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Original Research Article

Betel quid and tobacco chewing habits and its associated clinical findings in a rural tertiary care hospital

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ABSTRACT

Background: Among all forms of tobacco, smokeless tobacco is known to be more carcinogenic than smoking according to various studies. Smokeless tobacco is consumed through various forms in our region like kaddipudi, gutkha, khaini, pan, etc. This study aims at evaluating the different chewing patterns of tobacco and to assess their impact on the oral mucosa.
Methods: The patients who attended ENT department with the habit of chewing tobacco were taken into this study after considering the inclusion and exclusion criteria. A detailed questionnaire including various habits and chewing patterns were filled and received from all the subjects, and a comprehensive ENT examination was done for them.
Results: In our study, a total of 120 subjects were included who chewed tobacco in various combinations, which we divided into 6 categories; of which 97 users were under category 2 (betel leaf, betel nut, slaked lime and kaddipudi). Among 120 subjects, 35 had malignancy, 51 potentially malignant lesions, 30 early changes and 4 had no changes. There was a statistically significant correlation noted between the duration of chewing for >15 years (p=0.000); frequency of chewing >5 times/day (p=0.004) and also overnight tobacco placement (p=0.027) with the occurrence of potentially malignant lesions and malignancy.
Conclusions: In our study, the combination of betel leaf, betel nut, slaked lime with kaddipudi was the most commonly used combined form of smokeless tobacco. The duration, frequency of tobacco chewing, and overnight placement were statistically significant associated with potentially malignant lesions and malignant lesions.

Keywords: Smokeless tobacco, Tobacco products, Carcinogens, Head and neck neoplasms, Squamous cell carcinoma of head and neck

INTRODUCTION

Tobacco, in its various forms, has been routinely used worldwide for centuries. However, in the last 50 years or so, awareness was gradually spread regarding their damaging effects, and that understanding has led to educational and regulatory efforts aimed at reducing tobacco use. Understanding the carcinogenic components of tobacco products and how they lead to head and neck cancers is of utmost necessity to curb its widespread usage.

Due to the widespread use of smokeless tobacco (SLT) products, 74% of the global burden of head and neck squamous cell carcinoma (HNSCC) occurs in India.[1] Indians develop HNSCC (oral cavity, lip, pharynx) at the highest rate in the world at 20 cases per 100,000 people.[2] In India, the use of tobacco is widespread and culturally acceptable among both genders. Many studies have been conducted that show the association of SLT usage with potentially malignant lesions (PML) and cancers of the oral cavity along with a possible contributory role in cardiovascular disease, hypertension, peptic ulcer, and

mortality. Almost 100 million people in India and Pakistan use SLT and in many ways.[3,4]

Tobacco is usually consumed through various forms in our region like kaddipudi, gutkha, khaini, and pan. Kaddipudi (powdered sticks) is the cheapest form of tobacco, made by crushing the stalks and petioles of the tobacco plant into a fine powder. It is used either as the powder or in a processed form, as bricks and blocks made with jaggery (sugar molasses) and water, and is the commonly used form of tobacco in our locality.[5] Many people use betel leaf, betel nut, slaked lime in various forms along with kaddipudi. Throughout Asia, the most widely used method is 'pan' chewing, which is a combination of betel leaf, areca nut, or slaked lime smeared on betel leaf and tobacco. International agency for research on cancer (IARC) has classified areca nut as a human carcinogen (group 1).[6] Gutkha is a pre-mixed dried form of areca nut, slaked lime, spices, flavouring agents and tobacco.

Smokeless tobacco products are found to contain more than 30 carcinogens, including tobacco-specific N-nitrosamines (TSNAs), nitrite, nitrate, and heavy metals such as nickel, cadmium, and chromium.[6] According to the review of literature; first, there will be minor changes in the oral mucosa, followed by potentially malignant changes and then malignant lesions. After an extensive search of the literature, no relevant articles were found that dealt with the varying patterns of tobacco chewing in non-smokers and their associated oral clinical findings. Very few articles are available regarding the early changes in the oral cavity in tobacco chewers. So, this study is designed to assess the chewing patterns and its associated oral mucosal changes among the people of Kuppam.

