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A study to assess and correlate the habit behaviours among oral submucous fibrosis, leukoplakia, oral lichen planus in Udaipur Population- A Cross-Sectional Study

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Abstract

Background: Oral mucosal lesions (OMLs), including oral submucous fibrosis (OSMF), leukoplakia, and oral lichen planus (OLP), are linked to tobacco and arecanut use, posing significant oral health risks.

Aim & Objectives: This study assessed habit behaviors and their correlation with OSMF, leukoplakia, and OLP severity in Udaipur's population.

Methods: A cross-sectional study of 150 patients evaluated demographic data, habits, and clinical findings. Statistical analysis (ANOVA) determined associations between chewing habits and lesion severity.

Results: OSMF was most prevalent (60%), followed by OLP (50%) and leukoplakia (40%). Long-term tobacco/arecanut use significantly correlated with lesion severity ($p<0.0001$). Frequency and duration of chewing habits were key risk factors.

Conclusion: The study highlights the strong association between chewing habits and OMLs, emphasizing the need for early detection and preventive strategies. Public health initiatives, including awareness campaigns and routine screenings, are crucial in high-risk populations to reduce malignant progression.

Keywords: Oral mucosal lesions, oral submucous fibrosis, leukoplakia, oral lichen planus, habit behavior.

Introduction

Oral mucosal lesions (OMLs) encompass a range of conditions affecting the oral lining, from benign, asymptomatic patches to painful or potentially malignant disorders. Common OMLs include leukoplakia, erythroplakia, lichen planus, oral candidiasis, and traumatic ulcers. Their prevalence is influenced by factors such as tobacco and arecanut use, alcohol consumption, oral hygiene, age, gender, and socioeconomic status. In South Asia, high rates of potentially malignant lesions are linked to cultural habits like tobacco and betel nut chewing. Accurate prevalence data is vital for identifying high-risk groups, informing public health strategies, and guiding early detection and intervention efforts. Disparities in access to healthcare and underreporting, particularly in low-income regions, hinder comprehensive understanding. Standardized diagnostic methods, including clinical examinations and biopsies, are essential for reliable data. OMLs can impair vital functions and significantly affect quality of life. Monitoring trends and investigating emerging lifestyle factors such as vaping are important for future prevention. This study focuses on assessing the prevalence of potentially malignant disorders in Udaipur, Rajasthan, and evaluating their association with the use of chewing tobacco, arecanut, or both. Understanding regional risk factors will aid in developing targeted awareness, screening, and preventive care strategies to reduce the burden of oral mucosal lesions. [1-12]

Aims & Objectives

This study aims to assess and correlate habit behaviours associated with oral submucous fibrosis (OSMF), leukoplakia, and oral lichen planus (OLP) in the Udaipur population. The primary objective is to evaluate various deleterious habit behaviours—such as tobacco chewing, arecanut consumption, and smoking—among individuals diagnosed with these conditions.[13-20] Additionally, the study seeks to determine the possible association between the nature and duration of these habits and the severity of OSMF, leukoplakia, and OLP. Understanding these correlations will aid in identifying high-risk behaviours and support the development of targeted prevention and intervention strategies. [21-30]

Materials & Methods

The present cross-sectional study titled “A study to assess and correlate the habit behaviours among oral submucous fibrosis, leukoplakia, oral lichen planus in Udaipur population” was conducted in the Department of Oral Medicine and Radiology, Darshan Dental College and nearby regions. A total of 150 clinically diagnosed subjects were selected—50 each with Oral Submucous Fibrosis (OSMF), Leukoplakia, and Oral Lichen Planus (OLP)—based on WHO (2005) criteria (Photograph 3, 4 and 5). Ethical clearance and informed consent were obtained prior to the study. [31-40]

Subjects were examined using standard oral diagnostic tools, including dental chairs, probes, mirrors, and sterilized equipment (Figure 1 & 2).

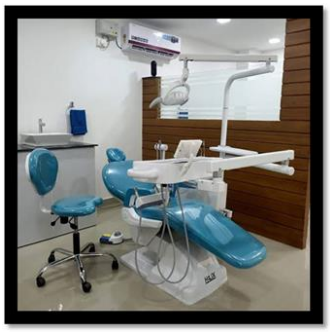


Figure 1: Dental chair with Illumination light.

Figure 2: Armamentarium required for the study including straight probe, mouth mirror, tweezer, sterilized gauge piece, kidney tray, mouth mask

Figure 3: Oral manifestations of Oral submucous fibrosis patients according to J. N. Khanna, N.N. Andrade classification.

Figure 4: Oral manifestations of oral leukoplakia in patients according to Van der wal et al classification.

