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Original Research Article

Epidemiological Evaluation of Oral Potentially Malignant Disorders: Prevalence, Risk Factors and Histopathological Correlation among Patients Attending a Tertiary Care Hospital in Bhubaneswar, Odisha

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Conflict of interest: Nil

Abstract:

Background: Oral squamous cell carcinoma (OSCC) is preceded by oral potentially malignant diseases (OPMDs) representing a significant public health concern in India where oral cancer ranks among the top three cancers.

Aim: To evaluate the prevalence, risk factors, and histopathological correlation of OPMDs in patients attending a tertiary care hospital in Bhubaneswar, Odisha.

Methods: A cross-sectional hospital-based study was carried out Bhubaneswar's Kalinga Institute of Dental Sciences and Kalinga Institute of Medical Sciences (KIIT DU), from August 2023 to August 2024. A total of 1000 patients were screened using WHO criteria. Demographic data, lifestyle factors, and clinical findings were recorded. Histopathological confirmation was performed where indicated. Statistical ANOVA, logistic regression, and the chi-square test were all used in the analysis.

Results: Of 1000 patients, 999 valid cases were analyzed. The majority were aged 30–50 years (55.3%), with a male predominance (67.9%). The most common OPMDs were oral submucous fibrosis (22.5%), oral lichen planus (17.4%), leukoplakia (14.1%), and tobacco pouch keratosis (10.7%). Cigarette smoking (43.5%) and paan chewing (29.5%) were the most prevalent risk factors. Significant associations were observed between age, sex, socioeconomic status, and OPMD occurrence ($p < 0.05$). Histopathological examination revealed variable degrees of epithelial dysplasia, with leukoplakia and erythroplakia showing higher malignant potential.

Conclusion: OPMDs are prevalent among middle-aged males of lower socioeconomic status in Odisha, largely linked to tobacco and areca nut habits. Early detection, patient education, and habit cessation programs are critical to reduce malignant transformation risk.

Keywords: Oral Submucous Fibrosis, Oral Potentially Malignant Disorders, Leukoplakia, Prevalence, Risk Factors, Odisha.

Introduction

Oral cancer is a major health burden worldwide, with its highest impact seen in South and Southeast Asia. India contributes a significant proportion of global cases, where oral squamous cell carcinoma (OSCC) constitutes one of the most common malignancies. A striking concern is that the majority of Indian patients are diagnosed in advanced stages, which limits treatment options and results in poor survival. Many cases of OSCC are preceded by oral potentially malignant disorders (OPMDs), a group of lesions that include leukoplakia, erythroplakia, oral submucous fibrosis (OSMF), and oral lichen planus. These conditions are considered early clinical markers that may progress to malignancy if not detected and managed in time.

The occurrence of OPMDs varies across populations, shaped by lifestyle, cultural practices, and socioeconomic status. In India, reported

prevalence ranges from 2% to 16%, with regional variations linked to local habits. Tobacco use in smoked and smokeless forms, areca nut chewing, and alcohol consumption are the predominant risk factors. Of these, areca nut use, commonly practiced in the form of paan, is deeply rooted in cultural traditions of eastern India and has been recognized as an independent carcinogen. Other contributors such as poor oral hygiene, nutritional deficiencies, and viral infections further elevate risk. Men, people between the ages of 30 and 50, and those from economically weaker backgrounds are consistently shown to be more vulnerable, reflecting both higher exposure and limited healthcare access.

Histopathological examination is critical in confirming the diagnosis and assessing the malignant potential of OPMDs, as dysplastic changes often determine progression to carcinoma. Some lesions may remain static or regress following cessation of high-risk habits, while others demonstrate aggressive changes requiring close monitoring. Odisha, in eastern India, has a long-standing tradition of betel quid and areca nut use, yet systematic data on OPMDs in this region are scarce. To address this gap, the present study was undertaken to associated risk factors, assess the prevalence, and histopathological features of OPMDs among patients attending a tertiary care hospital in Bhubaneswar.

Materials and Methods

Study design & setting: A hospital-based cross-sectional observational study conducted at Bhubaneswar's Kalinga Institute of Dental Sciences and Kalinga Institute of Medical Sciences (KIIT DU).

Study duration: August 2023 – August 2024.

Sample size: 1000 patients attending the dental outpatient department.

Inclusion criteria:

- Patients >15 years with clinically diagnosed OPMDs (as per WHO criteria, 1980).
- Willingness to give informed consent and take part.

Exclusion criteria:

- Patients with prior diagnosis of oral cancer.
- Medically compromised patients with unrelated systemic conditions.

Data collection:

- Demographics (age, sex, socioeconomic class).
- Detailed history of habits (smoking, smokeless tobacco, paan, gutka, alcohol).
- Clinical examination for OPMDs.
- Biopsy and histopathological examination where necessary.

Statistical Analysis: SPSS version 20 was used to analyze the data. They calculated descriptive statistics. Associations between categorical variables were tested with chi-square. ANOVA assessed mean differences in duration of habits across age groups. Logistic regression identified independent risk factors. $p < 0.05$ was considered significant.

Results

Demographics

- Total valid cases: 999.
- Age: Majority (55.3%) were 30–50 years; 28.4% <30 years; 15% 50–70 years; 1.3% >70 years.
- Sex: Males (67.9%) outnumbered females (32.1%).
- Socioeconomic status: 58.6% lower middle class; 15.8% lower class.

