

Oral Submucous Fibrosis: Correlation of Clinical Grading to Various Habit Factors

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ABSTRACT

Objectives: The aim of this study was to correlate the clinical grading of oral submucous fibrosis (OSMF) with various habit factors and to observe the habit factors associated with the severity of OSMF. **Materials and Methods:** This study was carried out in the Department of Oral Medicine and Radiology, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India. Two hundred patients clinically diagnosed with OSMF were included in the study. The observations were tabulated and subjected to statistical analysis using chi-square test and Spearman's rank correlation test. **Results:** A total of 200 subjects participated in the study of which 182 were males and 18 were females. Forty-eight males and nine females had Grade I OSMF. One hundred nineteen males and eight females had Grade II OSMF. Fifteen males and only one female had Grade III OSMF. On the basis of functional staging, the total participants in stage I, stage II, and stage III were 185, 14, and 1, respectively. The participants having Grade I, Grade II, and Grade III OSMF with functional staging I were 57, 122, and 6, respectively. The participants having Grade II and Grade III OSMF with functional staging II were 5 and 9, respectively. **Conclusion:** It is alarming that nearly half of the total subjects were in the younger age group and were having OSMF. Also, as the age increased, the subjects were found to be more attracted to consuming areca nut derivatives in the form of betel quid with or without tobacco. It is recommended that community-oriented outreach programs on oral health awareness be developed, emphasizing children who represent the upcoming future, to avoid/quit areca nut and its derivatives.

KEYWORDS: *Areca Nut, Clinical Grading, Oral submucous Fibrosis*

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INTRODUCTION

There is a ubiquitous belief that use of smokeless tobacco is less injurious than smoking, which needs to end. Unceasing public education system with adequate scientific evidence and simple logic can successfully banish this belief.^[1]

The use of tobacco has increased considerably in the last few decades, especially as various new forms of smokeless forms of tobacco have been emerging, alluring new consumers.^[2] The concept of premalignant lesions has now been replaced by the term oral potentially malignant disorders (OPMDs), which states that not all lesions may convert into cancer and there is a family of morphological

alterations among which some may have an augmented potential for malignant transformation.^[2,3] Various risks to health and lifestyle caused by tobacco consumption evolve over a long period and take decades to become apparent. Consumers spend their scanty family resources on them rather than spending them on food or other necessities. The use of such products not only imposes expeditious suffering on users and families but the harm incited, though diminishing, affects them little by little each day.^[1]

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Oral submucous fibrosis (OSMF) is one of the most common OPMDs prevalent in consumers. The condition is well recognized for its malignant potential rate of 7.6% and is particularly associated with the use of areca nut in various forms with significant duration and frequency of chewing habits.^[4,5]

The role of critical components of a habit such as duration, frequency, and chewing time to the clinical grading of OSMF is lacking in the present scenario of evidence-based dentistry. Thus, this study is being carried out to correlate these habit factors to the clinical grading of OSMF.^[6]

MATERIALS AND METHODS

This prospective study was carried out in the Department of Oral Medicine and Radiology, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha, India. Clinical criteria for the grading of OSMF was as per the criteria described by Haider *et al.*^[7] A total of 200 patients clinically diagnosed with OSMF were included in the study from January 2017 to May 2018. Before the start of the study, an ethical approval was obtained from the institutional ethics committee (letter no.: KIMS/KIIT/IEC/99/2016). Only those patients who volunteered to participate in the study and had signed the written consent form were included in the study.

1. Inclusion criteria:
 - Patient with a clinical diagnosis of OSMF.
 - Patients between the age group 20–60 years were included in this study.
 - Patients with OSMF having a history of chewing areca nut and its related products were included in the study.
2. Exclusion criteria
 - Patients with known history of systemic disorders causing limitation of mouth opening.

