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Evaluation of prevalence of pre-malignant lesions amongst patients visiting to the out-patient department of oral and maxillofacial surgery

[1]Aliya Khan, BDS, MDS, PG Student, Department of Oral and Maxillofacial Surgery, M A Rangoonwala College of Dental Sciences and Research Centre, Pune.

[2]Janardan Garde, MDS, Oral and Maxillofacial Surgery, Prof and Head of Department, Department of Oral and Maxillofacial Surgery M A Rangoonwala College of Dental Sciences and Research Centre, Pune.

Corresponding Author: Dr. Aliya Khan, BDS, MDS, PG Student (II Year), Department of Oral and Maxillofacial Surgery, M A Rangoonwala College of Dental Sciences and Research Centre, Pune.

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Abstract

Oral Malignancies are considered to be 6th most common malignancies in the world. India alone accounts for about 1/3rd of the worlds oral malignancies and has a high rate of pre-malignant lesions and conditions. Oral Pre-malignant Lesions (OPMLs) are relatively common, targeting 2.5% of the general population and are known to prevent further spread of malignancies and thus prevent decline rate of morbidity. As a result, assessment of their prevalence is of utmost significance. Therefore, the present study was envisaged with a view to assess the prevalence of OPMLs amongst the patients visiting to the Department of Oral and Maxillofacial Surgery.

Keywords: premalignant lesions, leukoplakia, erythroplakia, OSMF, tobacco induced keratosis, ulcero-proliferative lesions

Introduction

The term 'pre-malignant lesion' was coined by Romanian physician Victor Babes in 1875. A pre-malignant lesion is a disease, syndrome or a finding that, if left untreated, may lead to cancer.[1] Indian population visiting dental hospitals shows prevalence of pre-malignant lesions ranges from 2.5% to 8.4%.[2] An estimation of 6,57,000 new cases of a variety of malignancies of oral and maxillofacial region are being identified each year. Among them, mortality rate of almost 50-55% is seen.[3-4]

A rising number of patients with OPMLs is seen due to consumption of smokeless and smoking forms of tobacco and other carcinogenic agents. As a result, habit cessation is of utmost significance in order to help decline the total prevalence of OPMLs; for which oral

screening is easy, cost effective and non-invasive way. Oral Screening is defined as "A process of identifying apparently healthy people who may be at increased risk of a disease or condition" (National Screening Committee).[5] One of the recently published meta-analysis, stated prevalence of leukoplakia around 5-6% compared to the prevalence of erythroplakia amongst the community based studies that was 1.2% when compared with in hospital based studies. Numerous risk factors have been identified till date for pre-malignant lesions; some of which are tobacco chewing, cigarette smoking, genetics, etc.

A total of 1.3% of population suffering from any OPML or malignancy is known to have positive family history of any malignancy. Cogliano et al [6] stated that the use of smokeless tobacco proved to be one of the major risk factors in initiating malignancy whereas Sankaranarayanan et al 2005 [7] stated use of tobacco in any form with or without alcohol consumption would be a proven risk factor. One study assessed sensitivity and specificity of visual inspection of pre-malignant lesions and proved it to be one of the most promising diagnostic modalities (I-How-Chang et al 2011).[8]

Only 5% of population below the age of 30 years is known to show presence of OPMLs and hence, the population ageing between 30-60 years was included in the present study.[9] The population with OPMLs is 1.3 times more likely to have suffered from oral trauma and 1.5 times more likely to have consumed hot and spicy food items. As a result, the present study was performed to assess the prevalence of OPMLs amongst the Indian population.

Methodology : The present study was envisaged with a view to evaluate prevalence of pre-malignant lesions and conditions amongst the subjects visiting to the Department of Oral and Maxillofacial Surgery of M. A. Rangoonwala College of Dental Sciences, Pune. A total of 400 subjects volunteered to be a part of the present study amongst the subjects that visited from 1st September 2022 to 28th February 2023. Assessment of oral cavity with diagnostic instruments followed by appropriate recording of case history was the method of choice selected to diagnose commonly occurring OPMLs and was conducted by a single trained and calibrated examiner. All the oral surgeons were trained and calibrated to diagnose commonly occurring conditions. Oral cavity of all the subjects was assessed for OPMLs as per WHO-IARC guidelines and demographic data like age and gender was procured to evaluate prevalence of OMPLs amongst the population of Maharashtra. The subjects had the right to withdraw at any given point of time from the study and no incentives were shared for enhancing participation in the study.

Inclusion Criteria

1) Patients aged between 30-60 years
2) Patients showing willingness to participate for oral examination and to fill a written consent.
3) Patients with known history of tobacco consumption in various forms for more than one year

Exclusion Criteria

1) Patients below 30 years and above 60 years of age
2) Patients unwilling to undergo oral examination
3) Patients suffering from any systemic disease.
4) Patients with no habits

Statistical Analysis

The data on categorical variables is shown as n (% of cases). The inter-group statistical comparison of distribution of categorical variables is done using Chi-Square test. All the results are shown in tabular as well

as graphical format to visualize the statistically significant difference more clearly. In the entire study, the p-values less than 0.05 are considered to be statistically significant. The entire data is statistically analysed using Statistical Package for Social Sciences (SPSS version 24.0, IBM Corporation, USA) for MS Windows.

