



Original Study

Prevalence of Oral Potentially Malignant Disorders, Oral Leukoplakia, Oral Lichen Planus, Oral Submucous Fibrosis - A Four years Hospital based Retrospective Study

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Abstract

Background: To assess the prevalence of oral potentially malignant disorders among patients visiting dental institutes.

Methods: The data were collected retrospectively for four years, from 2018 to 2021, from the NOCR records of the department of oral medicine and radiology in a dental institute.

Results: A total of 14,905 patients attended the department of oral medicine and radiology. Among these, 257 cases were oral potentially malignant disorders. Males were more commonly affected than females. Based on the time period, 2018 has the highest prevalence. The most frequently seen lesion in males was Leukoplakia and in females was Oral Lichen Planus.

Conclusion: With knowledge of the prevalence rate of oral potentially malignant disorders, preventive programs can be developed to prevent malignant transformation.

Key words: Leukoplakia, Lichen Planus, Oral Submucous Fibrosis

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Introduction:

Oral cancer is a significant global healthcare problem. It is the sixth most common cancer in the world. India only accounts for one-third of all oral cancer cases worldwide and has a high prevalence of pre-malignant lesions and conditions. Oral potentially malignant disorders in hospitals throughout India have a 2.5 to 8.4 % prevalence. Oral potentially malignant disorders can progress to cancer at a rate of up to 17% within seven years of diagnosis¹. The WHO categorized the following oral conditions as oral potentially malignant disorders (OPMDs): Leukoplakia, Erythroplakia, Lichen Planus, Oral Submucous Fibrosis, Palatal Lesion of Reverse Smoking, and Discoid Lupus Erythematosus. The prevalence of these OPMDs varies by country ^[1].

In India, tobacco chewing and smoking are deleterious habits of higher prevalence and have been found to be significant risk factors for pre-cancer and cancer. Bidis and betel nut in quid form (pan) are hand-rolled, unfiltered, and locally produced products that are more commonly used in rural areas and among low-income groups. Furthermore, OPMDs have been correlated to a variety of demographic factors such as age, gender, occupation, education level, and socioeconomic status¹. OPMDs such as Leukoplakia, Lichen Planus, and OSMF have high malignant transition rates leading to oral cancer with a high morbidity and mortality rate, which makes it necessary to assess the efficacy of screening programs. To lower the incidence of oral cancer, a comprehensive approach is required, combining health education and literacy, risk factor reduction, and early detection ^[2].

Although several studies have found a varying frequency of OPMDs in the global population, the West Godavari district has seen both male and female populations with a prevalence of predisposing factors – habitual/acquired; therefore, this study was conducted to assess the prevalence of OPMDs among patients visiting dental institutions, and it's a relationship to age, gender, and time period.

Materials and Methods

The present study was planned in a hospital-based setup of a dental institute in the West Godavari district/province of Southern India. A retrospective study was designed, where data of patients visiting the department of Oral Medicine and Diagnosis, registered under the National Oral Cancer Registry (NOCR), between the time period January 2018 to December 2021 were considered. Inclusion criteria included data with patients having a deleterious habit of using tobacco (smoke/smokeless form), areca nut or those with a burning sensation of the oral cavity and with a diagnosis of a potentially malignant lesion. Institutional review board approval was obtained (VDC/RP/2022/98).

Both genders and four age groups from less than 30 to greater than 60 years they categorized into Group I (G I – less than 30), Group II (G II- 31-40), Group III(G III – 41-50), Group IV (G IV- 51-60), Group V (G V- greater than 60). Those without affirming data or no NOCR registry were excluded. A total of 14,905 patients visited the hospital during the time period, among which 257 were registered under the institute's NOCR archives and fulfilled the required criteria. The data was collected, and the prevalence of OPMDs (Leukoplakia, Oral Lichen Planus and OSMF) was correlated with parameters such as age, gender, variant type and time period.

Statistical analysis:

Statistical analysis was performed using IBM SPSS VERSION 21.0. Descriptive analysis will be done. The Chi-Square test was used to compare the proportions, and a *P*-value of < 0.05 was considered statistically significant for all the comparisons.

Results:

The current study included patients who visited the Department of Oral Medicine and Radiology at a dental institute in Southern India. Relevant patient information was retrieved from the departmental archives over four years (2018-2021).

From a total of out-patient records of 14,905, there was a higher female population of 9,480 (63.6%) and a male population of 5,425 (36.4%) (Figure1). Among the five age groups, patients between the ages of 41 and 50 had the highest frequency (24.3%) (Figure2). Out of the total population, 257 of them presented with OPMDs.