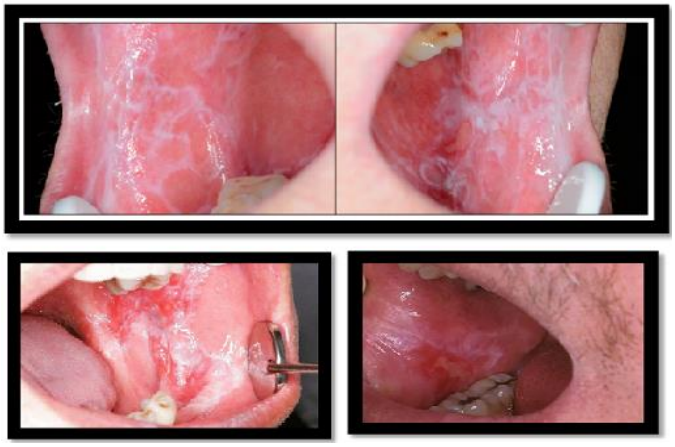
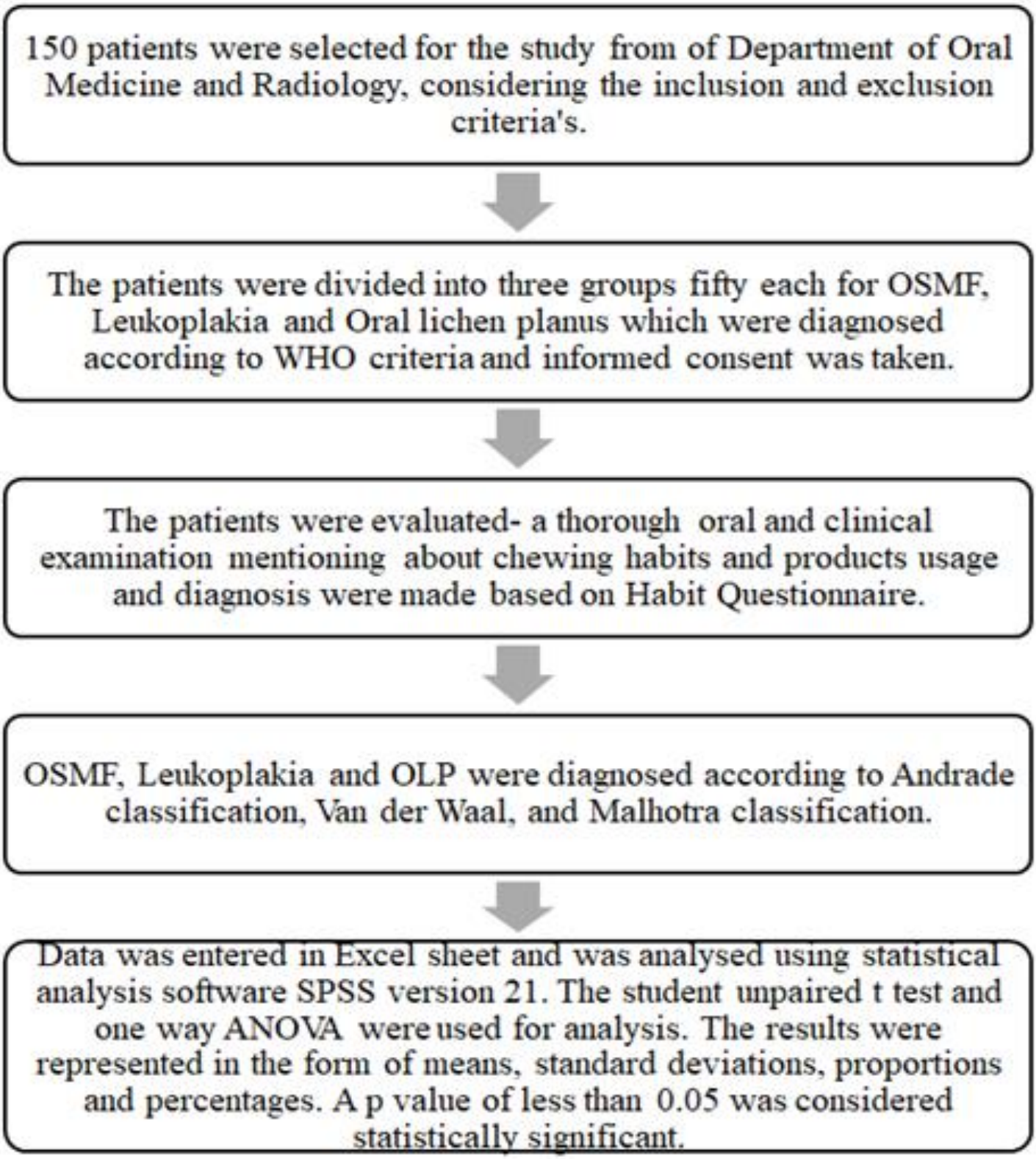


Figure 5: Oral manifestations of oral lichen planus in patients according to Malhotra et al.

Habit behaviours were assessed using a structured case history proforma and habit questionnaire. Lesions were graded using established classification systems: Khanna and Andrade for OSMF, Van der Wal et al. for leukoplakia, and Malhotra et al. for OLP. Participants were divided into three groups: Group A (OSMF), Group B (Leukoplakia), and Group C (OLP). Clinical features and severity were recorded and correlated with chewing habits and product usage. Data were analyzed using SPSS version 21, applying unpaired t-tests and one-way ANOVA. Results were expressed in terms of means, standard deviations, and percentages, with significance set at $p < 0.05$.