Results

Table 1: Distribution of demographic characteristics and prevalence of pre malignant lesions.

		No. of cases	% of cases
Age groups (years)	30 – 40	84	21.6
	41 – 50	151	38.7
	51 – 60	155	39.7
Gender	Male	224	57.4
	Female	166	42.6
Pre malignant lesion	Leukoplakia	35	9.0
	Erythroplakia	19	4.9
	OSMF	92	23.6
	Tobacco induced keratosis	106	27.2
	Lichen planus	64	16.4
	Ulcero-proliferative lesion	74	19.0

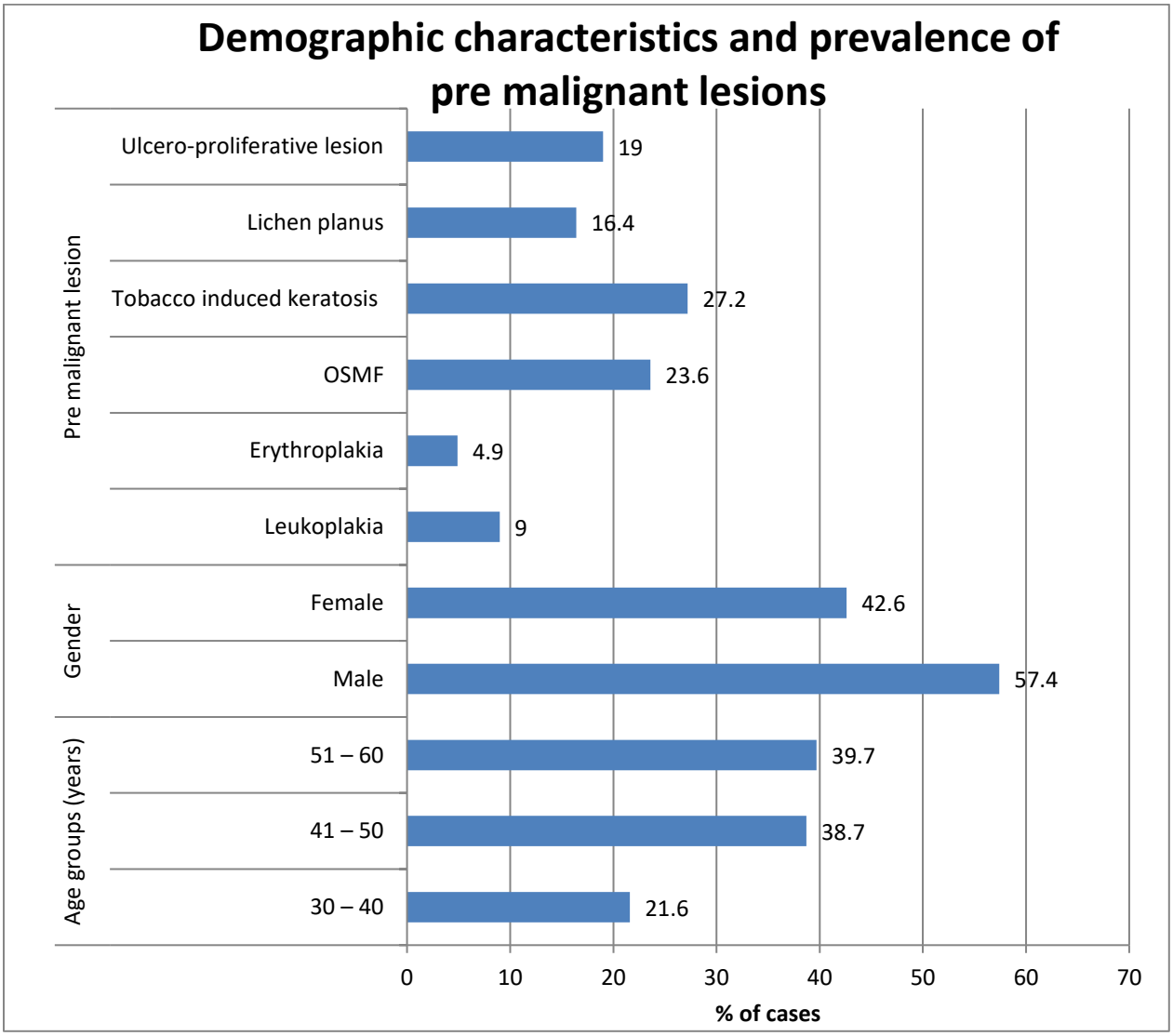

Figure 1: Distribution of demographic characteristics and prevalence of pre malignant lesions.

Table 2: Distribution of prevalence of pre malignant lesions according to gender in each age group.