Gender prevalence (Table 1 and Fig 1) Correlating gender with OPMDs prevalence, it was found that males were mostly affected than females by a large margin. 177 male patients out of 5425 and 80 females out of 9480 had one of the OPMDs. Assessing the distribution of OPMDs among both genders, Leukoplakia had the highest frequency (88), and among females, it was Oral Lichen Planus (66). For gender comparison of specific variants of OPMDs, erosive lichen planus was most common in females 33(12.8%) and reticular lichen planus in males 13(5.1%). Homogenous Leukoplakia and OSMF Stage I was most prevalent in both genders. There was a statistically significant between gender and OPMDs with a *p*-value of 0.000.

Gender wise distribution of OPMDs				
	Lichen Planus	Leukoplakia	OSMF	Total
Male	26	88	63	177
Female	66	13	01	80
Age-wise distribution of OPMDs				
	Lichen Planus	Leukoplakia	OSMF	Total
<30	13	7	11	31
31-40	15	20	22	57
41-50	25	18	14	57
51-60	25	23	11	59
>60	14	23	06	43
Year wise distribution of OPMDs				
	Lichen Planus	Leukoplakia	OSMF	Total
2018	31	36	22	89
2019	28	29	23	80
2020	12	13	05	30
2021	21	23	14	58

Table 1: Prevalence of Oral Potentially Malignant Disorders

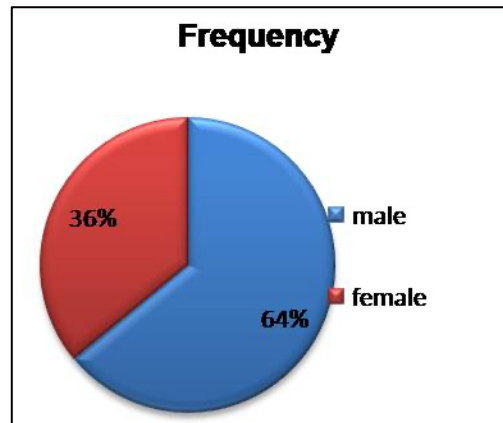


Fig 1: Gender distribution of the samples

Age prevalence (Table 2 & Fig 2) correlating the prevalence of age with OPMDs, 51-60 years of age had the highest prevalence of 23% and the least among less than 30 years of age. Among the five age groups, Lichen Planus was common in less than 30 years, 41-50 years and 51-60 years age group, OSMF in 31-40 years, and Leukoplakia among those above 60 years of age. With OLP variants taken into consideration: Reticular Lichen Planus had a frequent occurrence in Group I, Group II (3.5%), Erosive OLP in Group III, Group IV and Group V of 5.4%, 4.7% & 3.5%, respectively. In patients with Leukoplakia, all groups had the highest prevalence of Homogenous Leukoplakia & OSMF stage I was common in all age groups. There was a statistically significant between gender and OPMDs with a p -value of 0.124.

	Category	Gender		P value
		Male	Female	
Lichen Planus	Reticular Lichen Planus	13 (5.1%)	30 (11.7%)	0.000
	Erosive Lichen Planus	10 (3.9%)	33 (12.8%)	
	Bullous Lichen Planus	3 (1.2%)	3 (1.2%)	
Leukoplakia	Homogenous Leukoplakia	82 (31.9%)	11 (4.3%)	
	Erythroplakia	2 (0.8%)	0	
	Speckled Leukoplakia	3 (1.2%)	1 (0.4%)	
	Verrucous Leukoplakia	1 (0.4%)	1 (0.4%)	
Oral Sub mucous Fibrosis	Stage 1	32 (12.5%)	1 (0.4%)	
	Stage 2	14 (5.4%)	0	
	Stage 3	13 (5.1%)	0	
	Stage 4	4 (1.6%)	0	
Total		177 (68.9%)	80 (31.1%)	

Table 2: Prevalence of oral potentially malignant disorders based on gender

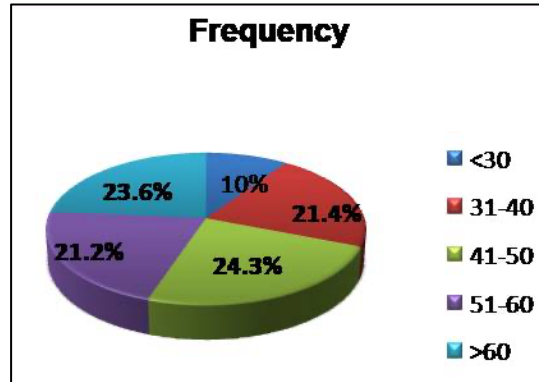


Fig 2: Age distribution of the samples

Time period (Table 3,4) Correlating the prevalence of Time period with OPMDs, It was found that 2018 had the highest prevalence (34.6%) and the Least prevalence was in the year 2020 (11.7%). Among four years time periods, Leukoplakia had the highest prevalence. In the year 2018 and 2020 similar pattern was seen where reticular lichen planus, homogenous leukoplakia and OSMF stage I were most prevalent, whereas, in 2019, reticular and erosive lichen planus, homogenous Leukoplakia and OSMF stage I and 2021 erosive lichen planus 13(5.1%), homogenous leukoplakia 23(8.9%) and OSMF stage I 8(3.1%) were most common. There was no statistically significant between gender and OPMDs with a *p*-value of 0.164.