Schematic Diagram of Methodology



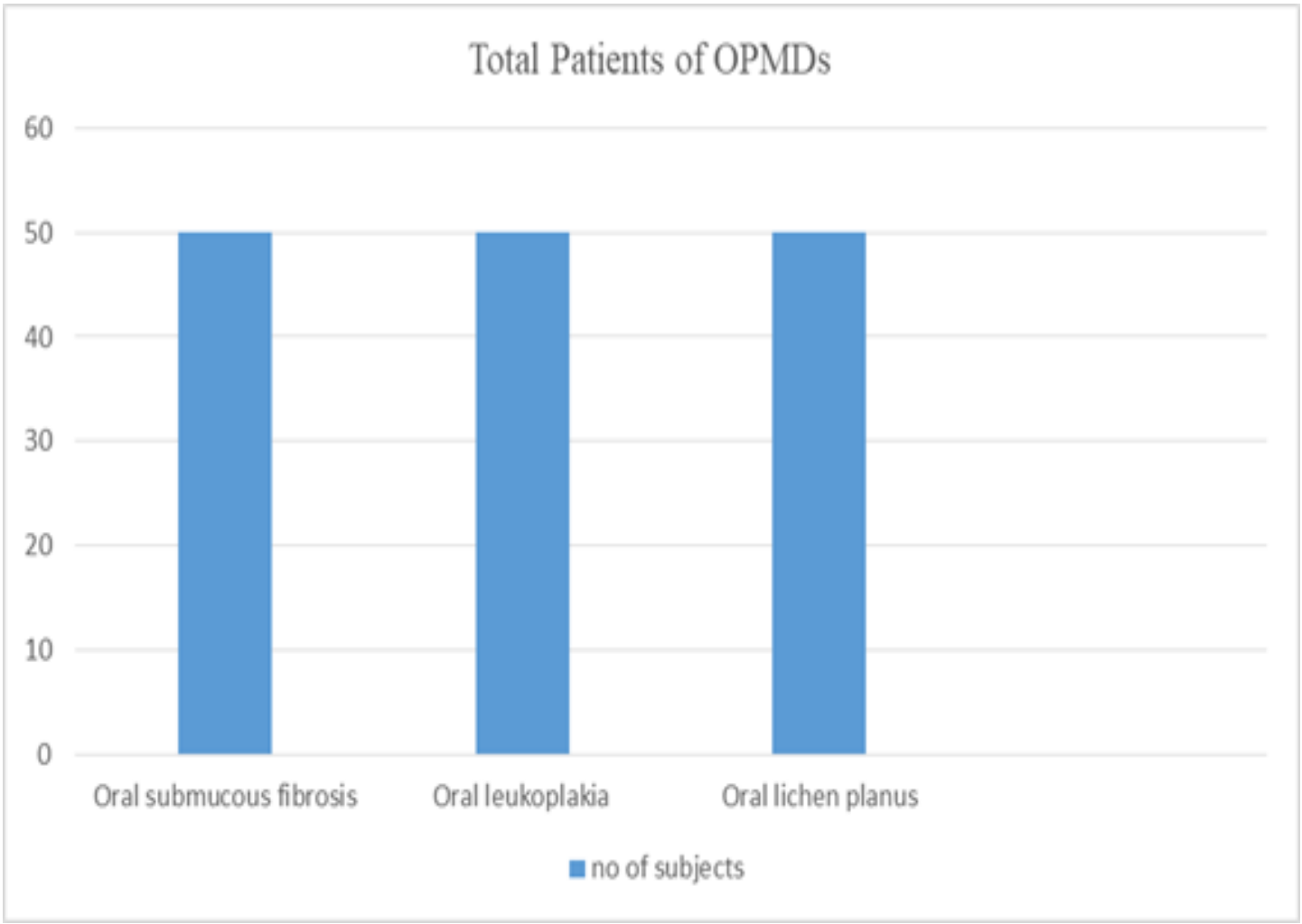
Results

The present cross-sectional study titled "A study to assess and correlate the habit behaviours among oral submucous fibrosis, leukoplakia, oral lichen planus in Udaipur population" was conducted at Darshan Dental College and nearby areas with 150 subjects equally divided into three groups: Oral Submucous Fibrosis (OSMF), Leukoplakia (OL), and Oral Lichen Planus (OLP). (Table and Graph 1).

Table 1:

Conditions	Number of Subjects	Group Percentage (%)
Oral Submucous Fibrosis (OSMF)	50	33.33%
Leukoplakia	50	33.33%
Oral Lichen Planus (OLP)	50	33.33%
Total	150	100%

Graph 1:



The study comprised 75 males and 75 females. Most male participants (41.6%) were aged 21–30, while most females (27.4%) were in the 51–60 age group. A declining trend in male habit behavior was noted with age, while it increased among females. Socio-demographic data revealed that most males were

unskilled workers (63.3%), while most females were housewives (58.9%). Males showed higher incidences of diabetes (33.3%) and hypertension (29.3%). In contrast, 63.7% of females reported no significant medical history. Dental history showed 46.6% of males and 40% of females had undergone prior dental treatment. (Table & Graph 2 and 3)

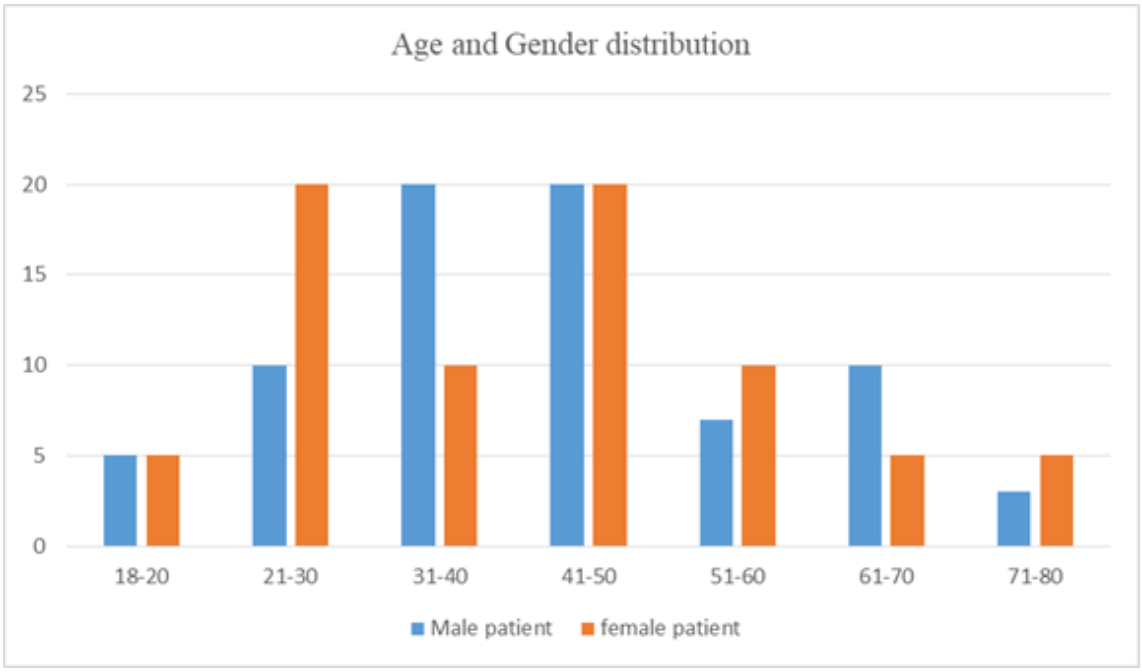
Table 2:

