

Assessment of Periodontal Status in Smokeless Tobacco Chewers and Non-chewers among Industrial Workers in Visakhapatnam City

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Abstract

Background: More than one-third of the tobacco consumed in India is of smokeless form. While the smokeless tobacco (ST) products have been strongly associated with oral cancer, the association between ST and periodontal disease is less clear. The present study was conducted on industrial workers because in premises, there is a ban on smoking tobacco, and hence, workers tend to consume more of ST products. The aim of this study is to assess periodontal status in ST chewers and non-chewers among industrial workers in Visakhapatnam city. **Materials and Methods:** A cross-sectional analytical study was conducted on 800 industrial workers (400 ST chewers and 400 non-chewers) of Visakhapatnam city. Information regarding ST habits was obtained using the Global Adult Tobacco Survey questionnaire, followed by clinical examination to assess periodontal status using the community periodontal index and attachment loss. The comparison between chewers and non-chewers was done using Pearson's Chi-square test. Logistic regression analysis was used to estimate the difference of periodontal status and loss of attachment (LOA) between chewers and non-chewers. **Results:** ST chewing habit was observed the maximum (46.5%) among age group 25–44 years. Most of male chewers had habit of chewing gutkha followed by khaini, and majority of the female chewers were using khaini followed by betel nut quid. A significantly higher prevalence of bleeding on probing and calculus was found among non-chewers. ST chewers had 2.06 (95% confidence interval [CI]: 1.55–2.75) times more risk of developing periodontal pockets and 2.23 (95% CI: 1.68–2.98) times more risk of having LOA when compared with non-chewers. **Conclusions:** ST has deleterious effects on the periodontium. Hence, it is one of the important risk factors for periodontal disease.

Keywords: Periodontal disease, Risk factor, Smokeless tobacco.

INTRODUCTION

Tobacco use is a major public health problem globally and a major preventable cause of death and disability. The World Health Organization estimates 4.9 million deaths that are annually attributed to tobacco. This figure is expected to raise to 10 million in 2030, with 7 million of these deaths occurring in developing countries, mainly India.^[1] The state of the epidemic of tobacco use in India was described in the Global Adult Tobacco Survey (GATS), an internationally standardized survey designed to track tobacco use around the world.^[2] According to that, India faces diverse epidemics of tobacco use.^[3] There are currently about 240 million tobacco users aged 15 years and above in India.^[4]

Smokeless tobacco (ST) chewing warrants special attention in India due to its popularity and widespread social acceptance.^[5] The major factors that persist to encourage people to use smokeless form of tobacco are its low price, ease of purchase, and the

widely held misconception of purported medicinal value in curing toothache, headache, and in decreasing hunger. Furthermore, in contrast to smoking, there is no taboo against using ST.^[6]

While the ST products have been strongly associated with oral cancer, the association between ST and periodontal disease is less clear.^[7] Gingival recession has been reported in ST users by many but not all clinical surveys.^[7] There is insufficient evidence to support consistent association between ST and periodontal disease.^[7]

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The lifestyle, socioeconomic status, and the standard of living of industrial workers are different from the rest of the population. Poverty, language barriers, and poor education contribute different lifestyle that encourages addictive tobacco habits.^[8] As there is a ban on smoking tobacco in most of the industrial premises, workers tend to consume more of ST products. Therefore, they form a special group who could be at a higher risk of periodontal breakdown. Thus, a study was conducted to assess periodontal status in ST chewers and non-chewers among industrial workers in Visakhapatnam city.

MATERIALS AND METHODS

A cross-sectional analytical study was conducted in 12 small scale industries of Visakhapatnam city selected by simple random sampling method. Ethical clearance was obtained from the Institutional Review Board (IEC reference no: ANIDS/IEC/2020017). Approval for conducting the study was solicited and obtained from the respective authorities of industries. Informed consent was obtained from each individual before conducting interview and clinical examination.

A pilot study was conducted among forty ST chewers and forty non-chewers using GATS questionnaire^[8] through guided interview to determine feasibility of the study. The sample size determination was carried out using the formula $n = (Z\alpha + Z\beta)^2 \times p \times q \times 2/d^2$ (Where $Z\alpha$ = value for Z at significant level when α [0.05] = 1.96, $Z\beta$ = Z value for β error = 0.84, P = anticipated population proportion [“safest choice”] = 0.50, and q = $[1-P]$ = 0.50). After calculating, the sample size came around 392 per group, which was rounded off to 400, and the similar number of 400 participants for non-chewers was included in the study.