	Age group (years)											
	30 – 40 years (n=84)				41 – 50 years (n=151)				51 – 60 years (n=155)			
Pre malignant lesion	Male (n=50)		Female (n=34)		Male (n=92)		Female (n=59)		Male (n=82)		Female (n=73)	
	n	%	n	%	n	%	n	%	n	%	n	%
Leukoplakia	6	12.0	4	11.8	5	5.4	7	11.9	8	9.8	5	6.8
Erythroplakia	2	4.0	1	2.9	9	9.8	2	3.4	3	3.7	2	2.7
OSMF	14	28.0	9	26.5	34	37.0	8	13.6	16	19.5	11	15.1
Tobacco induced keratosis	10	20.0	6	17.6	14	15.2	16	27.1	34	41.5	26	35.6
Lichen planus	9	18.0	7	20.6	21	22.8	14	23.7	3	3.7	10	13.7
Ulcero-proliferative lesion	9	18.0	7	20.6	9	9.8	12	20.3	18	22.0	19	26.0
P-value	0.998^{NS}				0.006^{**}				0.289^{NS}			
P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant. **P-value<0.01, NS – Statistically non-significant.												

In the age groups 30 – 40 years and 51 – 60 years, distribution of prevalence of pre malignant lesions did not differ significantly between group of male and group of female cases studied (P-value>0.05 for both).

In the age group 41 – 50 years, distribution of prevalence of pre malignant lesions differs significantly between group of male and group of female cases studied (P-value<0.05).

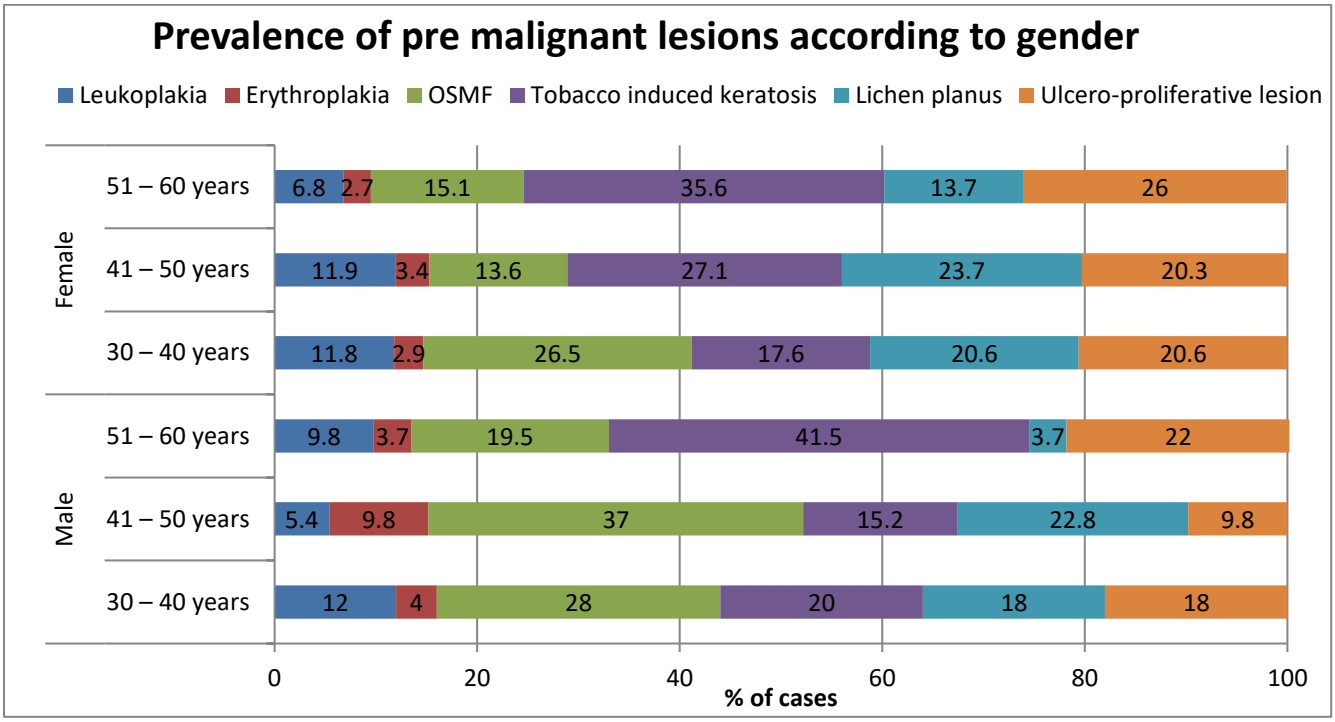

Figure 2:Distribution of prevalence of pre malignant lesions according to gender in each age group.

Table 3: Distribution of prevalence of pre malignant lesions according to gender (All age groups combined).

	All age groups			
	Male (n=224)		Female (n=166)	
Pre malignant lesion	n	%	n	%
Leukoplakia	19	8.5	16	9.6
Erythroplakia	14	6.3	5	3.0
OSMF	64	28.6	28	16.9
Tobacco induced keratosis	58	25.9	48	28.9
Lichen planus	33	14.7	31	18.7
Ulcero-proliferative lesion	36	16.1	38	22.9
Total	224	100.0	166	100.0
P-value	0.046*			
P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant. *P-value<0.05.				

Distribution of prevalence of pre malignant lesions differs significantly between group of male and group of female cases studied (P-value<0.05).