- Patients with a history of previous treatment for OSMF.
- Patients with missing upper and lower anterior teeth.
- Patients having cervical lymphadenopathy and diagnosed oral squamous cell carcinoma

The observations were tabulated and subjected to statistical analysis using chi-square test and Spearman’s correlation test.

RESULTS

A total of 200 subjects participated in the study of which 182 were males and 18 were females. Forty-eight males and nine females had Grade I OSMF. One hundred nineteen males and eight females had Grade II OSMF. Fifteen males and only one female had Grade III OSMF [Table 1]. In this study, the participants were divided into four age groups. Group I included participants between the age ranges of 21–30 years. Similarly, group II, group III, and group IV included the age range between 31–40, 41–50, and 51–60 years, respectively. Group I had a total of 89 participants. Similarly, group II, group III, and group IV included 57, 35, and 19 participants, respectively [Table 2].

On the basis of functional staging, the total participants in stage I, stage II, and stage III were 185, 14, and 1, respectively. The participants having Grade I, Grade II, and Grade III OSMF with functional staging I were 57, 122, and 6, respectively. The participants having Grade II and Grade III OSMF with functional staging II were 5 and 9, respectively [Table 3].

Similarly, the association between the frequency of chewing habit with clinical grading of OSMF [Table 4], the association between duration of chewing with clinical grading of OSMF [Table 5], the association between the contents with clinical grading of OSMF

Table 1: Association between genders with clinical grading of oral submucous fibrosis

Gender	Grade I	%	Grade II	%	Grade III	%	Total	%	Chi-square	P value
Male	48	26.37	119	65.38	15	8.24	182	91.00	4.4871	0.1061
Female	9	50.00	8	44.44	1	5.56	18	9.00		
Total	57	28.50	127	63.50	16	8.00	200	100.00		

*P < 0.05 (P value less than 0.05 is considered to be significant)

Table 2: Association between age groups with clinical grading of oral submucous fibrosis

Age groups	Grade I	%	Grade II	%	Grade III	%	Total	%	Chi-square	P value
21–30	20	22.47	62	69.66	7	7.87	89	44.50	11.8744	0.0649
31–40	14	24.56	39	68.42	4	7.02	57	28.50		
41–50	12	34.29	20	57.14	3	8.57	35	17.50		
51–60	11	57.89	6	31.58	2	10.53	19	9.50		
Total	57	28.50	127	63.50	16	8.00	200	100.00		

*P < 0.05 (P value less than 0.05 is considered to be significant)

[Table 6], the association between chewing time with clinical grading of OSMF [Table 7], and the association between various habits with clinical grading of OSMF [Table 8] are given in the respective tables.

A negative correlation was found with the gender, age groups, participants chewing only paan, and the duration of chewing habit. The negative correlation between the age group with that of grading of OSMF was significant. Also, a negative correlation between the participants chewing paan with grading of OSMF was also significant. A positive correlation between various habit factors and grading of OSMF was found in participants chewing paan masala, gutkha,

combination of habits, frequency of chewing, the chewing time, and spitting/swallowing of the contents. Similarly, a positive correlation between grading of OSMF was significant in patients having a habit of combination of areca nut products and participants who had higher frequency of chewing areca nut products [Table 9].

Two multiple logistic regression model analyses for clinical grading with various factors and functional grading with habit factors were also carried out [Tables 10 and 11]. Keeping the stage III of OSMF as a constant, logistic regression model for various parameters were compared and analyzed [Tables 12–15].