Condition	Category	Year				P value
		2018	2019	2020	2021	
Lichen Planus	Reticular lichen planus	13 (5.1%)	13 (5.1%)	9 (3.5%)	8 (3.1%)	0.164
	Erosive lichen planus	14(5.4%)	13(5.1%)	3(1.2%)	13(5.1%)	
	Bullous lichen planus	4 (1.6%)	2(0.8%)	0	0	
Leukoplakia	Homogenous Leukoplakia	32(12.5%)	27(10.5%)	11 (4.3%)	23 (8.9%)	
	Erythroplakia	0	0	2(0.8%)	0	
	Speckled Leukoplakia	2(0.8%)	2(0.8%)	0	0	
	Verrucous Leukoplakia	2(0.8%)	0	0	0	
Oral Sub mucous Fibrosis	Stage 1	9 (3.5%)	13 (5.1%)	3(1.2%)	8(3.1%)	
	Stage 2	6(2.3%)	5(1.9%)	1(0.4%)	2(0.8%)	
	Stage 3	5(1.9%)	5(1.9%)	1(0.4%)	2(0.8%)	
	Stage 4	2(0.8%)	0	0	2(0.8%)	
Total		89(34.6%)	80(31.1%)	30(11.7%)	58(22.6%)	

Table 4: Prevalence of oral potentially malignant disorders based on year

Condition	Category	Age					P value
		G I (<30)	G II (31-40)	G III (41-50)	G IV (51-60)	G V (>60)	
Lichen Planus	Reticular Lichen Planus	9 (3.5%)	9 (3.5%)	10 (3.9%)	10 (3.9%)	5 (1.9%)	0.124
	Erosive Lichen Planus	3 (1.2%)	5 (1.9%)	14 (5.4%)	12 (4.7%)	9 (3.5%)	
	Bullous Lichen Planus	1 (0.4%)	1 (0.4%)	1 (0.4%)	3 (1.2%)	0	
Leukoplakia	Homogenous Leukoplakia	7 (2.7%)	19 (7.4%)	16 (6.2%)	19 (7.4%)	32 (12.5%)	
	Erythroplakia	0	0	1 (0.4%)	1 (0.4%)	0	
	Speckled Leukoplakia	0	1 (0.4%)	1 (0.4%)	2 (0.8%)	0	
	Verrucous Leukoplakia	0	0	0	1 (0.4%)	1 (0.4%)	
Oral Submucous Fibrosis	Stage 1	8 (3.1%)	11 (4.3%)	6 (2.3%)	4 (1.6%)	4 (1.6%)	
	Stage 2	1 (0.4%)	5 (1.9%)	4 (1.6%)	3 (1.2%)	1 (0.4%)	
	Stage 3	2 (0.8%)	5 (1.9%)	2 (0.8%)	3 (1.2%)	1 (0.4%)	
	Stage 4	0	1 (0.4%)	2 (0.8%)	1(0.4%)	0	
Total		31 (12.1%)	57 (22.2%)	57 (22.2%)	59 (23%)	53 (20.6%)	

Table 4: Prevalence of oral potentially malignant disorders based on age

Discussion

OPMDs are commonly encountered entities in the Indian population. The high number of cases is due to tobacco usage, alcoholism, dietary habits and unattended psychosomatic needs. It is widely known that not all potentially malignant disorders progress to cancer, but they have a higher chance of malignant transformation if not detected and treated early. There is limited information on the prevalence of OPMDs in the general population worldwide. However, reports suggest that it ranges from 1% to 5% [3].

In the present study, 14,905 patients and 257 were diagnosed with OPMDs. The lesions were more prevalent among males (177) than females (80). This difference may be attributed to the fact that a higher percentage of the male population reported having deleterious habits that lead to OPMDs. This was supported by *Patil B et al.*^[4]. In the present study, gender was significantly associated with developing oral potentially malignant

disorders, with males at higher risk of developing oral potentially malignant disorders. According to *Nair et al* [5], the prevalence of oral potentially malignant disorders and oral cancer was higher in men. A similar conclusion was mentioned in a Taiwan study by *Chung et al.*[6], who found a statistically significant difference between several oral potentially malignant disorders and gender.