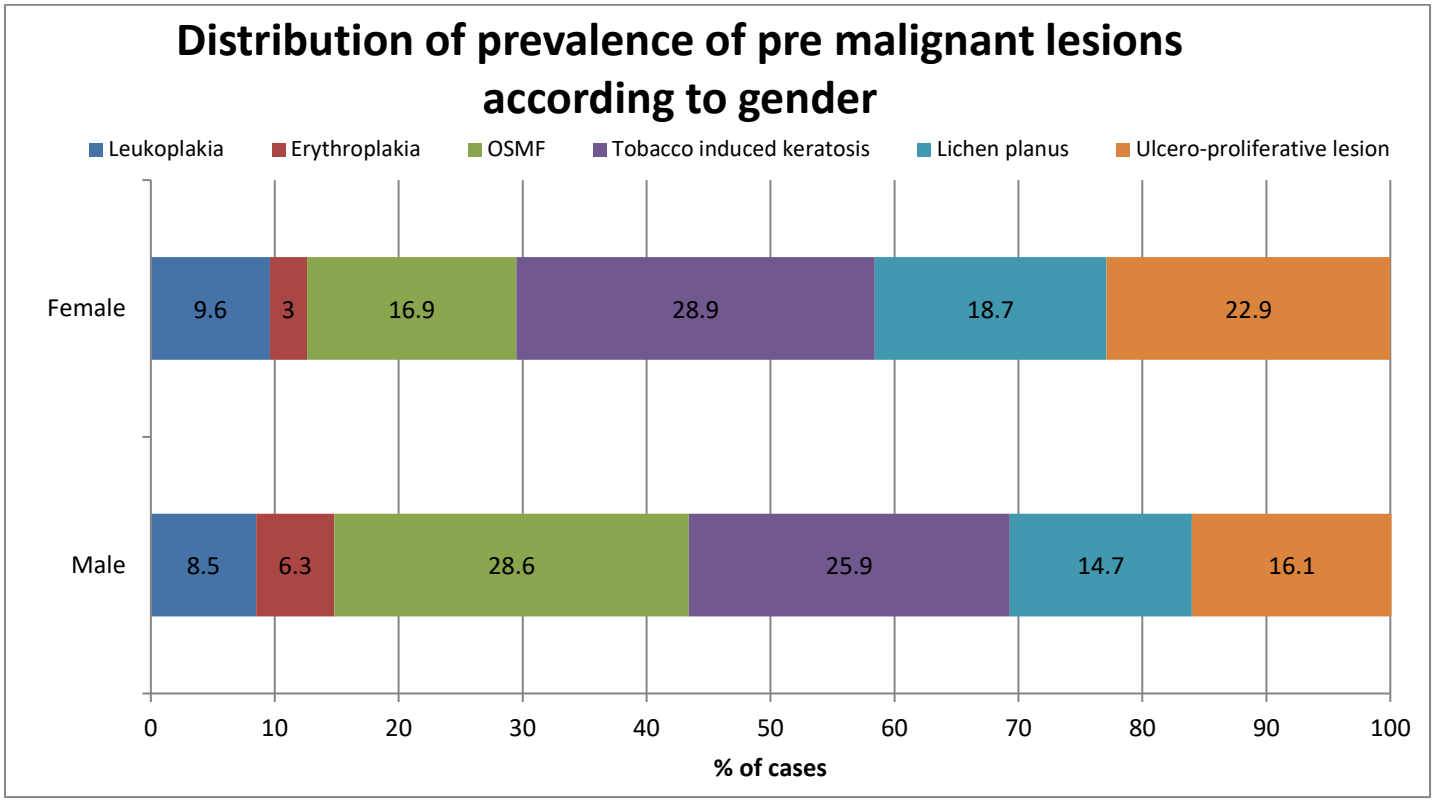

Figure 3: Distribution of prevalence of premalignant lesions according to gender (All age groups combined).

Table 4: Distribution of prevalence of pre malignant lesions according to age groups in each gender group.

	Gender											
	Male (n=224)						Female (n=166)					
	30 – 40 yrs (n=50)		41 – 50 yrs (n=92)		51 – 60 yrs (n=82)		30 – 40 yrs (n=34)		41 – 50 yrs (n=59)		51 – 60 yrs (n=73)	
Pre malignant lesion	n	%	n	%	n	%	n	%	n	%	n	%
Leukoplakia	6	12.0	5	5.4	8	9.8	4	11.8	7	11.9	5	6.8
Erythroplakia	2	4.0	9	9.8	3	3.7	1	2.9	2	3.4	2	2.7
OSMF	14	28.0	34	37.0	16	19.5	9	26.5	8	13.6	11	15.1
Tobacco induced keratosis	10	20.0	14	15.2	34	41.5	6	17.6	16	27.1	26	35.6
Lichen planus	9	18.0	21	22.8	3	3.7	7	20.6	14	23.7	10	13.7
Ulcero-proliferative lesion	9	18.0	9	9.8	18	22.0	7	20.6	12	20.3	19	26.0
P-value	0.001^{***}						0.573^{NS}					
P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant. ***P-value<0.001, NS – Statistically non-significant.												

In group of male cases, distribution of prevalence of pre malignant lesions differs significantly across three age groups (P-value<0.05).

In group of female cases, distribution of prevalence of pre malignant lesions did not differ significantly across three age groups (P-value>0.05).