Table 3: Association between functional stagings with clinical grading of oral submucous fibrosis

Functional grading	Grade I	%	Grade II	%	Grade III	%	Total	%	Chi-square	P value
Stage I	57	30.81	122	65.95	6	3.24	185	92.50	78.3869	0.0001*
Stage II	0	0.00	5	35.71	9	64.29	14	7.00		
Stage III	0	0.00	0	0.00	1	100.00	1	0.50		
Total	57	28.50	127	63.5	16	8.00	200	100.0		

*P < 0.05 (P value less than 0.05 is considered to be significant)

Table 4: Association between frequencies with clinical grading of oral submucous fibrosis

Frequency	Grade I	%	Grade II	%	Grade III	%	Total	%	Chi-square	P value
1–4 packets	8	66.67	3	25.00	1	8.33	12	6.00	35.4949	0.0001*
5–9 packets	29	42.03	39	56.52	1	1.45	69	34.50		
10–14 packets	11	27.50	28	70.00	1	2.50	40	20.00		
>15 packets	9	11.39	57	72.15	13	16.46	79	39.50		
Total	57	28.50	127	63.50	16	8.00	200	100.00		

*P < 0.05 (P value less than 0.05 is considered to be significant)

Table 5: Association between duration with clinical grading of oral submucous fibrosis

Duration (years)	Grade I	%	Grade II	%	Grade III	%	Total	%	Chi-square	P value
0–3	12	29.27	28	68.29	1	2.44	41	20.50	4.2824	0.6385
4–6	13	27.08	31	64.58	4	8.33	48	24.00		
7–9	11	22.92	31	64.58	6	12.50	48	24.00		
>10	21	33.33	37	58.73	5	7.94	63	31.50		
Total	57	28.50	127	63.50	16	8.00	200	100.00		

*P < 0.05 (P value less than 0.05 is considered to be significant)

Table 6: Association between contents with clinical grading of oral submucous fibrosis

Contents	Grade I	%	Grade II	%	Grade III	%	Total	%	Chi-square	P value
Spit	56	29.02	122	63.21	15	7.77	193	96.50	0.9443	0.6237
Swallow	1	14.29	5	71.43	1	14.29	7	3.50		
Total	57	28.50	127	63.50	16	8.00	200	100.00		

*P < 0.05 (P value less than 0.05 is considered to be significant)

Table 7: Association between chewing time with clinical grading of oral submucous fibrosis

Chewing time (min)	Grade I	%	Grade II	%	Grade III	%	Total	%	Chi-square	P value
0–5	11	33.33	20	60.61	2	6.06	33	16.50	6.5927	0.3602
6–10	18	22.78	56	70.89	5	6.33	79	39.50		
11–15	21	38.18	29	52.73	5	9.09	55	27.50		
>15	7	21.21	22	66.67	4	12.12	33	16.50		
Total	57	28.50	127	63.50	16	8.00	200	100.00		

*P < 0.05 (P value less than 0.05 is considered to be significant)

Table 8: Association between various habits with clinical grading of oral submucous fibrosis

Habits	Grade I	%	Grade II	%	Grade III	%	Total	%	Chi-square	P value
Paan masala without tobacco										
No	57	28.64	126	63.32	16	8.04	199	99.50	0.5777	0.7491
Yes	0	0.00	1	100.00	0	0.00	1	0.50		
Gutkha										
No	32	38.10	44	52.38	8	9.52	84	42.00	7.9187	0.0191*
Yes	25	21.55	83	71.55	8	6.90	116	58.00		
Paan										
No	31	21.68	99	69.23	13	9.09	143	71.50	11.5342	0.0031*
Yes	26	45.61	28	49.12	3	5.26	57	28.50		
Combination										
No	53	29.94	113	63.84	11	6.21	177	88.50	7.2858	0.0262*
Yes	4	17.39	14	60.87	5	21.74	23	11.50		
Total	57	28.50	127	63.50	16	8.00	200	100.0		

*P < 0.05 (P value less than 0.05 is considered to be significant)

Table 9: Correlation between clinical grading of oral submucous fibrosis with various factors by Spearman's rank correlation