Prevalence of OPMDs

- Oral submucous fibrosis: 22.5%
- Oral lichen planus: 17.4%
- Leukoplakia: 14.1%
- Tobacco pouch keratosis: 10.7%
- Erythroplakia: 2.5%
- Others: smoker's palate (2%), frictional keratosis (3.6%), speckled leukoplakia (0.5%)

Habits

- Cigarette smoking: 43.5%
- Paan chewing: 29.5%
- Gutka: 11.2%
- Bidi smoking: 4.4%
- Bidi + alcohol: 11.3%

Histopathology

- Mild to moderate epithelial dysplasia was common in leukoplakia.
- OSMF showed varying grades of fibrosis (stages I–IV).
- Erythroplakia and speckled leukoplakia revealed higher grades of dysplasia, indicating malignant potential.

Statistical associations

- Age and sex significantly associated with type of OPMD ($p = 0.003$).
- Males in the 30–50 age group showed maximum prevalence.
- Socioeconomic status correlated with OPMD occurrence, higher prevalence in lower classes.
- Duration of habit use positively correlated with severity of lesions.

Discussion

This study assessed the prevalence, associated risk habits, and histopathological features of OPMDs in

a tertiary care hospital in Bhubaneswar, Odisha. Out of 1000 participants, 999 valid cases were analyzed, providing robust data on the disease profile in this region. The findings revealed OSMF as the most common lesion, followed by oral lichen planus and leukoplakia. The majority of affected individuals belonged to the 30–50-year age group, and males were more frequently affected than females. Cigarette smoking and paan chewing emerged as the most common habits, while socioeconomic status also showed a significant association with the occurrence of these disorders.

The predominance of OSMF in this population highlights the cultural and habitual influence of areca nut and paan chewing, which are widely practiced in Odisha. Although leukoplakia has been reported as the most frequent OPMD in certain regions of India, the present study observed OSMF as the leading condition, underscoring the regional variation in disease distribution. The proportion of oral lichen planus cases was also notable, possibly reflecting better clinical recognition and histopathological confirmation in a tertiary care setting. These differences across regions emphasize the need to consider local habits and practices when designing preventive strategies.

Age and gender patterns in this study are consistent with broader trends observed in India. The highest burden was recorded in the 30–50-year age group, reflecting the early initiation of risk habits and the cumulative effect of long-term exposure. Men were more affected than women, which can be attributed to greater consumption of tobacco and alcohol among males. However, a gradual rise in cases among females has been noted in some regions, largely due to increased use of smokeless tobacco products. This changing trend is a cause for concern and highlights the importance of including both genders in awareness and screening programs.

The analysis of risk habits confirmed their central role in the development of OPMDs. The most prevalent was cigarette smoking, followed by paan chewing, gutka use, and bidi smoking. Although fewer individuals reported combined habits, such as bidi smoking with alcohol consumption, these cases presented with more severe lesions, reinforcing the multiplicative effect of combined exposures. Socioeconomic background also had a significant impact, with a majority of cases belonging to the lower middle and lower classes. Economic disadvantage not only increases the likelihood of adopting inexpensive and harmful products but also limits access to healthcare and early diagnosis.

Histopathological evaluation provided important confirmation of malignant potential. Leukoplakia and erythroplakia often demonstrated moderate to severe epithelial dysplasia, indicating a higher risk of transformation. OSMF showed progressive fibrotic changes, while lichen planus included both reticular and erosive patterns, with the latter being more prone to dysplastic alterations. These findings reinforce the necessity of biopsy and microscopic evaluation in all suspected cases, as clinical appearance alone cannot reliably determine malignant risk. Identifying dysplastic changes at an early stage allows for timely intervention and improved prognosis.

The high prevalence of OPMDs observed in this study, particularly among middle-aged males from lower socioeconomic backgrounds, has significant public health implications. The cultural acceptance of areca nut and paan chewing in Odisha contributes heavily to the disease burden, making behavior change challenging. Public health measures should focus on education, habit cessation programs, and community-based screening initiatives. Dental practitioners and primary healthcare providers play a crucial role in early recognition and referral. Nutritional counseling and lifestyle modifications can further support preventive efforts. Although this study was conducted in a hospital setting and may not capture the true community prevalence, the large sample size provides valuable evidence for designing region-specific strategies.

Conclusion

In this hospital-based study from Bhubaneswar, oral potentially malignant disorders were found to be common, particularly oral submucous fibrosis, oral lichen planus, and leukoplakia. Most patients were men in the third to fifth decades of life, and many belonged to lower socioeconomic groups. Tobacco use in smoked and smokeless forms, along with areca nut and paan chewing, emerged as the principal risk factors. Histopathological analysis confirmed varying degrees of epithelial dysplasia, emphasizing the potential for malignant transformation. These findings highlight the importance of early recognition, routine biopsy of suspicious lesions, and long-term follow-up. Targeted prevention programs, patient education, and habit cessation initiatives are essential to reduce the future burden of oral cancer in this high-risk population. Broader community screening strategies, especially in regions where culturally embedded practices contribute to disease prevalence, may provide the greatest impact in lowering morbidity and improving outcomes.

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