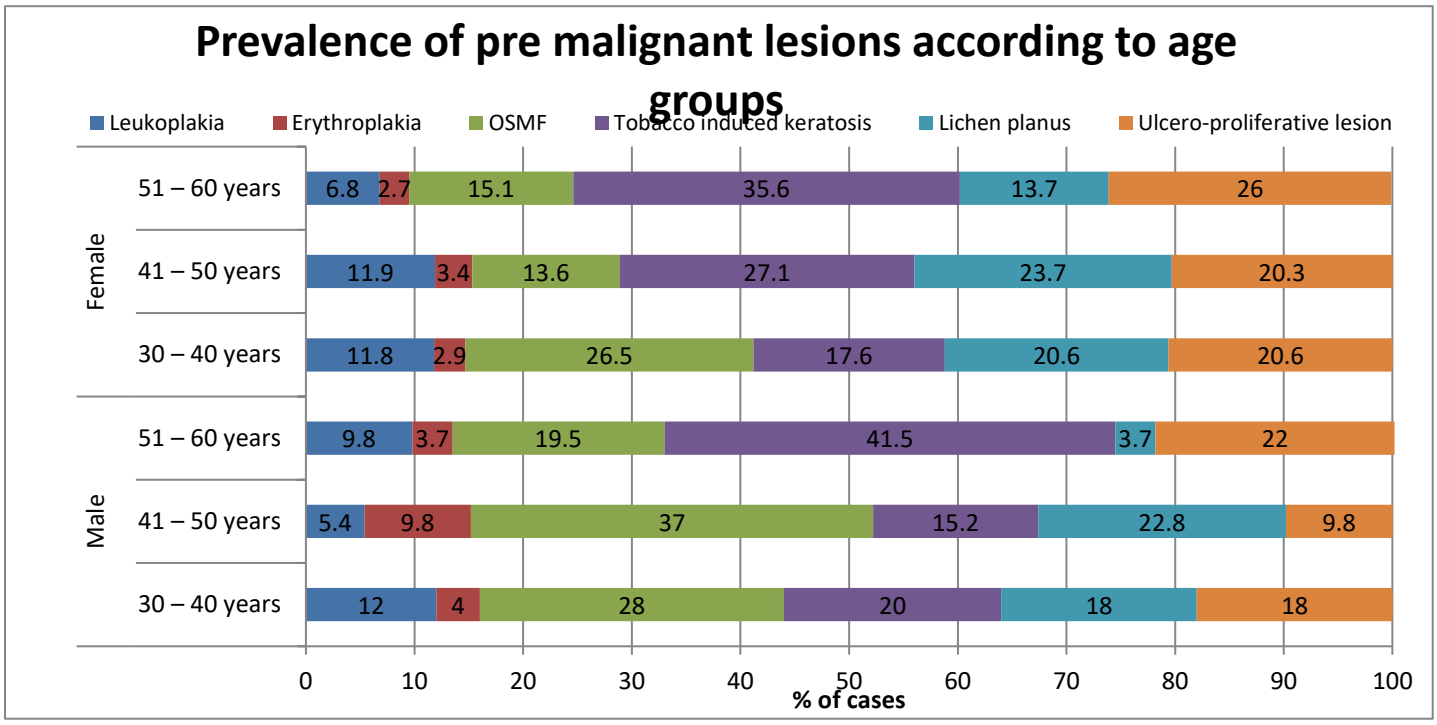

Figure 4: Distribution of prevalence of pre malignant lesions according to age groups in each gender group.

Table 5: Distribution of prevalence of pre malignant lesions according to age groups (Both gender groups combined).

	Age group (years)					
	30 – 40 years		41 – 50 years		51 – 60 years	
Pre malignant lesion	n	%	n	%	n	%
Leukoplakia	10	11.9	12	7.9	13	8.4
Erythroplakia	3	3.6	11	7.3	5	3.2
OSMF	23	27.4	42	27.8	27	17.4
Tobacco induced keratosis	16	19.0	30	19.9	60	38.7
Lichen planus	16	19.0	35	23.2	13	8.4
Ulcero-proliferative lesion	16	19.0	21	13.9	37	23.9
Total	84	100.0	151	100.0	155	100.0
P-value	0.001***					
P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant. ***P-value<0.001.						

Distribution of prevalence of pre malignant lesions differs significantly across three age groups (P-value<0.05).