The study population was divided into two groups. One group comprised habitual chewers of ST products (ST chewers) and the other group did not consume tobacco in any form (non-chewers). Individuals aged 15 years and above, who currently chew ST for a minimum period of 12 months, were included in the study. Inclusion criteria for non-chewers were aged 15 years and above without any smoking, alcohol, or tobacco chewing habits. Individuals suffering from any obvious systemic disease that may influence the periodontal status were excluded from the study. The study participants were selected from industries to cover sample size in each group based on the criteria of the study. In the present study, adequately matched non-chewers were interviewed and examined from the same industry.

The principal investigator was trained and calibrated intra-examiner (κ = 0.84) reliability. Data collection

comprised interviewing the study participants regarding demographic details and various tobacco-related habits using GATS questionnaire^[9] in English language. Each participant was interviewed regarding the ST use by principal examiner, and questionnaire was filled by principal examiner. It was followed by clinical examination to assess periodontal status using the community periodontal index (CPI) and attachment loss.^[10] Interviews and oral examinations were scheduled in the working hours of the industries to ensure the presence of workers. At a time, only five workers were called which did not disturb industry’s work schedule. There were no dropouts from consent to interview and examination.

Statistical analysis was done using the statistical package-SPSS version 20 (Armonk NY: IBM Corp.). The comparison between chewers and non-chewers was done using Pearson’s Chi-square test. Bivariate analysis between ST habits, duration, and frequency with periodontal status was assessed using Chi-square test. Logistic regression analysis was used to estimate the difference of periodontal status and loss of attachment (LOA) between chewers and non-chewers. Statistical significance was set at $P < 0.05$ for the study.

RESULTS

A total of 800 participants (male 588 and female 212) were examined in this study, 400 ST chewers and 400 non-chewers, ranging between ages of 15 and 64 years.

According to CPI scores, 4.5% of ST chewers and 5.8% of non-chewers had bleeding on probing (CPI score 1); 46.3% of chewers and 56.8% of non-chewers had calculus. There was a significant difference between CPI score for ST chewers and non-chewers (Chi-square = 44.691, $P < 0.001$) (Table 1). ST chewers had 2.06 (95% confidence interval [CI]: [1.55–2.75]) times more risk of developing periodontal pockets than non-chewers. The difference was statistically significant ($P < 0.001$) (Table 2).

About 47.3% of chewers and 31.0% of non-chewers presented a LOA of 4–5 mm (LOA score 1). Only 4% of ST chewers were having a LOA of 6–8 mm (LOA score 2), and 1% of the non-chewers had LOA of 6–8 mm (LOA score 2). There was a significant difference between LOA score of ST chewers and non-chewers (Chi-square = 33.394, $P < 0.001$) (Table 3). ST chewers had 2.23 (95% CI [1.68–2.98]) times more risk of having LOA when compared with the non-chewers. The difference was statistically significant ($P < 0.001$) (Table 4).

Table 1: Distribution of smokeless tobacco chewers and non-chewers according to the community periodontal index score

Groups	Healthy (Score 0)	Bleeding (Score 1)	Calculus (Score 2)	Pocket depth	Total score
4–5 mm (Score 3) 6 mm or more (Score 4)					
Chewers (%)	0	18 (4.5)	185 (46.3)	192 (48.0)	5 (1.3)
Non-chewers (%)	22 (5.5)	23 (5.8)	227 (56.8)	128 (32.0)	0

$P < 0.001$

Table 2: Logistic regression analysis of periodontal pockets between smokeless tobacco chewers and non-chewers

Groups	CPI		Total	Unadjusted OR (95% CI), P
Score 0–2, periodontal score 3–4, periodontal pockets present pockets absent				
Chewers (%)	272 (68)	128 (32)	400	1
Non-chewers (%)	203 (50.7)	197 (49.2)	400	2.062 (1.55–2.75), <0.001

CPI: Community periodontal index, OR: Odds ratio, CI: Confidence interval

Table 3: Distribution of smokeless tobacco chewers and non-chewers according to the loss of attachment scores

Groups	LOA			Total	Pearson χ^2	P
0–3 mm 4–5 mm 6–8 mm (Score 0) (Score 1) (Score 2)						
Chewers (%)	195 (48.8)	189 (47.3)	16 (4.0)	400 (100.0)	33.394	<0.001*
Non-chewers (%)	272 (68.0)	124 (31.0)	4 (1.0)	400 (100.0)		
Total (%)	467 (58.4)	313 (39.1)	20 (2.5)	800 (100.0)		

*Statistical significant. Significance level was set at $P < 0.05$ for the study. LOA: Loss of attachment**Table 4: Logistic regression analysis of loss of attachment between smokeless tobacco chewers and non-chewers**

Groups	LOA		Total	Unadjusted OR (95% CI), P
Score 0, LOA absent Score 1–2, LOA present				
Chewers (%)	272 (68)	128 (32)	400	1
Non-chewers (%)	195 (48.8)	205 (51.2)	400	2.234 (1.68–2.98), <0.001

OR: Odds ratio, CI: Confidence interval, LOA: Loss of attachment

DISCUSSION

This study was conducted to determine the patterns of various types of ST chewing habits and to assess periodontal status among ST chewers and non-chewers.