Age Group (Years)	Male Patients (n=75)	Female Patients (n=75)
18-20	5	5
21-30	10	20
31-40	20	10
41-50	20	20
51-60	7	10
61-70	10	5
71-80	3	5
Total	75	75
Percentage of Males and Females (%)	50.0%	50.0%

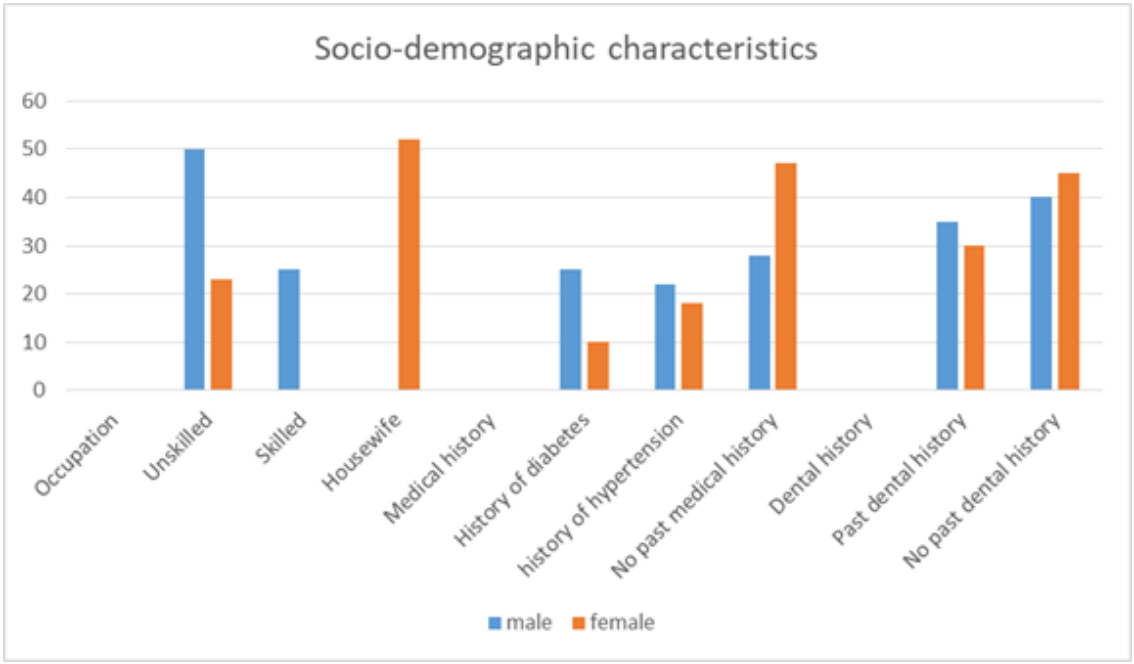
Table 3:

Sociodemographic Character	Male (n=75)	Female (n=75)
Occupation		
Unskilled	50 (63.3%)	23 (37.9%)
Skilled	25 (39.1%)	N/A
Housewife	N/A	52 (58.9%)
Medical History		
History of Diabetes	25 (33.3%)	10 (13.3%)
History of Hypertension	22 (29.3%)	18 (24.0%)
No past medical history	28 (37.1%)	47 (63.7%)
Dental History		
Previous dental treatment	35 (46.6%)	30 (40.0%)
No past dental history	40 (54.4%)	45 (60.0%)

Graph 2:



Graph 3:



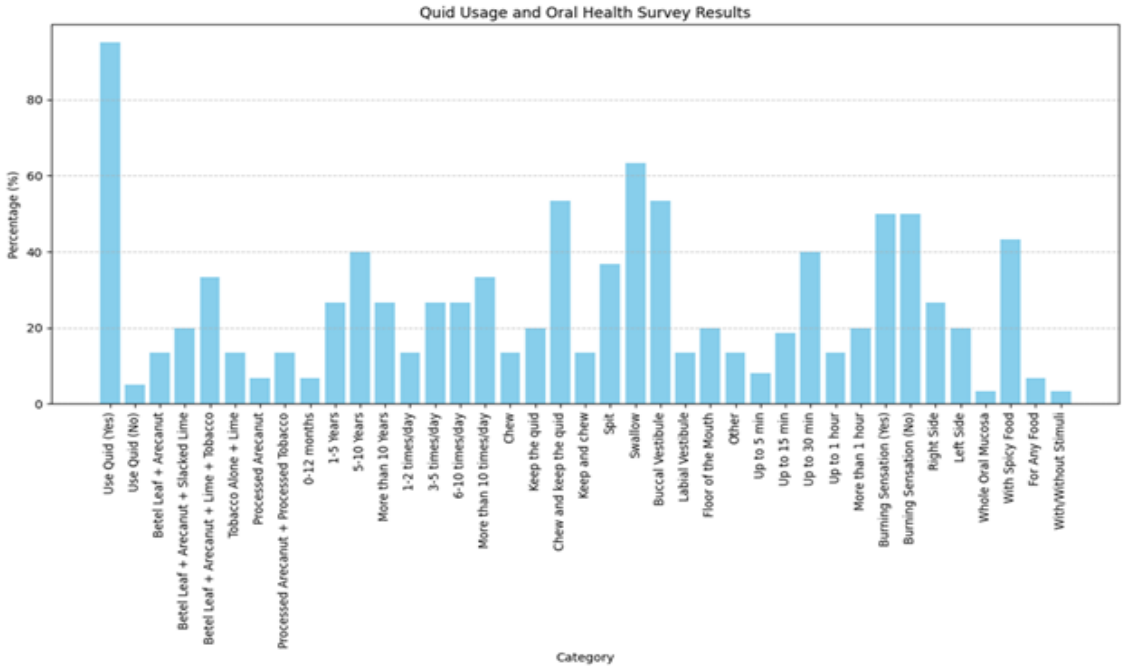
A high prevalence (95%) of quid use was observed. The most common type was Betel Leaf + Arecanut + Lime + Tobacco (33.3%), used frequently (over 10 times/day by 33.3%). Half the participants reported burning sensations, mainly on the right buccal mucosa, commonly triggered by spicy food. A significant association was found between quid use characteristics and oral symptoms ($p < 0.0001$). (Table & Graph 4).