Factors	N	Spearman R	t-value	P-level
Gender	200	-0.1382	-1.9630	0.0510
Age groups	200	-0.1474	-2.0963	0.0373*
Paan masala	200	0.0297	0.4175	0.6768
Gutkha	200	0.1344	1.9083	0.0578
Paan	200	-0.2281	-3.2963	0.0012*
Combination	200	0.1475	2.0978	0.0372*
Functional grading	200	0.3967	6.0819	0.0001*
Frequency	200	0.3872	5.9095	0.0001*
Duration	200	-0.0027	-0.0386	0.9693
Contents	200	0.0683	0.9632	0.3366
Chewing time	200	0.0300	0.4225	0.6732

*P < 0.05 (P value less than 0.05 is considered to be significant)

Table 10: Multiple logistic regression model analysis for clinical grading with various factors

Factors	Clinical grading with various factors			
	Model fitting criteria		Likelihood ratio tests	
	-2 Log likelihood of reduced model	Chi-square	df	Sig.
Gender	213.814	0.429	2	0.807
Age	215.211	1.827	8	0.986
Habit factor	222.176	8.791	8	0.360
Frequency	244.279	30.894	6	0.000
Duration	221.147	7.762	8	0.457
Contents	214.816	1.431	2	0.489
Chewing time	223.263	9.878	6	0.130

This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom. Unexpected singularities in the Hessian matrix are encountered

DISCUSSION

In this study, no significant deviation was observed in the distribution of the participants according to age and gender based on the OSMF grading. This finding was in accordance to the study conducted by Hosein *et al.*,^[8] where they found similar findings. The clinical and functional grading of OSMF was

adopted from Haider *et al.*^[7] wherein the inter-incisal mouth opening is more than 20 mm in stage I; in stage II, the inter-incisal mouth opening is 10–20 mm; and in stage III, the inter-incisal mouth opening is <10 mm.

In our study, gutkha chewers showed more predominance of Grade III stage of OSMF and mean

Table 11: Multiple logistic regression model analysis for functional grading with various factors

Factors	Functional grading with various factors				
	Model fitting criteria		Likelihood ratio tests		
	-2 Log likelihood of reduced model	Chi-square	df	Sig.	
Gender	38.869	0.089	2	0.956	
Age	41.420	2.640	8	0.955	
Habit factor	40.383	1.603	8	0.991	
Frequency	45.072	6.292	6	0.391	
Duration	39.629	0.849	8	0.999	
Contents	40.825	2.045	2	0.360	
Chewing time	41.486	2.706	6	0.845	

This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom. Unexpected singularities in the Hessian matrix are encountered

Table 12: Logistic regression model: clinical grading stage I oral submucous fibrosis with various parameters

Clinical grading ^a Stage I		Parameter estimates							
		B	Std. error	Wald	df	Sig.	Exp (B)	95% Confidence interval for Exp (B)	
								Lower bound	Upper bound
Stage I	Intercept	8.502	3503.318	0.000	1	0.998			
Gender	Male	1.192	1.736	0.472	1	0.492	3.295	0.110	98.888
	Female	0 ^b			0				
Age group	21–30	-16.518	2571.108	0.000	1	0.995	6.703E-08	0.000	
	31–40	-16.174	2571.108	0.000	1	0.995	9.456E-08	0.000	
	41–50	-16.686	2571.108	0.000	1	0.995	5.667E-08	0.000	
	51–60	-17.073	2571.108	0.000	1	0.995	3.848E-08	0.000	
Habit factor	Paan masala	1.478	5213.506	0.000	1	1.000	4.384	0.000	
	Gutkha	1.391	1.084	1.648	1	0.199	4.021	0.480	33.648
	Paan	2.844	1.240	5.260	1	0.022	17.190	1.512	195.375
	Gudaku	18.483	2425.788	0.000	1	0.994	106436844.004	0.000	
	Combination	0 ^b			0				
Frequency	1–4 packets	2.921	1.636	3.191	1	0.074	18.567	0.753	458.035
	5–9 packets	4.144	1.233	11.299	1	0.001	63.058	5.628	706.531
	10–14 packets	3.252	1.257	6.694	1	0.010	25.845	2.200	303.621
	>15 packets	0 ^b			0				
Duration	0–3 years	3.929	2379.630	0.000	1	0.999	50.863	0.000	
	4–6 years	2.134	2379.630	0.000	1	0.999	8.445	0.000	
	7–9 years	1.138	2379.629	0.000	1	1.000	3.120	0.000	
	>10 years	3.166	2379.629	0.000	1	0.999	23.703	0.000	
Contents	Spit	1.054	1.905	0.306	1	0.580	2.869	0.069	119.985
	Swallow	0 ^b			0				
Chewing time	0–5 min	0.527	1.259	0.175	1	0.675	1.695	0.144	19.997
	6–10 min	2.118	1.037	4.170	1	0.041	8.312	1.089	63.443
	11–15 min	1.500	1.054	2.024	1	0.155	4.482	0.568	35.387
	>15 min	0 ^b			0				