METHODS

This study was a hospital-based observational study on smokeless tobacco chewers among people in and around Kuppam who attended the ENT department of PESIMSR, Kuppam, Andhra Pradesh, India from February 2018 to January 2019. The institutional ethical committee approval was taken before starting the study. All the subjects who chewed betel quid and tobacco in different forms for more than three months were included in this study. Smokers, alcoholics, and people who chew tobacco even after definitive treatment for their lesions were excluded from this study. A detailed questionnaire was prepared, which included details about various smokeless tobacco forms and chewing habits. The tobacco-chewing preferences, along with other ingredients, were categorized into six types, and all the subjects were placed accordingly. After that, the subjects were examined for early changes, PML, and malignant lesions. The data regarding the chewing patterns, duration, frequency, and oral cavity lesions were then collected and tabulated in MS office excel 2011. Statistical analysis with chi-square test was done using STATA 14.1 software; p-value<0.05 was considered as statistically significant.

RESULTS

In our study, a total of 120 subjects were included out of which 17 were male, and 103 were female. The age distribution of the subjects was <20 years- 1, 21-40 years - 29, 41-60 years- 66 and >61 years- 24. The various occupations held amongst them were 16 manual laborers, 61 farmers, 31 homemakers and 12 miscellaneous. The most commonly used forms of SLT of our locality were categorized into six types, as listed in Table 1 (Figure 1). The combination of betel leaf, betel nut, slaked lime with kaddipudi was the most commonly used form of SLT by 97 participants (80.8%). Betel leaf, betel nut, slaked lime was the next common combined form with 16 users. 3 participants solely used gutkha, and 3 used other forms like 'Hans' chhap khaini while only 1 used paan with tobacco. None in our study used kaddipudi directly for chewing without other ingredients.

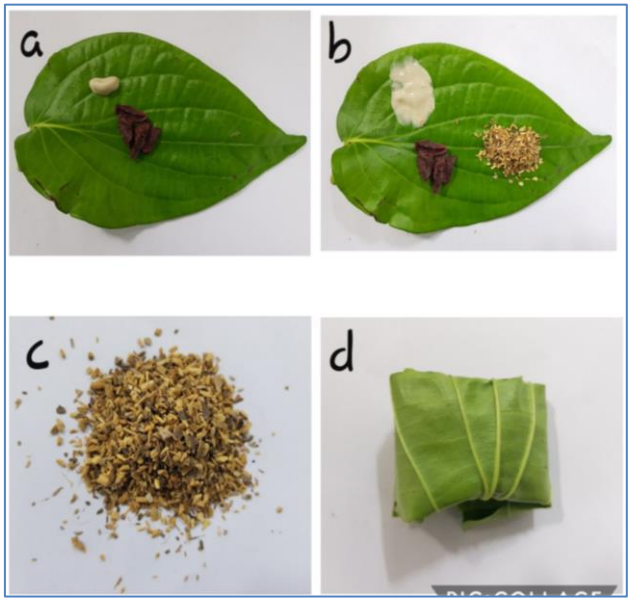


Figure 1: Commonly used smokeless tobacco chewing forms. a) betel leaf, betel nut, slaked lime, b) betel leaf, betel nut, slaked lime with kaddipudi, c) kaddipudi, d) pan with tobacco.

The duration of chewing tobacco varied in all the 120 subjects, of which only 13 people chewed for less than 6 years, 22 chewed for 6-15 years, 32 for 16-30 years and 53 subjects have chewed for greater than 30 years. So, the majority of them (44.17%) had chewed tobacco for >30 years. Among 85 subjects who chewed tobacco for >15 years, 34 had developed malignancy, 33 had PML, 16 had early changes, and 2 had no changes. Statistically, there was an extremely significant correlation noted between the duration of chewing for >15 years and malignancy shown in Table 2 (p=0.000). Similarly, the duration of chewing for >30 years was also compared

with the presence of malignancy which too was found to be statistically well significant (p=0.008).