Table 4:

Sn.	Characteristic	Option	Number of Patients	Percentage
1	Do you use quid?	Yes	140	95%
		No	10	5%
2	What type of quid do you use?	A) Betel Leaf + Arecanut	20	13.33%
		B) Betel Leaf + Arecanut + Slacked Lime	30	20%
		C) Betel Leaf + Arecanut + Lime + Tobacco	50	33.3%
		D) Tobacco Alone + Lime	20	13.33%
		E) Processed Arecanut	10	6.67%
		F) Processed Arecanut + Processed Tobacco	20	13.33%
3	How long have you been using quid?	(a) 0-12 months	10	6.67%
		(b) 1-5 Years	40	26.67%
		(c) 5-10 Years	60	40%
		(d) More than 10 Years	40	26.67%
4	How many times in a day do you use quid?	(a) 1-2 times	20	13.33%
		(b) 3-5 times	40	26.67%
		(c) 6-10 times	40	26.67%
		(d) More than 10 times	50	33.3%
5	Do you chew or keep the quid in the mouth?	(a) Chew	20	13.33%
		(b) Keep the quid	30	20%
		(c) Chew and keep the quid	80	53.33%
		(d) Keep and chew	20	13.33%
6	Do you spit or swallow the quid?	(a) Spit	55	36.67%
		(b) Swallow	95	63.33%
7	Where do you place the quid?	(a) Buccal Vestibule (Right/Left)	80	53.33%
		(b) Labial Vestibule (Right/Left)	20	13.33%
		(c) Floor of the Mouth	30	20%

		(d) Other	20	13.33%
8	How long do you keep the quid in the mouth?	(a) Up to 5 min	12	8%
		(b) Up to 15 min	28	18.67%
		(c) Up to 30 min	60	40%
		(d) Up to 1 hour	20	13.33%
		(e) More than 1 hour	30	20%
9	Do you have burning sensation in the oral cavity?	Yes	75	50%
		No	75	50%
10	Burning sensation location (if any)?	(a) Right side	40	26.67%
		(b) Left side	30	20%
		(c) Whole of oral mucosa	5	3.33%
11	Burning sensation triggered by food?	(1) With spicy food	65	43.33%
		(2) For any food	10	6.67%
		(3) With/without stimuli	5	3.33%
	Result	P value	150	Significant ($p<0.0001$)

Graph 4:



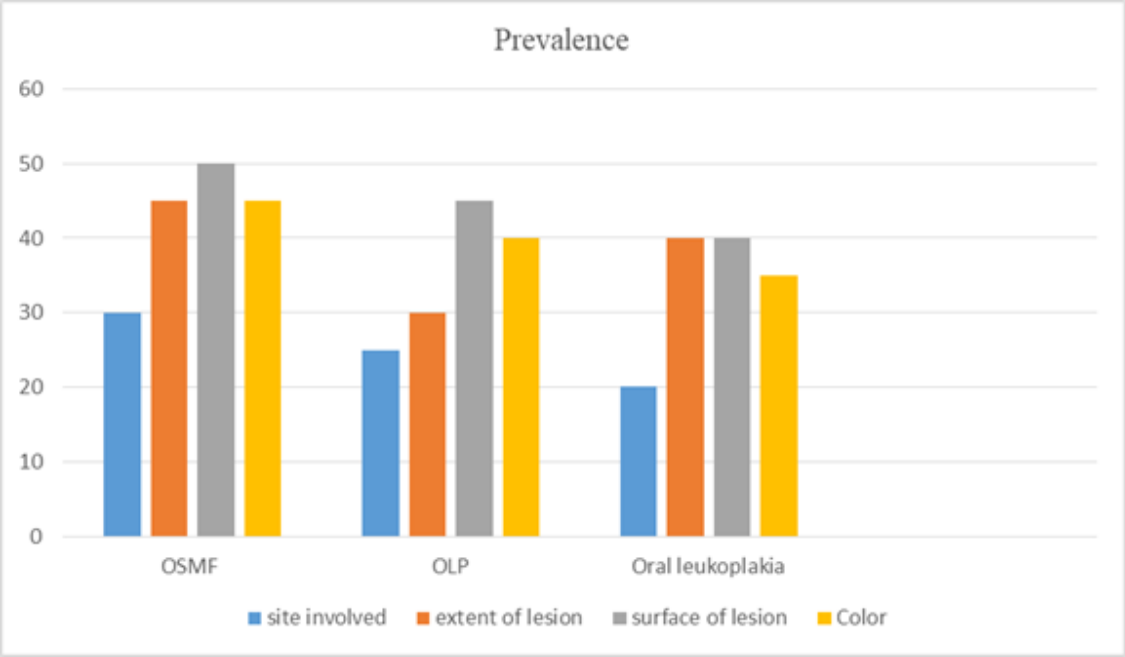
Lesion-specific analysis showed buccal mucosa as the common site for OSMF and OL, while OLP affected the ventral tongue. OSF and OLP lesions were mostly localized; OL lesions were more diffuse. White striae

were found in all OSF patients, and erythematous areas were more frequent in OLP. Tenderness was more common in OSMF and OLP. (Table & Graph 5)

