroplakia had hardly any influence of the habits. In non-disease group, even oral leukoplakia was not influenced by any of the habits.

#### IV. Discussion

This study was conducted with the objective of assessing the prevalence and risk factors of OPMDs amongst Konkan population of Maharashtra, India. The data was collected after complete clinical assessment of patients and statistically analysed.

There was male preponderance with 73.3% as compared to female with only 26.7%. Similar study conducted by Kumar S et al in 2015 amongst the Indore district of Madhya Pradesh India, where they conducted a cross sectional study amongst 1241 individuals. The prevalence of OPMDs amongst the Indore population was found higher in males as compared to female which is similar to our study results. Our Study results were also similar to the study conducted by Jain A et al in 2019 in middle aged North Indian population, where they reported with male predominance of 58.6%

Considering the descriptive statistics of socio-economic status of the patients, Jain A et al reported cases of OPMDs more in middle and lower class group of people as compared to upper class group individuals. Similarly in Konkan population we reported the cases of OPMDs were higher in lower middle class group (39.4%) of individuals.

In Konkan population of Maharashtra, India, the maximum prevalence is with tobacco pouch keratosis (50.6%), followed by with oral speckled leukoplakia (15.5%), with oral lichen planus (10.5%), and with oral leukoplakia (10.4%) and very few cases are reported with the prevalence of oral sub mucous fibrosis and erythroplakia. Sandeep K et al reported maximum cases with oral sub mucous fibrosis of the population and least population with the cases of erythroplakia, but in our case we reported maximums prevalence of cases with tobacco pouch keratosis and least with oral submucous fibrosis and erythroplakia. Similar study results were reported by Chung et al in 2005 amongst Taiwan population and Jain a et al in North Indian population. Singh AK et al reported with speckled leukoplakia and least cases of erythroplakia. In our study results, oral speckled leukoplakia is a second highest premalignant lesion and erythroplakia is a least prevalent lesion of oral mucosa in Konkan population.

The Majority of the patients had a habit of consuming pan (82.7%), followed by tobacco (78.7%). There were 50% of the patients with the habit of using Khaini, and 60.1% had a habit of alcohol consumption. Among bidi smokers, 71.3% had a habit of smoking more than 2 times a day. There were 76.9% cigarette smokers with frequency of at least twice a day. Among tobacco chewers, about 92.3% had a frequency of consuming at least two times a day, while among pan eaters, majority i.e. 59.3% had a frequency of once daily. Gutakha was consumed once daily by 86.7% of the users, while khaini was consumed by 69.5% of the users at least two times a day. The similar study results were reported by Singh A et al and Kumar S et al tobacco usage is the major risk factor followed by betel nut, areca nut and alcohol consumption. Chakraborty et al in 2022 reported with major risk factor for OPMDs with a patient's consuming smokeless form (45%) and smoked form (40%) of tobacco remaining of them consumes both form of tobacco.

We also found that, common site for OPMDs was buccal mucosa followed by labial mucosa. Similar agreement were found between study results reported by Singh AK et al in 2021 amongst Indian population.

We also looked for systemic disease as additional risk factor in patients of OPMDs, and there were 22.9% patients with hypertension, while 8.7% with only diabetes. Both the disease types were present in 6.1% patients, while majority i.e. 62.3% patient had no systemic illness. Sandeep K and their associates were found that diabetes had strong association with OPMDs.

## **V. Conclusion**

Considering all the study results and reviewing previously published article based on prevalence and risk factors causing of OPMDs, we found that there is distinctiveness in the highest occurrence of OPMDs amongst the Indian population but the tobacco is the commonest etiological factor for occurrence of OPMDs. So, patients with a habit of consuming tobacco either in smoked form or smokeless form must be carefully examined for OPMDs. Also, the identification of risk factors is up most important thing in case of OPMDs. It will help in early diagnosis and treatment planning and prevention of oral cancer.

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