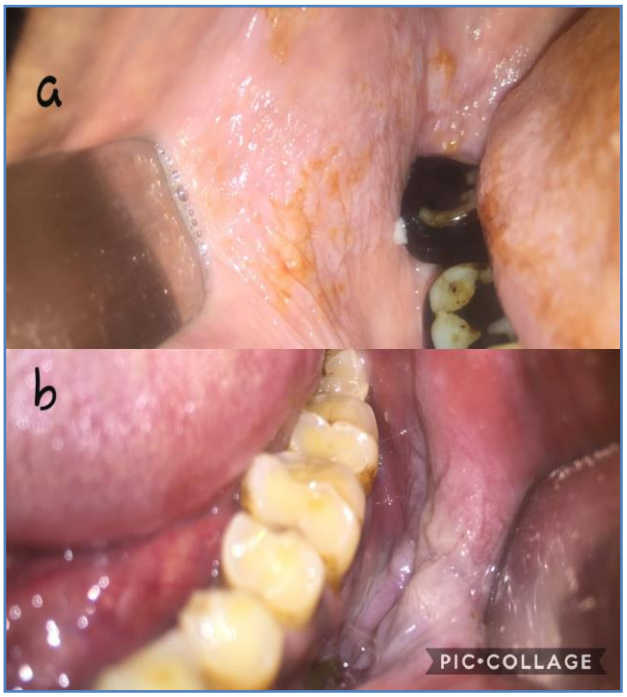


Figure 2: Early changes of buccal mucosa. a) betel chewers mucosa, b) betel quid lichenoid lesion.

We also studied the participants' frequency of chewing per day. The people who chewed 1-2 times/day were 5, 3-4 times/day were 41, 5-6 times/day were 37 and more than 6 times/day were also 37. The majority of subjects chewed 3-4 times/day (34.16%). Table 3, shows that there was a statistically significant association observed between those who chew tobacco for >5 times per day and the occurrence of PML and malignant lesions (p=0.004). In our study, tobacco was chewed as a habit in 106 subjects, and the remaining 14 had no addiction to chewing tobacco. Among 106 habitual subjects, 78 had developed both PML and malignant lesions, and only 28 had early/no lesions. There was no statistically significant association noted between the habit of chewing tobacco and clinical lesions (p=0.199). We also studied the site of placement of tobacco in the oral cavity, with 20 subjects conveying that they had kept SLT only in their right gingivobuccal sulcus (GBS), 34 in their left GBS, 59 in bilateral GBS, 7 in the gingivolabial sulcus and none had kept in the floor of mouth. As per Table 4, we also observed that only 17 subjects had kept tobacco overnight while the majority (103) cleaned their mouth before going to bed. There was a statistically significant association noted between keeping the tobacco overnight and developing potentially malignant and malignant lesions (p=0.027).

In our study, the outcome was assessed in terms of changes in the oral cavity in each subsite individually. The changes in the lip include pigmentation in 32 subjects, chelitis in 8, stomatitis in 19 and malignancy in only 1 subject. In buccal mucosa, among 120 subjects, 9 had no changes, early changes were seen in 30, PML were seen in 51 and malignancies in 30 subjects. The early changes in buccal mucosa were betel chewer's mucosa in 26 subjects, and betel quid lichenoid lesion in 4 subjects as shown in (Figure 2 and 4). The PML in our study were homogenous leukoplakia in 17, non-homogenous leukoplakia in 6, erythroplakia in 14 and 14 had oral submucosal fibrosis (OSF). Malignant lesions in the buccal mucosa were seen in 30 subjects (Figure 3). The tumor staging of these 30 subjects with buccal mucosa carcinoma includes T1-2, T2-7, T3-2, T4a-18, and T4b-1. Figure 5, depicts both the PML and malignant lesions of our study. We also assessed the correlation between those who chewed kaddipudi and the presence of any tumor. There was no significant correlation between kaddipudi chewers and early or late T-stage of the tumor (p=0.523).