Table 5:

Characteristic	OSF (n=50)	OL (n=50)	OLP (n=50)
Site Involved	Buccal mucosa (30 patients)	Buccal mucosa (25 patients)	Ventral surface of tongue (15 patients)
Extent of Lesion	Mostly localized	Mostly diffuse	Mostly localized
Lesion Definition	Well-defined	Well-defined	Bilateral, well-defined
Surface of Lesion	White radiating stria/lines (100%)	White radiating stria/lines (45%)	White radiating stria/lines (40%)
Other Surface Features	White keratotic patches, wrinkled areas	-	Erythematous areas (more common)
Color of Lesion	Pale (45%)	Pale (40%)	Pale (35%), Erythematous (reddish, more frequent)
Tenderness on Palpation	Yes (25 patients)	No tenderness	Yes (20 patients)
Statistical Significance (p-value)	0.0001	0.0002	0.0001

Graph 5:

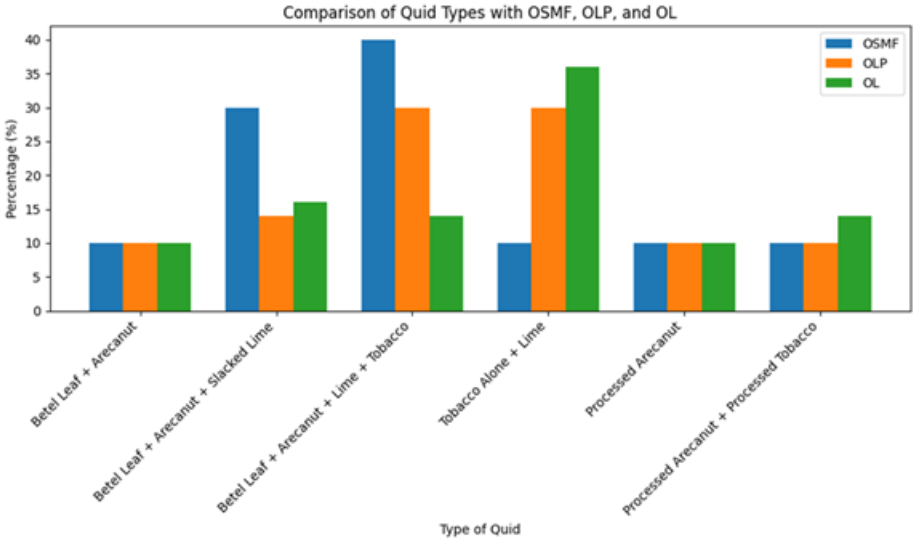


Quid types correlated significantly with lesion type. OSMF was more associated with complex combinations like Betel Leaf + Arecanut + Lime + Tobacco, while OL and OLP were linked to simpler combinations like Tobacco + Lime. Duration and frequency of quid use were high across all groups, with most participants preferring to chew and swallow the quid. (Table & Graph 6)

Table 6:

Type of Quid	OSMF (n=50)	OLP (n=50)	OL (n=50)	Statistical Significance (p-value)
Betel Leaf + Arecanut (Type A)	10%	10%	10%	Not Significant
Betel Leaf + Arecanut + Slacked Lime (Type B)	30%	14%	16%	0.0001
Betel Leaf + Arecanut + Lime + Tobacco (Type C)	40%	30%	14%	0.0000
Tobacco Alone + Lime (Type D)	10%	30%	36%	0.001 (Not Significant)
Processed Arecanut (Type E)	10%	10%	10%	Not Significant
Processed Arecanut + Processed Tobacco (Type F)	10%	10%	14%	Not Significant

Graph 6:



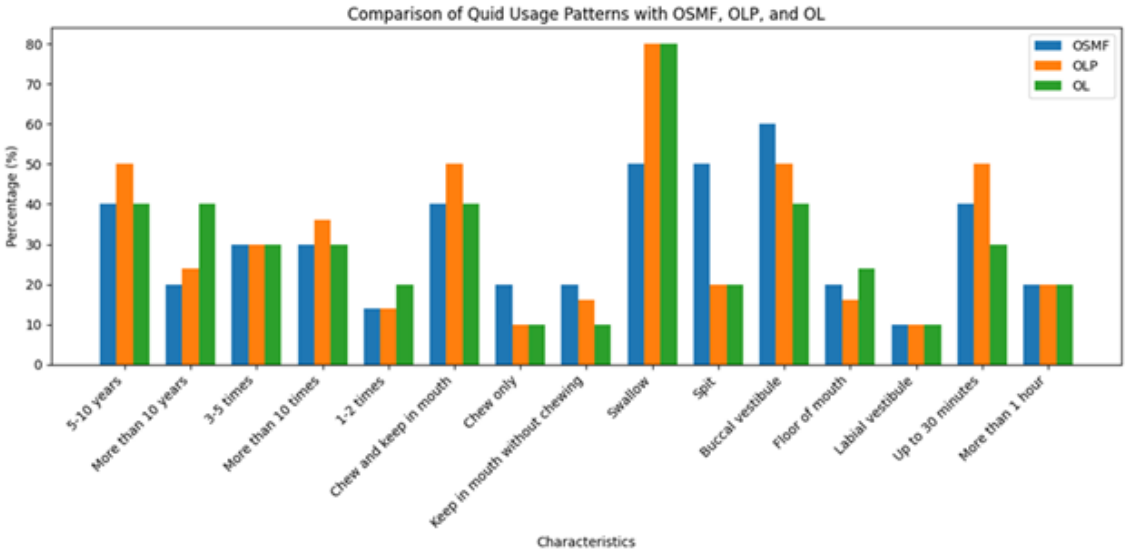
Burning sensations were most reported in OSMF (60%), followed by OLP (50%) and OL (40%), with significant variation in location and triggers. (Table & Graph 7)