^aThe reference category is stage III,

^bFloating point overflow occurred while computing this statistic. Its value is therefore set to system missing, ^cThis parameter is set to zero because it is redundant

duration was much less when compared to those having betel quid and paan only. Similar relationship was seen in the study conducted by Ali *et al.*^[9] and Reichart and Philippen^[10] for the severity of OSMF in relation to gutkha and other areca nut products. The effect of other concurrent habits such as mawa, paan masala, alcohol, smoking along with gutkha or areca nut products in the

same person does not affect the incidence and severity of OSMF.^[10]

In this study, it was concluded that although the prevalence based on duration and frequency of habit was variable, it was found that most of the subjects were having stage II OSMF and the severity was more in subjects who were chewing for longer duration

Table 13: Logistic regression model: clinical grading stage II oral submucous fibrosis with various parameters

Clinical grading ^a Stage II		Parameter estimates							
		B	Std. error	Wald	df	Sig.	Exp (B)	95% Confidence interval for Exp (B)	
								Lower bound	Upper bound
Stage II	Intercept	13.857	2.652	27.312	1	0.000			
Gender	Male	1.090	1.712	0.405	1	0.525	2.973	0.104	85.266
	Female	0 ^b			0				
Age group	21–30	-2.379	1.744	1.860	1	0.173	0.093	0.003	2.829
	31–40	-2.239	1.656	1.830	1	0.176	0.107	0.004	2.733
	41–50	-2.877	1.432	4.037	1	0.045	0.056	0.003	0.932
	51–60	-3.688	0.000		1		0.025	0.025	0.025
Habit factor	Paan masala	14.666	4638.751	0.000	1	0.997	2341849.299	0.000	. ^c
	Gutkha	1.136	0.891	1.625	1	0.202	3.113	0.543	17.839
	Paan	1.639	1.068	2.355	1	0.125	5.150	0.635	41.784
	Gudaku	16.626	2425.788	0.000	1	0.995	16619202.587	0.000	. ^c
	Combination	0 ^b			0				
Frequency	1–4 packets	-0.148	1.628	0.008	1	0.928	0.862	0.035	20.956
	5–9 packets	2.621	1.172	5.002	1	0.025	13.752	1.383	136.748
	10–14 packets	2.248	1.176	3.657	1	0.056	9.469	0.945	94.841
	>15 packets	0 ^b			0				
Duration	0–3 years	-10.746	1.640	42.914	1	0.000	2.153E-05	8.643E-07	0.001
	4–6 years	-12.403	1.262	96.656	1	0.000	4.104E-06	3.462E-07	4.866E-05
	7–9 years	-12.820	1.154	123.511	1	0.000	2.706E-06	2.821E-07	2.595E-05
	>10 years	-11.283	0.000		1		1.259E-05	1.259E-05	1.259E-05
Contents	Spit	-0.429	1.423	0.091	1	0.763	0.651	0.040	10.590
	Swallow	0 ^b			0				
Chewing time	0–5 min	-0.180	1.130	0.025	1	0.873	0.835	0.091	7.652
	6–10 min	1.222	0.885	1.908	1	0.167	3.394	0.599	19.214
	11–15 min	0.044	0.914	0.002	1	0.961	1.045	0.174	6.276
	>15 min	0 ^b			0				