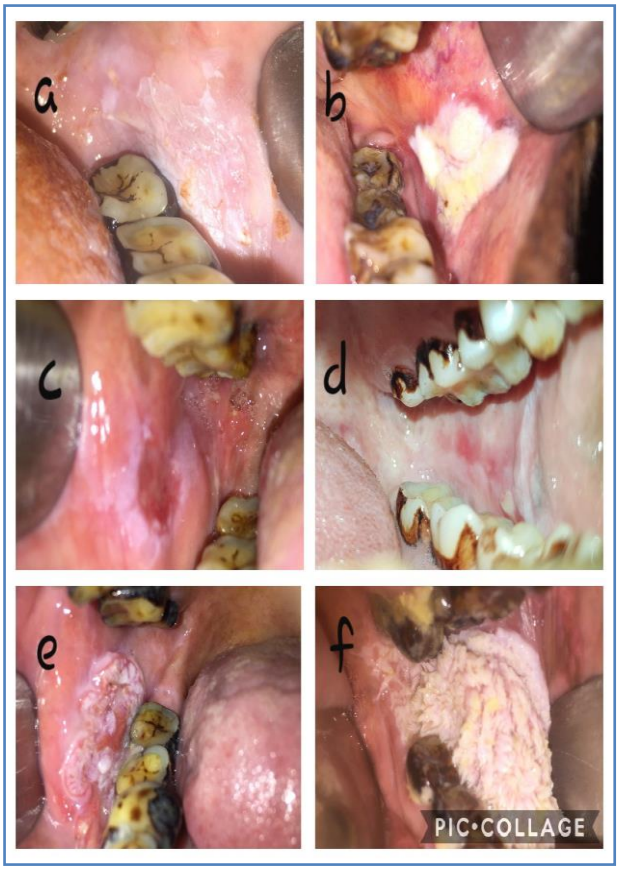


Figure 3: Potentially malignant and malignant lesions. a) homogenous leukoplakia, b) non-homogenous leukoplakia, c) erythroplakia, d) oral submucosal fibrosis, e) buccal carcinoma, f) buccal verrucous carcinoma.

According to our study, the changes in dentition were gingivitis in 20 subjects, receding of gums in 66, and 3 were edentulous. We also studied the changes seen over the tongue. A red coating of the tongue was seen in 61 subjects, bald tongue in 26 and malignancy was seen in 3 subjects. Similarly, the retromolar trigone (RMT) was

involved in only 25 subjects, out of which 14 had submucosal fibrosis, 10 had tumor extending from buccal mucosa and 1 case of malignancy arising from RMT. The changes over hard palate was noted as persistent nicotine staining of mucosa in 31 subjects. The floor of mouth was the least involved subsite of oral cavity in our study, which had only 3 subjects and all 3 had malignancy with 2 cases extending from buccal mucosa.

Table 1: The common tobacco chewing patterns of people in and around Kuppam.

Smokeless tobacco forms	Number of subjects
Betel leaf, betel nut, slaked lime	16
Betel leaf, betel nut, slaked lime with kaddipudi	97
Kaddipudi	0
Pan with tobacco	1
Gutkha	3
Others (khaini, mawa)	3

Table 2: Statistical correlation of duration of chewing (>15 years) and malignancy.

Duration of chewing (years)	No malignancy	Malignancy	Total
<15	34	1	35
>15	51	34	85
Total	85	35	120

P=0.000.

Table 3: Statistical analysis of frequency of chewing and their associated clinical changes.

Frequency of chewing (times/day)	No/early changes	Potential malignant /malignant changes	Total
>5	14	60	74
<5	20	26	46
Total	34	86	120

P=0.004.

Table 4: Statistical correlation of keeping tobacco overnight with changes in oral cavity.

Keeping overnight	No/early changes	Potential malignant /malignant changes	Total
Yes	1	16	17
No	33	70	103
Total	34	86	120

P=0.027.