Table 7:

Characteristic	OSMF (n=50)	OLP (n=50)	OL (n=50)
Duration of Quid Use			
- 5-10 years	40%	50%	40%
- More than 10 years	20%	24%	40%
Frequency of Quid Use per Day			
- 3-5 times	30%	30%	30%
- More than 10 times	30%	36%	30%
- 1-2 times	14%	14%	20%

Method of Quid Use			
- Chew and keep in mouth	40%	50%	40%
- Chew only	20%	10%	10%
- Keep in mouth without chewing	20%	16%	10%
Spit or Swallow Quid			
- Swallow	50%	80%	80%
- Spit	50%	20%	20%
Quid Placement			
- Buccal vestibule	60%	50%	40%
- Floor of mouth	20%	16%	24%
- Labial vestibule	10%	10%	10%
Duration of Keeping Quid in Mouth			
- Up to 30 minutes	40%	50%	30%
- More than 1 hour	20%	20%	20%

Graph 7:



ANOVA analysis confirmed statistically significant differences in habit patterns and lesion characteristics across groups ($p = 0.0001$). (Table- Graph 8 & 9)

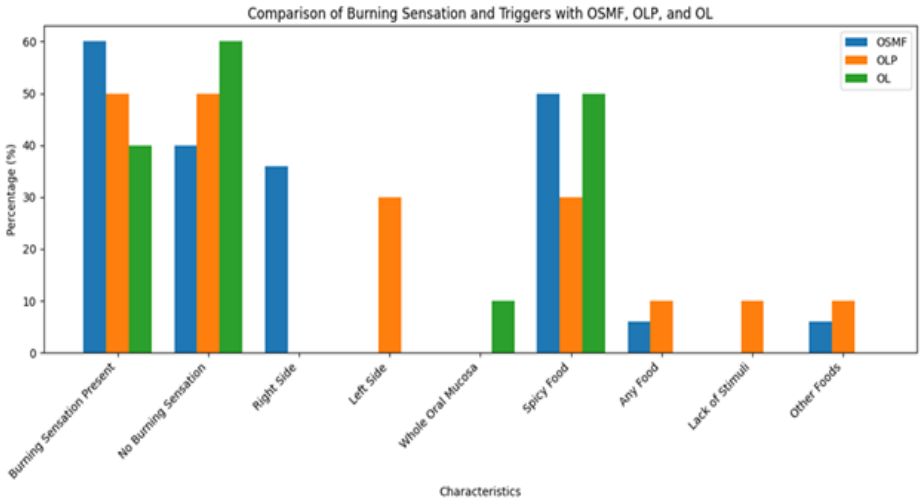
Table 8:

Characteristic	OSMF (n=50)	OLP (n=50)	OL (n=50)	Statistical Significance (p-value)
Presence of Burning Sensations	60%	50%	40%	0.0001 (Significant)
No Burning Sensation	40%	50%	60%	0.0002 (Significant)
Location of Burning Sensation				
- Right side	36%	-	-	Not Significant

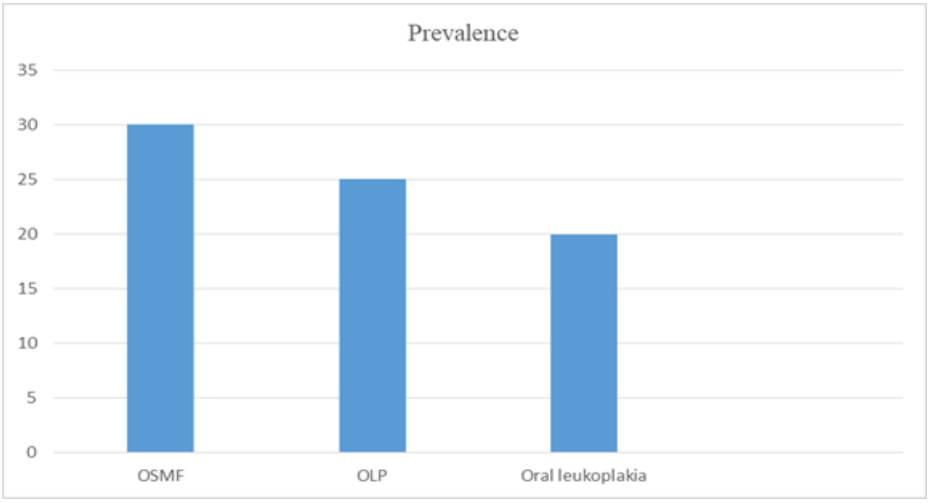
- Left side	-	30%	-	Not Significant
- Whole oral mucosa	-	-	10%	Not Significant
Triggers of Burning Sensation				
- Spicy food	50%	30%	50%	Not Significant
- Any food	6%	10%	-	Not Significant
- Lack of stimuli	-	10%	-	Not Significant
- Other foods	6%	10%	-	Not Significant

Source of Variation	Sum of Squares	Degrees of Freedom (df)	Mean Square	F-statistic	p-value
Between Groups	9	3	3.8765 ± 0.05	4.55	0.0001
Within Groups	441	147	4.5674 ± 0.23	3.54	0.0001
Total	500	150	12.456 ± 0.25	4.5	0.0001