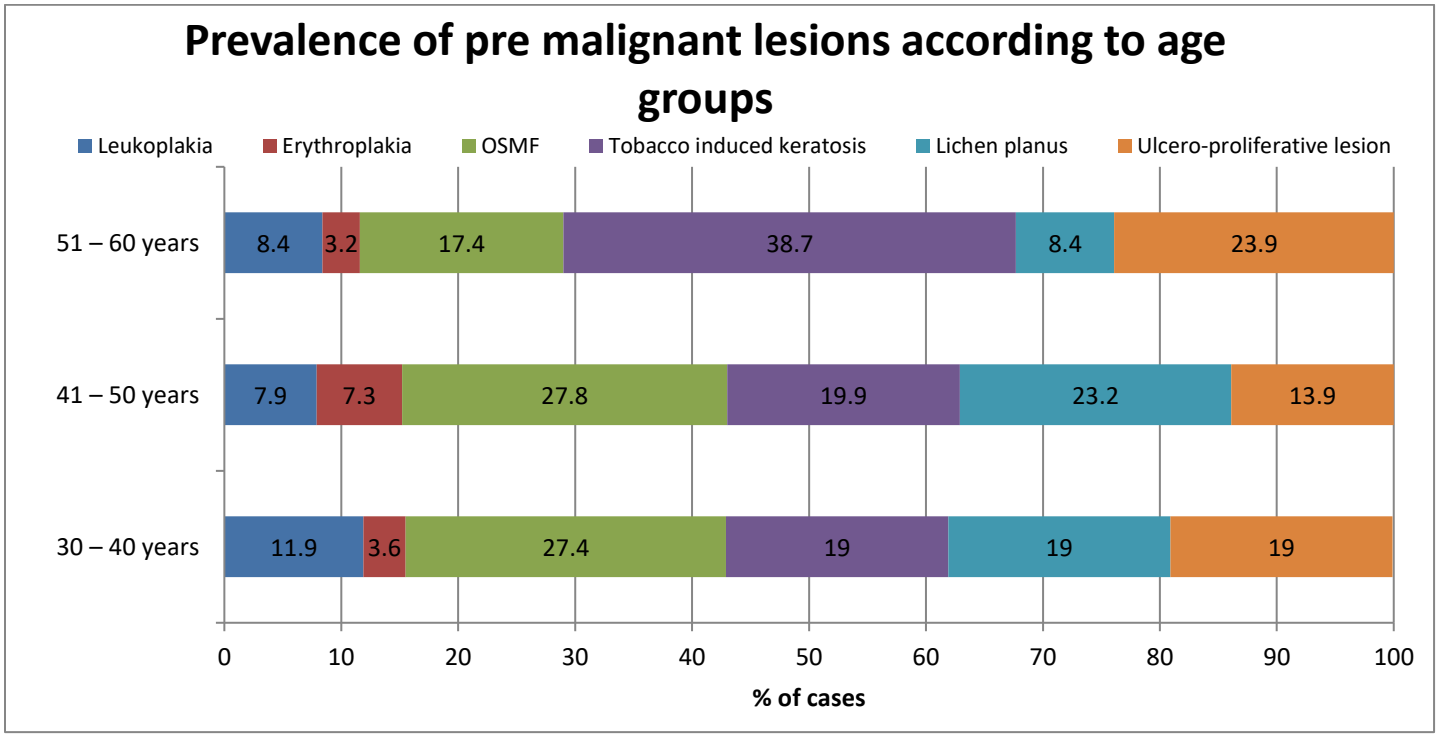

Figure 5: Distribution of prevalence of pre malignant lesions according to age groups (Both gender groups combined).

Table 6:Distribution of prevalence of pre malignant lesions according to duration.

	Duration (years)											
	<5yrs (n=35)		5 – 10yrs (n=72)		10 – 15yrs (n=104)		15 – 20 yrs (n=109)		>20 yrs (n=70)		Total (n=390)	
Pre malignant lesion	n	%	n	%	n	%	n	%	n	%	n	%
Leukoplakia	0	0.0	10	13.9	10	9.6	9	8.3	6	8.6	35	9.0
Erythroplakia	1	2.9	2	2.8	4	3.8	8	7.3	4	5.7	19	4.9
OSMF	9	25.7	12	16.7	23	22.1	24	22.0	24	34.3	92	23.6
Tobacco induced keratosis	9	25.7	20	27.8	36	34.6	29	26.6	12	17.1	106	27.2
Lichen planus	12	34.3	13	18.1	10	9.6	22	20.2	7	10.0	65	16.4
Ulcero-proliferative lesion	4	11.4	15	20.8	21	20.2	17	15.6	17	24.3	74	19.0
Total	35	100.0	72	100.0	104	100.0	109	100.0	70	100.0	390	100.0
P-value	0.032*											
P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant. *P-value<0.05.												

Distribution of prevalence of pre malignant lesions differs significantly across various durations of symptoms (P-value<0.05). The pre malignant lesions such as OSMF and Ulcero-proliferative lesion were more common in the group of cases with relatively higher duration of symptoms and vice-versa (P-value<0.05).