^aThe reference category is stage III,

^bFloating point overflow occurred while computing this statistic. Its value is therefore set to system missing,

^cThis parameter is set to zero because it is redundant

and swallowing the contents. These findings were in accordance with the study by Kumar^[11] where he found similar finding.

The widespread habit of chewing gutkha or combination of paan and gutkha is a major risk factor of OSMF, especially in the 21–30 years age group. In our study, an increase in clinical grading was found with severity and duration of habit. This finding was in accordance with the study, which was conducted by Pandya *et al.*,^[12] where they found increased severity in younger age group.

In this study, the duration and frequency of habits had a significant effect on the development of oral lesion, which was in accordance with the study conducted by Sujatha *et al.*^[13] and Yen *et al.*^[14]

Our study was carried out to evaluate the role of different variables, which play a pivotal role in the clinical grading of OSMF in Odisha population. The various literary surveys of gender distribution have shown distinction in the occurrence of OSMF.^[6] In this study, of the 200 participants, we observed that 182

were males and 18 were females, with a male-to-female ratio being 10:1. This finding was in accordance with the study conducted by Reddy *et al.*^[6] and Chatuvedi *et al.*^[15] Male predominance was observed in our study, which was in accordance with the previous studies.^[16-21]

Habitual chewing of gutkha and other areca nut products plays a pivotal role in the etiology of this condition. In our study, gutkha and other areca nut product users, such as tobacco and paan, when compared to mawa plain pan masala users showed a significant occurrence of OSMF in the severity of the condition.^[7]

In this study, as the duration of consuming areca nut products exceeded 10 years, the severity of the disease also increased, with the maximum number of cases observed in Grade I and Grade II OSMF. As the frequency of habit of consuming areca nut products increased for more than 10 times per day, it resulted in increased severity of OSMF. Subjects who consume less than 10 times per day had Grade I and Grade II OSMF. Also the style of chewing influenced the severity of the condition. The subjects who had the habit of

Table 14: Logistic regression model: functional staging stage I OSMF with various parameters

Functional staging ^a Stage I		Parameter Estimates					Exp (B)	95% Confidence interval for Exp (B)	
		B	Std. error	Wald	df	Sig.		Lower bound	Upper bound
		Intercept	-15.536	8817.916	0.000	1		0.999	
Gender	Male	-2.620	3555.745	0.000	1	0.999	0.073	0.000	. ^b
	Female	0 ^c			0				
Age group	21–30	19.289	7828.270	0.000	1	0.998	238174454.648	0.000	. ^b
	31–40	18.810	7685.991	0.000	1	0.998	147671005.102	0.000	. ^b
	41–50	21.358	7593.155	0.000	1	0.998	1885931089.657	0.000	. ^b
	51–60	-0.551	7648.856	0.000	1	1.000	0.576	0.000	. ^b
Habit factor	Paan masala	-14.319	7560.132	0.000	1	0.998	6.047E-07	0.000	. ^b
	Gutkha	1.017	1001.853	0.000	1	0.999	2.764	0.000	. ^b
	Paan	-3.554	1138.146	0.000	1	0.998	0.029	0.000	. ^b
	Gudaku	-6.232	4586.897	0.000	1	0.999	0.002	0.000	. ^b
	Combination	0 ^c			0				
Frequency	1–4 packets	-0.267	2547.200	0.000	1	1.000	1.306	0.000	. ^b
	5–9 packets	2.514	788.598	0.000	1	0.997	12.351	0.000	. ^b
	10–14 packets	-0.135	727.624	0.000	1	1.000	0.874	0.000	. ^b
	>15 packets	0 ^c			0				
Duration	0–3 years	11.552	2960.922	0.000	1	0.997	103964.868	0.000	. ^b
	4–6 years	14.603	2758.405	0.000	1	0.996	2197206.089	0.000	. ^b
	7–9 years	16.785	2359.685	0.000	1	0.994	19482390.788	0.000	. ^b
	>10 years	15.200	1929.530	0.000	1	0.994	3993092.424	0.000	. ^b
Contents	Spit	-2.800	1945.991	0.000	1	0.999	0.061	0.000	. ^b
	Swallow	0 ^c			0				
Chewing time	0–5 min	-3.051	1317.268	0.000	1	0.998	0.047	0.000	. ^b
	6–10 min	-3.569	836.989	0.000	1	0.997	0.028	0.000	. ^b
	11–15 min	-2.766	976.265	0.000	1	0.998	0.063	0.000	. ^b
	>15 min	0 ^c			0				