Out of 120 subjects, 35 had malignancy, 51 potentially malignant lesions, 30 early changes, and 4 had no changes.

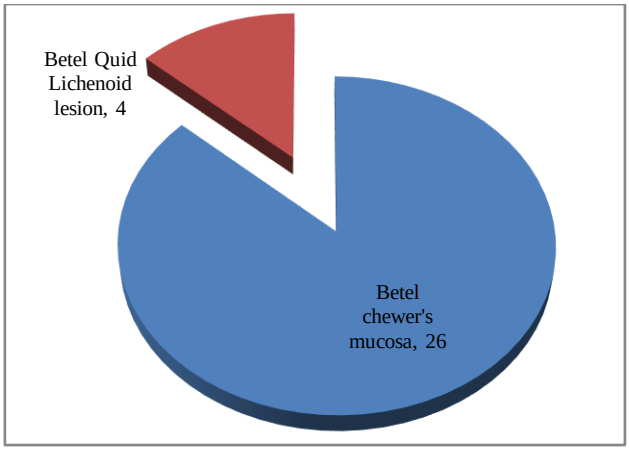


Figure 4: Early changes of buccal mucosa.

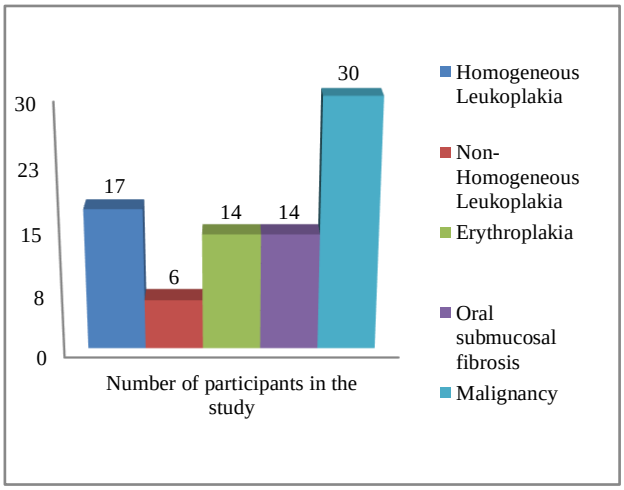


Figure 5: Potentially malignant and malignant lesions of buccal mucosa.

DISCUSSION

The relationship between smokeless tobacco and risk of oral cancer has been assessed in many studies with a number of cases ranging from 13 to 755, while our research involved 120 subjects in and around Kuppam, a remote village of India.[7-12] Due to the lack of education, awareness and poor socio-economic status; smokeless tobacco products are still being considered and promoted by many as a healthy and harmless alternative to cigarette smoking.

Talole et al had observed an increase in the risk of oral PML among female tobacco users in Naigaum, Mumbai, with 57.98% women having PML and no malignant lesions.[13] Our study also demonstrated a female predominance of total 85.8%, of which 40.7% had PML, and 31% had malignancy.

In a study done in 2014 by Pandey et al on oral tissue changes associated with smokeless tobacco in Karnataka, India; the majority were males (86.5%) suggesting no gender predilection as such.[14] Although the reason could

be the fact that our study excluded smokers and the majority of men in our study population were avid smokers and hence couldn't be included. Their research also compared different forms of SLT use like gutkha, khaini, mawa, pan with tobacco etc, and observed gutkha to be the most commonly used form (40%) and then pan with tobacco with 28.5% users. While our study dealt with the commonly used SLT forms in our locality, of which the combination of betel leaf, betel nut, slaked lime with kaddipudi was the most frequently used form in 97 subjects (80.8%). Betel leaf, betel nut, and slaked lime was the next common combined form (13.3%). Only 2.5% of participants solely used gutkha, and 2.5% used khaini, while only 0.8% used pan with tobacco.

