Original Article

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

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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

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smokeless forms of tobacco have been emerging, alluring new consumers.[2] The concept of premalignant lesions has now been replaced by the term oral potentially malignant disorders (OPMDs), which states that not all lesions may convert into cancer and there is a family of morphological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]
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 OMSF [Table 4], the association between duration of chewing with clinical grading of OMSF [Table 5], the association between the contents with clinical grading of OSMF.
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   | 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         | 63.50   | 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)
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
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 Philipsen\[^10\] 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
and swallowing the contents. These findings were in accordance with the study by Kumar\cite{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.\cite{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.\cite{13} and Yen et al.\cite{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.\cite{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.\cite{6} and Chatuvedi et al.\cite{15} Male predominance was observed in our study, which was in accordance with the previous studies.\cite{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.\cite{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 13: Logistic regression model: clinical grading stage II oral submucous fibrosis with various parameters

| 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 | 2.973 | 0.104 | 85.266 |
| Gender              |     |            |        |    |       |         |                                   |             |             |
| Male                | 1.090 | 1.712      | 0.405  | 1 | 0.525 | 0.093 | 0.003 | 2.829 |
| Female              | 0\b  | 0          |        | 0 | 0.000 | 0.025 | 0.025 | 0.025 |
| 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 | 0      | 1 | 0.000 | 0.025 | 0.025 | 0.025 |
| Habit factor        |     |            |        |    |       |         |                                   |             |             |
| Paan masala         | 14.666 | 4638.751 | 0.000  | 1 | 0.000 | 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 | 0.095 | 16619202.587 | 0.000 | c            |
| Combination         | 0\b  | 0          |        | 0 | 0.000 | 9.469 | 0.945 | 94.841 |
| 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          |        | 0 | 0.000 | 0.040 | 10.590 |
| 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 | 96.565 | 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 | 0.000 | 1.295E-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          |        | 0 | 0.000 | 0.040 | 10.590 |
| 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          |        | 0 | 0.000 | 0.040 | 10.590 |

\textsuperscript{a}The reference category is stage III.

\textsuperscript{b}Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.

\textsuperscript{c}This 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

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

| Parameter | B      | Std. error | Wald | df | Sig. | Exp (B) | 95% Confidence interval for Exp (B) |
|-----------|--------|------------|------|----|------|---------|-----------------------------------|
| Stage I   |        |            |      |    |      |         |                                   |
| Intercept | −15.536| 8817.916   | 0.000| 1  | 0.999| 0.073   | 0.000 − 1.000                     |
| Gender    |        |            |      |    |      |         |                                   |
| Male      | −2.620 | 3555.745   | 0.000| 1  | 0.999| 0.073   | 0.000 − 1.000                     |
| Female    | 0       |            | 0.000| 0  |      | 1.000   | 0.000 − 1.000                     |
| Age group |        |            |      |    |      |         |                                   |
| 21–30     | 19.289 | 7828.270   | 0.000| 1  | 0.998| 23817445.648| 0.000 − 1.000                     |
| 31–40     | 18.810 | 7655.991   | 0.000| 1  | 0.998| 14767105.102| 0.000 − 1.000                     |
| 41–50     | 21.358 | 7593.155   | 0.000| 1  | 0.998| 1885931089.657| 0.000 − 1.000                     |
| 51–60     | −0.551 | 7648.856   | 0.000| 1  | 1.000| 0.576   | 0.000 − 1.000                     |
| Habit factor |        |            |      |    |      |         |                                   |
| Paan masala | −14.319| 7560.132   | 0.000| 1  | 0.998| 6.047E-07| 0.000 − 1.000                     |
| Gutkha    | 1.017  | 1001.853   | 0.000| 1  | 0.999| 2.764   | 0.000 − 1.000                     |
| Paan      | −3.554 | 1138.146   | 0.000| 1  | 0.998| 0.029   | 0.000 − 1.000                     |
| Gudaku    | −6.232 | 4586.897   | 0.000| 1  | 0.999| 0.002   | 0.000 − 1.000                     |
| Combination | 0     |            | 0.000| 0  |      | 1.000   | 0.000 − 1.000                     |
| Frequency |        |            |      |    |      |         |                                   |
| 1–4 packets | −0.267| 2547.200   | 0.000| 1  | 1.000| 1.306   | 0.000 − 1.000                     |
| 5–9 packets | 2.514| 788.598   | 0.000| 1  | 0.997| 12.351  | 0.000 − 1.000                     |
| 10–14 packets | −0.135| 727.624   | 0.000| 1  | 1.000| 0.874   | 0.000 − 1.000                     |
| >15 packets | 0    |            | 0.000| 0  |      | 1.000   | 0.000 − 1.000                     |
| Duration  |        |            |      |    |      |         |                                   |
| 0–3 years | 11.552| 2960.922   | 0.000| 1  | 0.997| 103964.868| 0.000 − 1.000                     |
| 4–6 years | 14.603| 2758.405   | 0.000| 1  | 0.996| 2197206.089| 0.000 − 1.000                     |
| 7–9 years | 16.785| 2359.685   | 0.000| 1  | 0.994| 19482390.788| 0.000 − 1.000                     |
| >10 years | 15.200| 1929.530   | 0.000| 1  | 0.994| 3993092.424| 0.000 − 1.000                     |
| Contents  |        |            |      |    |      |         |                                   |
| Spit      | −2.800 | 1945.991   | 0.000| 1  | 0.999| 0.061   | 0.000 − 1.000                     |
| Swallow   | 0      |            | 0.000| 0  |      | 1.000   | 0.000 − 1.000                     |
| Chewing time |      |            |      |    |      |         |                                   |
| 0–5 min  | −3.051 | 1317.268   | 0.000| 1  | 0.998| 0.047   | 0.000 − 1.000                     |
| 6–10 min | −3.569 | 836.989    | 0.000| 1  | 0.997| 0.028   | 0.000 − 1.000                     |
| 11–15 min | −2.766| 976.265    | 0.000| 1  | 0.998| 0.063   | 0.000 − 1.000                     |
| >15 min  | 0      |            | 0.000| 0  |      | 1.000   | 0.000 − 1.000                     |

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*The reference category is stage III.
*Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.
*This 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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