^aThe reference category is stage III,

^bFloating point overflow occurred while computing this statistic. Its value is therefore set to system missing,

^cThis parameter is set to zero because it is redundant

chewing for longer time (i.e., for more than 5 min) and swallowing the contents without spitting had resulted in Grade I and Grade II severity. As the parameters in the form of duration, frequency, style of chewing for longer time with spitting increased, they had a significant correlation with the outcome of the severity of the disease in the form of clinical grading.^[5,22,23]

From the logistic regression model, it is evident that the initial stages of OSMF were influenced by the chewing frequency of areca nut products, whereas the advanced stages of OSMF were more influenced by the duration of the adverse habit [Tables 12 and 13]. On the contrary, the inter-incisal mouth opening was not influenced by various habit factors. This variability can be because of the subjective knowledge of the clinician recording the case, the history elicited by the patient, and the less number of patients included in the study.

In this study, not a single case was found who did not practice any form of chewing habit. This was a very significant finding as it proves beyond any doubt that

the chewing habit is essential to trigger changes leading to fibrosis in susceptible individuals.^[24]

The role of chewing tobacco along with areca nut/quid and paan was found to be significant in this study. According to a study by Trell *et al.*,^[25] it was found that tobacco chewing had shown to cause oral leukoplakia and cancers. Long-term follow-up is required to ascertain whether malignant change occurs more frequently and in shorter time intervals in cases of chewing paan/paan masala with tobacco compared with those who chew it without tobacco.^[25]

Inability to open the mouth was one of the most common complaint of the patient having OSMF (95%), which was similar to the finding in a study conducted by Marathe.^[17] Inability to protrude tongue was also present in 40% of our cases. A wide variation in the occurrence of this symptom is available in the literature.^[18]

Change in color of buccal mucosa (pallor/blanching) was observed in all patients.^[17,18] It was also observed

Table 15: Logistic regression model: functional staging stage II oral submucous fibrosis with various parameters