As per the literature available, no other study has categorised the chewing patterns of people and observed the associated clinical changes with them. In our study, among these 97 subjects who chewed betel leaf, betel nut, slaked lime with kaddipudi; 41.2% had PML, and 34% had malignancy. Kaddipudi is the main ingredient of chewing for the people in our region, and it is a powdered form of stalks and petioles of the tobacco plant. As it is a cheaply available tobacco product in our area, people get easily addicted to this and use it along with betel leaf, nut, and slaked lime. None in our study used kaddipudi directly without other ingredients.

Jiachen et al in his study concluded that the usage of smokeless tobacco resulted in exposure to potent carcinogens and also reported a positive association between regular use of smokeless tobacco and the risk of HNSCC among people who never smoked cigarettes.[15] In his extensive study, he also demonstrated that chewing tobacco for more than 10 years was associated with an elevated risk of HNSCC. From our study, we too found a highly significant correlation between the duration of chewing for >15 years and malignancy (p=0.000). Thus, the misconception that smokeless tobacco is a healthier alternative to cigarette smoking can be disaffirmed. A study by Jayalakshmi et al inferred that the duration of tobacco chewing was related to the incidence of oral cancer (p<0.001), particularly in the first 20 years whereas they observed no further risk increase among those who had chewed tobacco for more than 20 years.[16] But in our study, there was a highly significant correlation noted between the duration of chewing for >15 years and oral cancer (p=0.000) and also for >30 years (p=0.008). Wray and McGuirt had studied the records of 128 patients, of whom 78% had used smokeless tobacco for 40 or more years and noted that 40% of them had leukoplakia, erythroplakia or both at the time of presentation.[17] In our study of 120 patients, 44% used SLT >30 years of which 35.8% had PML, and 41.5% had malignancy.

Aishwarya et al, in their study revealed that the frequency and duration of tobacco use were associated with the risk of oral mucosal lesions.[18] A similar study from Mumbai compared the distribution of lesions according to the frequency of chewing with 74.5% of participants having lesions among those who chewed >5 times/day.[13] Whereas our study shows a more significant correlation with 81% having either PML or malignancy (p=0.004). Similarly, Sankaranarayanan et al in his study found there was a significant positive association between pan-tobacco chewing and cancer of the gingiva with the daily frequency of pan-tobacco chewing as its strongest predictor.[19] Bathi et al in their study compared 220 patients with OSF and found the relative risk of developing OSF increased proportionately to the frequency and duration of chewing.[20]

Pandey et al, in their study, also observed that the site of tobacco placement in their subjects was mainly in the right GBS (56%) and only 5% in the gingivolabial sulcus.[14] The majority of our subjects preferred placing bilaterally in both GBS (49.2%), 28% in left GBS, 16.6% in the right GBS and only 5.8% in the gingivolabial sulcus.

In the present study, we assessed whether tobacco chewing had become their regular habit or not. We got 88.3% of subjects who were habitual for tobacco. The subjects who were habitual for tobacco chewing developed potentially malignant and malignant lesions in 73.5% of cases. As tobacco chewing is a habit for our people, adequate psychiatric counselling is needed for all chewers to abstain from tobacco chewing.

A study by Gangane et al, from Wardha, found that gutkha chewing was significantly associated to oral cancer and also observed a strong association between oral cancer and sleeping overnight with tobacco quid in the mouth.[21] In our study, we found that only 17 subjects (14%) had kept tobacco overnight, but in them, there was a well significant association observed between keeping the tobacco overnight and developing PML and malignant lesions (p=0.027). The carcinogenic effect of tobacco will increase if it stays overnight in contact with the oral mucosa. Many case-control studies are needed to assess the ill-effects of overnight placement and its associated clinical manifestations.