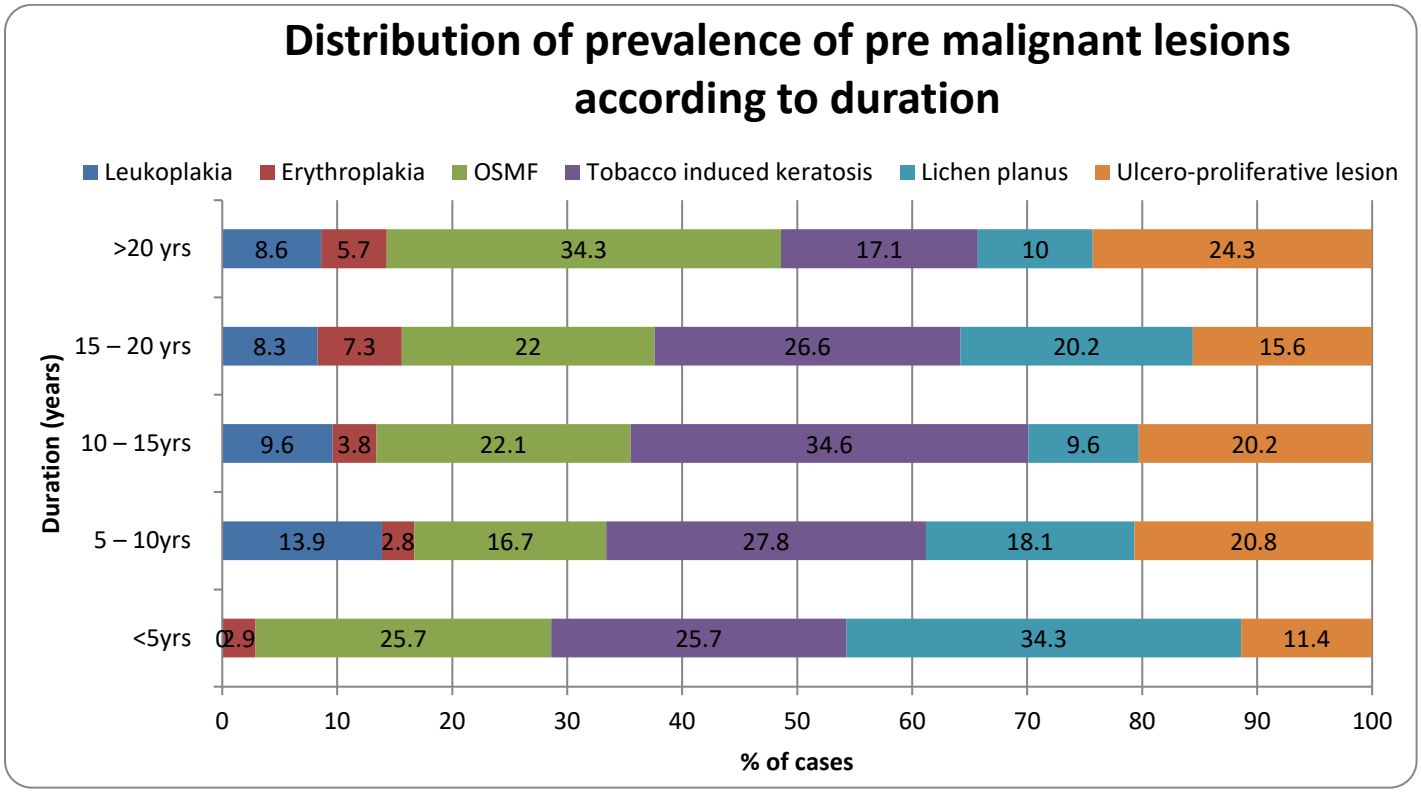

Figure 6: Distribution of prevalence of pre malignant lesions according to duration.

Discussion

Leukoplakia is one of the most common potentially pre-malignant lesions. It is varied in size, shape, consistency, macroscopically homogenous and nodular in nature. The first pre-malignant lesion assessed was Leukoplakia of which the prevalence amongst males noted was 12% in 30-40 years age group, 5.4% in 41-50 years age group and 9.8% in 51-60 years age group. Similarly, in females; amongst the 30-40 years age group prevalence noted was 11.8%, while in 41-50 years age group it was 6.8% and lastly in 51-60 years age group it was 6.8%. In conclusion, the prevalence of leukoplakia was higher in the 30-40 years age group and in males than compared with females and other age groups. The malignant transformation rate of leukoplakia is 0.13 to 17.5% and as a result, detection of leukoplakia is of utmost significance in order to prevent morbidity (Pindborg et al 1984).[10]

The second pre-malignant lesion assessed was Erythroplakia. In males, the 30-40 years age group showed prevalence of 4% compared to 9.8% in 41-50 years age group and lastly 3.7% amongst the 51-60 years age group. On the contrary, in females; the prevalence of erthyroplakia is much less. The prevalence noted was 2.9% amongst the 30-40 years age group, 3.4% in 41-50 years age group and 2.7% in 51-60 years age group. It is one of the lesion showing highest malignant transformation rate of about 87% followed by erythro-leukoplakia worldwide.[11]

The third pre-malignant condition assessed was OSMF as stated by Pindborg in 1966. In males, the prevalence noted was of 28% in 30-40 years age group, 37% in 41-50 years age group and 19.5% in 51-60 years age group. Nevertheless, in females; amongst the 30-40 years age group it was 26.5%, 13.6% in 41-50 years age group, 15.1% in 50-60 years age group. According to WHO, the

malignant transformation rate of OSMF ranges from 4.5-7.6% (Pindborg et al 1984; Amagasa et al 2011). One of the most common causes of OSMF is Areca nut (betel nut) chewing. Areca nut composition is tannins (11%–12%), alkaloids such as arecoline, arecaidine, guvacine, and guvacoline (0.15%–0.67%). Areca nut with addition of slaked lime (Ca $[OH]_2$), results in hydrolysis of arecoline to arecaidine. This arecaidine is the primary active metabolite causing fibroblast stimulation and proliferation; further altering collagen synthesis. Another active agent named tannin; reduces collagen degradation by action of inhibition of collagenases. The pathogenesis cascade begins with excessive betel quid chewing initiating the juxta-epithelial inflammatory reaction in the oral mucosa, interspersed with fibrosis and healing leading to trismus in later stages and thus inability in mouth opening.[12]