Functional staging ^a Stage II		Parameter Estimates					Exp (B)	95% Confidence interval for Exp (B)	
		B	Std. error	Wald	df	Sig.		Lower bound	Upper bound
Stage II	Intercept	-38.353	8866.739	0.000	1	0.997			
Gender	Male	-3.397	3555.745	0.000	1	0.999	0.033	0.000	
	Female	0 ^c			0			. ^b	
Age group	21-30	19.743	8081.053	0.000	1	0.998	375239850.488	0.000	
	31-40	18.597	7943.304	0.000	1	0.998	119241384.243	0.000	
	41-50	21.097	7853.511	0.000	1	0.998	1453828104.349	0.000	
	51-60	2.162	7907.378	0.000	1	1.000	8.691	0.000	
Habit factor	Paan masala	-26.693	7818.494	0.000	1	0.997	2.555E-12	0.000	
	Gutkha	0.484	1001.853	0.000	1	1.000	1.622	0.000	
	Paan	-5.684	1138.146	0.000	1	0.996	0.003	0.000	
	Gudaku	-5.775	4668.179	0.000	1	0.999	0.003	0.000	
	Combination	0 ^c			0				
Frequency	1-4 packets	0.663	2547.201	0.000	1	1.000	1.940	0.000	
	5-9 packets	-9.960	813.730	0.000	1	0.990	4.725E-05	0.000	
	10-14 packets	-0.210	727.625	0.000	1	1.000	0.811	0.000	
	>15 packets	0 ^c			0				
Duration	0-3 years	22.020	2311.391	0.000	1	0.992	3657489998.838	0.000	
	4-6 years	24.882	2039.435	0.000	1	0.990	64018824514.047	0.000	
	7-9 years	27.344	1456.176	0.000	1	0.985	750684874999.445	0.000	
	>10 years	26.967	0.000		1		514831689684.393	0.000	
Contents	Spit	11.593	2036.386	0.000	1	0.995	108288.066	0.000	
	Swallow	0 ^c			0				
Chewing time	0-5 min	-1.816	1317.269	0.000	1	0.999	0.163	0.000	
	6-10 min	-4.421	836.990	0.000	1	0.996	0.012	0.000	
	11-15 min	-2.169	976.266	0.000	1	0.998	0.114	0.000	
	>15 min	0 ^c			0				

^aThe reference category is stage III,

^bFloating point overflow occurred while computing this statistic. Its value is therefore set to system missing,

^cThis parameter is set to zero because it is redundant

that more than half of the patients (65%) had Grade II OSMF followed by Grade I (26%). These findings were in accordance with the study conducted by Phatak^[26] where they found a similar relationship.

In this study, posterior one-third of oral cavity (both buccal mucosa, retromolar area, and soft palate) was predominantly affected in Odisha population, which was similar to the observation from Pune population from Maharashtra State but contraindicated with the findings from a study based on Ernakulam population from Kerala State where labial mucosa was found to be significantly affected, which may represent a regional variation with respect to various chewing habits practiced in different parts of India.^[27,28]

As the parameters of our study in the form of duration, frequency, style of chewing for longer time without spitting increased, it had a significant correlation with the outcome of the severity of the disease in the form of clinical grading. This is in accordance to the literature,

which explains that areca nut's high alkaloid content of arecoline and tobacco ingredients, such as nitrosamine, are absorbed more in the patients who keep it for longer duration and swallow it.^[6,23]

CONCLUSION

In conclusion, the result of this study throws light on the habit trends of the people in the institution where this study was conducted. It is alarming that nearly half of the total subjects were in the younger age group and were having OSMF. Also, as the age of the subjects increased, they were found to be more attracted to consuming areca nut and its derivatives in the form of betel quid with or without tobacco.

As the saying goes "prevention is better than cure," it is imperative that developing countries, especially those with large oral cancer burden declare OSMF as a public health problem and direct their energies and possessions toward prevention. It is recommended that community-oriented outreach programs on oral health awareness be developed,

emphasizing children who represent the upcoming future, to avoid/quit areca nut and its derivatives.

The limitations of this study include potential information of preconceived notion as self-reporting by the patient was used to collect the information, hence underreporting of habits could have taken place. Another possible blemish could be detection bias as the researcher was aware of the habit history of the patient before oral examination. In future research, the examiner should be blinded to the habit details and should examine the oral cavity first to prevent such bias.

Further studies, including comparisons of demographic data as well as dose–response relationship with oral lesions, with larger sample size and in the general population need to be performed. Studies observing the effects of termination of oral habits are sparse; hence, there is a lack of evidence regarding the chances of turnaround of altered mucosa, and studies need to be performed in this regard. The results of such studies can prove to be a boon in educating patients regarding the adverse effects of tobacco, alcohol, and betel quid habits.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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