Over a period of time, with continuous tobacco chewing, certain early changes are usually observed over the oral mucosa, especially at the site of placement of the betel quid. Betel chewer's mucosa was defined in 1971 as - a condition of the oral mucosa where, because of either direct action of the quid or due to traumatic effect of chewing, or both, there is a tendency of desquamation or peeling off of the oral epithelium, and the underlying area assumes a pseudomembranous or wrinkled appearance.[22] According to a study done by Patel et al betel chewer's mucosa was found in 2.2% of their subjects, whereas Reichart et al, reported the same early lesion in 13.1% subjects of his study.[23,24] In our study, we observed that 21.6% of subjects had betel chewers mucosa, which could probably be due to the effects of the additive kaddipudi, that is widely used in our locality. Betel quid

lichenoid lesions are oral mucosal lesions characterized by the presence of fine, white, wavy parallel lines that do not overlap or criss-cross, not elevated and which, in some instances, radiate from a central erythematous area.[23] Ikeda et al observed that betel quid chewing is so strongly associated with lichenoid lesions that it almost exclusively occurs at the site of the placement of betel quid.[25] Also, in the study by Patel et al lichenoid oral lesion was observed in 1.5% of subjects who chewed betel quid with tobacco and all the lesions were found at the site identified by them as their primary site of quid placement.[23] Similarly, in our study, we observed that 3.3% of subjects had betel quid lichenoid lesions.

An extensive case-control study done by Thomas et al, clearly showed that SLT was associated with the most substantial increase in the risk of oral PML and suggested that it may be the most important source of field cancerization of the oral cavity.[26] Aishwarya et al in their study demonstrated OSF (18%) as the most common oral mucosal lesion followed by leukoplakia (14%) while our study showed leukoplakia to be the most frequent (19.2%) and then OSF (11.6%).[18] In a similar study of 205 patients with OSF by Angadi et al a strong association was seen between SLT use and OSF. They also observed that OSF developed within 1 year of continued gutkha usage.[27] A study by Hashibe et al from Kerala, India investigated the association of chewing habits with OSF and found that ever-tobacco chewing was a strong risk factor for OSF.[28] A similar study by them also revealed that tobacco chewing was a significant risk factor for leukoplakia, and its association was significantly higher for females compared to males.[29]

Khan et al in his study in 2014 also concluded that a strong causal link existed between oral cancer and various forms of smokeless tobacco.[30] Out of several research works done at Tata memorial hospital (TMH), Mumbai, one study done by Rao et al, found that tobacco chewing was a significant risk factor for cancers of anterior aspect of tongue, whereas bidi smoking was a significant risk factor for tongue base cancer and thereby concluding that the type of the tobacco used had a direct relationship with the site of the cancer.[31] In our study, 97 subjects used betel leaf, betel nut, slaked lime with kaddipudi exclusively of which 33 had malignancy (28 Buccal carcinomas, 3 tongue carcinomas, 1 lip carcinoma, and 1 RMT carcinoma). Znaoor et al, had also studied the association of tobacco chewing with cancer of the different subsites of the oral cavity and found that the relative risk of tongue cancer (2.74) was less than that of mouth cancer (6.95) among tobacco chewers.[32]

Parmar et al in his cross-sectional study from Ahmedabad, Gujarat found various dental problems to be more common among chewers like a periodontal pocket, gingival lesion, and gingival recession.[33] In the present study, we observed gingivitis in 16.6% subjects, receding of gums in 55% subjects, and 2.5% were edentulous subjects. Datta et al mentions in his study that the addition of tobacco-caused a synergistic effect on the harmful impacts of betel-nut over periodontal tissue.[34,35]

A survey by Hashibe et al from Kerala suggested that higher education was likely associated with decreased risk of oral PML. They also showed that a higher socio-economic status and higher income were associated with a lower risk of oral PML.[36] So the need of the hour is proper awareness, advertisement, and education amongst the most vulnerable population, especially the women who most often resort to such chewing habits.

CONCLUSION

In our study, the combination of betel leaf, betel nut, slaked lime with kaddipudi was the most commonly used combination of SLT that caused significant deleterious effects. The duration, frequency of tobacco chewing, and overnight placement were statistically significant associated with PML and malignant lesions proving how dangerous such chewing habits can be. Therefore, widespread awareness campaigns starting from rural villages to urban towns are to be implemented, to educate the vulnerable population regarding the various SLT chewing habits, and the potential harm they cause in the long run if they continue to do so. Similarly, the government should also undertake necessary interventions to curb the use of tobacco preparations.

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