Graph 8:



Graph 9:

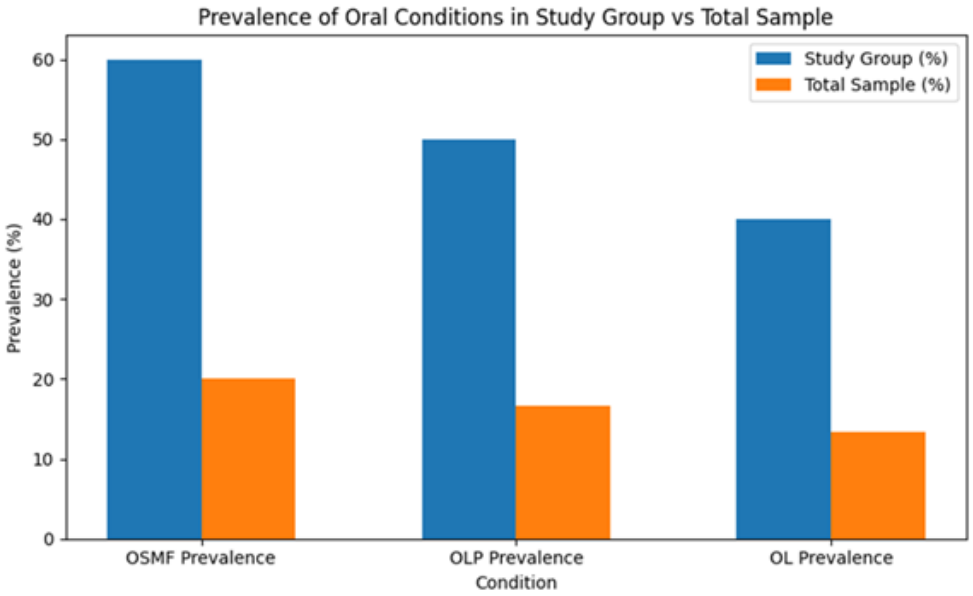


Overall, OSMF was the most prevalent lesion (20%), followed by OLP (16.67%) and OL (13.33%), indicating strong correlations between quid use habits and lesion development.

Table 9:

Condition	Prevalence in Study Group (%)	Prevalence in Total Sample (%)	Potential Contributing Factors
Oral Submucous Fibrosis (OSMF)	60%	20%	Linked to long-term use of betel quid (betel leaf, arecanut, tobacco), common in South and Southeast Asia
Oral Lichen Planus (OLP)	50%	16.67%	Autoimmune response, genetic factors, immune dysfunction, stress, medications, and infections
Oral Leukoplakia (OL)	40%	13.33%	Chronic tobacco use (smoking and chewing), potential premalignant nature

Graph 10:



Discussion

Oral Potentially Malignant Disorders (OPMDs), including Oral Submucous Fibrosis (OSMF), Leukoplakia, and Oral Lichen Planus (OLP), are increasingly prevalent globally due to lifestyle factors like tobacco and betel quid use. This study highlights a strong correlation between the duration and frequency of quid use and the severity of OPMDs, with lesions most common among individuals aged 31–50. A notable 95% of participants reported quid use, with those consuming it over 10 times daily or for more than a decade experiencing significantly severe lesions. The buccal vestibule was the most common site of lesion development, while 63.33% of users reported swallowing quid, potentially increasing systemic cancer risk. Burning sensations, particularly triggered by spicy food, were frequently reported in OSMF cases. Gender distribution was nearly equal, reflecting changing consumption patterns. Socio-demographic factors such as low health literacy among unskilled workers and

cultural practices among housewives influenced usage behaviors. The study also reveals a statistically significant link between tobacco use and dysplastic changes, especially in leukoplakia. These findings emphasize the need for early detection, lifestyle modification, and public health interventions targeting high-risk groups. Dietary counseling and psychological support should also be integrated into patient care to improve outcomes and quality of life.

This study on oral potentially malignant disorders (OPMDs) has key limitations, including a small sample size (150 patients), limiting generalizability across diverse populations. The cross-sectional design prevents establishing causality, and self-reported habit data (e.g., tobacco use) may be biased.

Future research should expand sample sizes and include diverse ethnic, regional, and socio-economic groups to improve generalizability. Longitudinal studies are needed to track disease progression and establish causal links between habits (e.g., betel quid chewing) and OPMDs. Genetic research could identify susceptibility markers, enabling personalized prevention strategies. Biomarker discovery may improve early detection, while community-based interventions should target high-risk populations with culturally tailored programs.

Collaboration among researchers, healthcare providers, and policymakers is essential to enforce tobacco/betel quid regulations, promote screening, and enhance public health strategies. Addressing these gaps can improve early diagnosis, reduce OPMD progression, and mitigate oral cancer risks globally.[41-60]

Conclusion

This study examines the strong association between oral potentially malignant disorders (OSMF, leukoplakia, OLP) and betel quid/tobacco use, with 95% of participants reporting habitual use. Frequent, long-term exposure correlated with increased lesion severity, particularly in 31–50-year-olds. Key risk factors included quid placement (e.g., buccal vestibule), swallowing habits, and dietary triggers like spicy foods. Gender distribution indicated shifting societal trends, while occupational data highlighted high-risk groups (unskilled workers, housewives).

Despite insights, limitations like small sample size and cross-sectional design restrict generalizability. Future research should prioritize longitudinal studies, genetic markers, and biomarker discovery for early detection. Public health measures—targeted awareness campaigns, stricter tobacco/betel quid regulations, and culturally adapted interventions—are vital for prevention. Collaborative efforts among researchers, clinicians, and policymakers can mitigate OPMD progression and improve outcomes through timely screening and lifestyle modifications.[61-73]

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