Information collected regarding the age of habit initiation revealed that 4.25% had started chewing ST below the age of 15 years. In the present study, minimum age of initiation of habit was 10 years, which is similar to the one reported by Amarasena *et al.*^[11] in Patna, Bihar, in which age of initiation of habit was 11 years. Easy availability of ST products and peer group influence could be the possible reasons for initiation of the habit at an early age.

In the present study, it was found that bleeding on probing and calculus was more among non-chewers as compared to chewers (Table 1). This finding was in contrast to the reports of Amarasena *et al.*,^[11] in which increased calculus formation had been reported in areca nut chewers. In other study conducted by Al-Kholani,^[12] it was found that the oral hygiene status of non-chewers was significantly better than that of chewers. The reason for more calculus in non-chewers in the present study could be poor oral hygiene practices among non-chewers.

Chewers experienced more periodontal destruction of the periodontium than non-chewers (Table 2) which is similar to the findings of studies conducted by Waerhaug^[13] and Ling *et al.*^[14]

Among the ST chewers, 48.0% had pocket depth 4–5 mm when compared to non-chewers, where 16.6% of participants had a pocket depth of 4–5 mm. This result is similar to the finding reported by Kumar *et al.*,^[15] in which less than half (46%) of the ST chewers had a periodontal pocket of 4–5 mm when compared to non-chewers (10%). In the present study, 47.3% presented with LOA of 4–5 mm, whereas among non-chewers, 31.0% had LOA of 4–5 mm (Table 3). This finding is similar to study reported by Kumar *et al.*,^[15] in which 66% had LOA of 4–5 mm in ST chewers and 24% had LOA of 4–5 mm in non-chewers.

The hardness of the areca nut and interactions of the various ingredients presents in the chewing products with periodontal tissues might be responsible for the poor periodontal status of chewers. Areca nut, which contains alkaloids such as arecoline, might have a significant causative role in periodontal diseases along with other variables such as the level of oral hygiene, dietary factors, general health, and dental status.

In the present study, there was a higher prevalence of attachment loss in older age groups than in younger age groups, which was a similar finding by Baelum *et al.*,^[16] suggesting that age could be a factor affecting such changes.

Limitations of the study could be, all data on the use of ST were based on self-reports from participants, collected by guided interviews. In this mode of questionnaire administration, it is expected that some young people might tend to avoid reporting behaviors that they perceive to be socially unacceptable. If ST use was underreported, this would lead to misclassification of respondents on exposure, and the estimated association between the use of ST products and the presence of oral mucosal lesions could be biased. Since this was a cross-sectional study, the lack of temporality is an inherent limitation.

It is recommended from the present study that as the ST accounts for such a high proportion of oral mucosal lesions and periodontal disease, controlling tobacco use is of immense important if we are to make progress in reducing the burden of tobacco-related oral diseases. Regulatory actions are therefore

warranted to control the manufacture, marketing, and the consumption of ST products that contain areca nut and/or tobacco, gutkha, and khaini. People are aware about the health hazards of tobacco and merely that is not sufficient to stop them from starting or from continuing the habit. There is also a need to develop multifactorial tobacco quitting strategies focusing on early age intervention. Special efforts are needed to educate the adolescent population using available modalities such as oral health exhibition and oral health outreach programs.

CONCLUSIONS

Most of male chewers had habit of chewing gutkha followed by khaini, and majority of the female chewers were using khaini followed by betel nut quid. A significantly higher prevalence of bleeding on probing and calculus was found among non-chewers, whereas the chewers were experiencing more periodontal destruction than the non-chewers. ST chewers had 2.06 times more risk of developing periodontal pockets than non-chewers. There was a higher prevalence of attachment loss in older age groups than in younger age groups. It was found that ST chewers had 2.23 times more risk of having LOA when compared with the non-chewers. Based on the results, it was concluded that ST has deleterious effects on the periodontium. Hence, ST is one of the important risk factors for periodontal disease.

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