The fourth pre-malignant lesion assessed was Tobacco induced keratosis; that was first described by Axell and colleagues in 1976. In males, amongst the 30-40 years age group the prevalence noted was 20%, while 15.2% in 41-50 years age group and 41.5% in 51-60 years age group. Comparatively, in females; 17.6% in 30-40 years age group, 27.1% in 41-50 years age group and 35.6% in 51-60 years age group. It has a small rate of malignant transformation in case local irritants are not completely debrided and as a result, management at an initial stage is of utmost significance.[13]

The fifth pre-malignant lesion assessed was Lichen Planus which was first described by Wilson Erasmus in 1869. The prevalence noted amongst the 30-40 years age group was 18%, 22.8% in 41-50 years age group and 3.7% in 51-60 years age group. Likewise, in females amongst the 30-40 years age group the prevalence seen was 20.6% while it was 23.7% in 41-50 years age group and 13.7% in 51-60 year age group. A study carried out by Zerdoner et al 2003 stated; clinically it is ardous to differentiate between lichen planus and epithelial dysplasia. Owing to the results of their study, about 24% of oral lichen planus cases showed presence of 5 of the 12 WHO diagnostic criteria for epithelial dysplasia out of which only 6% failed to show marked histologic features suggestive of lichen planus. As a result, it is essential to advise biopsy of these lesions at an early stage to lay all the doubts to rest.[14] Greenspan et al 1963 described a triad of Oral lichen planus (OLP), diabetes mellitus (DM) and Vascular hypertension as Greenspan's Syndrome. A thorough medical history of individuals showing oral lesions of OLP is must in order to rule out diagnosis of Greenspan's lesion.

The sixth pre-malignant condition assessed was Ulcero-proliferative lesion. For which the prevalence noted in Males in 30-40 years age group was 18%, 9.8% in 41-50 years age group and 22% in 51-60 years age group. In parallel, in females; amongst the 30-40 years age group it was 20.6%, in 41-50 years age group it was 20.3% and 51-60 years age group it was 26%.

The duration of distribution of the OPMLs differs significantly across various age groups. The highest prevalence of 34.6% was seen in the Tobacco induced keratosis amongst the 10-15 years. Similarly, the second highest prevalence of 34.3% was seen in Lichen planus in < 5 year years duration category followed by the rest of the groups. In contrast, the least prevalence of 2.8% was found in 5-10 years category amongst the erythroplakia group. As a result, it was noted that the assessment of duration category in assessing prevalence of OPMLs was of significance.

Few studies carried out by Pimple et al 2012 [15]; Burungale et al 2014 [16]; Kumar et al 2015 [17] stated those

suffering from OPMLs were more likely to be tobacco users. Similarly, Thomas et al 2003 [18] stated the population most commonly getting affected was ranging between 45-54 years; Majeed K et al [19] concluded mean age group showing prevalence of OPMLs ranges between 31-40 years while Pahwa et al 2018 [20] proved from his study that the population most commonly getting affected from OPMLs is from the age group 18-45 years; which was found to be in agreement with the present study. This is the commonest age group wherein maximum of habit formation occurs.

Narasannavar A et al concluded from his study that 52.4% were males and 47% were females who showed prevalence of pre-malignant lesions. This study was in accordance with the present study in which the prevalence of males was 57.4% and 42.6% were females.[21] On the contrary, a study carried out by Kashid et al 2020 stated negative relationship between potentially malignant disorders (PMD) and gender.[22] Rosenquist et al 2005 stated association between OPMLs and poor oral hygiene. Besides these, malnutrition, high body mass index, uncontrolled diabetes could act as independent risk factors for initiation of OPMLs.[23]

Gender was another factor found significantly been associated with development of OPMLs with males being at higher risk to develop OPMLs. Nair et al stated, higher prevalence of OPMLs amongst males. Another analogous study carried out by Chung et al showed statistically significant difference in OPMLs in males and females. Both of these studies showed similar findings with the present study and concluded the prevalence of OPMLs to be higher amongst males. One of the reasons owing to this marked gender discrepancy in OPMLs could be attributed to the adverse habits such as tobacco consumption, poor oral hygiene were more in males. More than 60 carcinogens have been detected in tobacco. Nicotine with all other carcinogens accelerates inflammatory process once it comes in to contact with the oral mucosa; results in to atrophic and hypertrophic alterations within the oral mucosa.[20,24]

Conclusion

An extensive approach was essential to decline the incidence and prevalence of oral carcinoma's that compiles oral health education, adverse habit cessation, risk factor reduction and diagnosis at the incipient stage. All the patients were explained, educate and alarmed about the possible malignant transformation of these lesions and conditions and their utmost need for habit cessation in order to improve their life expectancy. Oral screening is stressed in order to help identify OPMLs at an early stage and thus reduce the rate of morbidity and mortality; since they have shown a rate of progression of 17% within a mean time period of about 7 years. In essence, owing to limited literature available to draw final conclusions owing to the prevalence OPMLs, an array of studies are essential for in depth understanding of etiology and epidemiology of pre-malignant and malignant lesions.

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