The current study found the highest year-wise prevalence of OPMD in 2018, followed by 2019 and the least during 2020, one reason being the lockdown imposition during the COVID-19 outbreak. Several authors conducted prevalence studies in different time periods. Mehrotra et al. examined the data from 2003 to 2007 and found no clear-cut patterns in prevalence, while there was evidence of a progressive increase [7].

Gangane et al. revealed in a survey that most oral cancers in their survey were recorded in people aged 50 to 59. In this study, the age group 51-60 years had the highest prevalence of OPMDs, which was almost similar to theirs. On the other hand, Saraswathi et al. indicated that most patients were between the ages of 40 and 61. According to a study by Thomas et al., multiple oral pre-malignant lesions in Trivandrum were more common in the age group of 45-54. The highest prevalence of OPMDs was identified in the age group of 35-45 years in the study by Pimple et al [8].

Assessing the prevalence of individual OPMD and their variants, this study came across a higher prevalence of OLP among women than in men, which is also in agreement with other studies were done by *Xue et al.*, *Ingafou et al.*, *Torrente-Castells et al.*, *Tovaru et al.* The erosive type was more common among OLP [9]. *T.Santhosh et al.* found erosive OLP in higher numbers than reticular form [10]. A possible explanation for this is that Female hormone levels, such as estrogen and progesterone, are known to fluctuate, particularly during menstruation and menopause. Also, the various social roles might cause increased stress levels in the body.

In the present study, it was found that OSMF was higher in men than in women. The clinical staging of OSMF patients was evaluated in this study. The majority of patients were found in stage I (12.5%), followed by stage II (5.4%). *Nigam NK et al.* conducted in Moradabad district rural population had Stage II commonly, whereas the urban population had Stage I OSMF predominantly [11]. *AL Mathew et al.* conducted in South Kerala OSMF Stage I was the most prevalent stage (47.4%). A study reported by *Srivastava R et al. (2019)* showed that the maximum number of patients were seen in stage II (46.42%) and stage III (34.52%). *Kumar et al.* found that (41.94%) of cases were stage II, followed by (22.29%) of stage IV, which were somewhat different from present study [12].

Epidemiological studies prove that consumption of areca nut is the main etiological factor for OSMF. Several mechanisms are associated with the development of OSMF. Areca alkaloids have been linked to increased collagen synthesis, reduced degradation, and further accumulation of collagen, and these are possible mechanisms involved in disease development. Several biological pathways are involved in this process, and they are either stimulated or down-regulated in this process [13].

Other than that, men had a higher prevalence of Leukoplakia than women. Clinically, Leukoplakia can be divided into homogeneous and non-homogeneous based on colour and surface texture. In this study, homogenous Leukoplakia (12.05%) was found to be more prevalent than non-homogenous Leukoplakia (1.60%). These findings are comparable to *Axell et al.* (3.5 % vs 0.3%) from Sweden and *Gupta et al.* (1.26 vs 0.21) from Eranakulam District, India. Because of recognized differences in prognosis, there is a reason for diagnosing subgroups of Leukoplakia. Non-homogeneous leukoplakias are more likely to transform than homogeneous leukoplakias (*Diz et al., 2011; Speight et al., 2018*), and it is very rare for non-homogeneous Leukoplakia to show severe dysplasia or even superficially invasive SCC after biopsy at baseline detection (*Pentenero et al., 2003; Lee et al., 2006*) [14].

India has always been a prevalent nation for OPMDs and oral cancer. Its incidence rates are higher in Indian states like Uttar Pradesh, Jharkhand, Bihar, Kerala and Tamil Nadu. Pan Parag, zarda, and other smokeless tobacco products have become more popular in north India, particularly in areas like Uttar Pradesh. This area has a high incidence of oral cancer due to habit [15].

FW Mello et al. mentioned the prevalence of OPMD by geographical location; Asia has seen the highest frequency of OPMDs, followed by South America and the Caribbean. This difference may be due to different habits in these populations; for example, the use of betel quid products is more commonly reported in South Asia ^[16].

Conclusion

Patients in rural areas have limited access to essential medical services and qualified healthcare providers. The government and health institutions will be able to use prevalence data to deploy dental professionals for early detection of oral cancer, resulting in improved treatment outcomes. This provides the best chance of long-term survival, preventing a diagnostic delay. This study stands out of the fact that, in India, there has not been available supporting statistical data for the current study period or over such a long period of time.

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Conflicts of interest - There are no conflicts of interest.

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