

Periodontal Health Screening of Patients Consuming Smokeless Tobacco in a Tertiary Hospital in Burdwan, West Bengal-An Observational Study

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Abstract

Background: Smokeless tobacco (SLT) is a kind of tobacco product that's not burned so it doesn't produce smoke. Instead, it is chewed (gutka), sucked on (khaini), or even sniffed into the nose. Usage of these products is extremely harmful as they contain nearly 4000 chemicals most of which are mutagenic and carcinogenic adversely affecting the health status. **Aim:** Though there is sufficient evidence in the literature on the deleterious effects of tobacco on periodontal health, studies on the harmful effects of SLT in the population of Burdwan are scarce thus, inspiring us for this study. **Materials and Methods:** Of the total 300 subjects (males = 258, females = 42) chosen for this cross-sectional study, 100 were gutka users, 100 were khaini users, and the rest were non-users. The clinical parameters included were plaque index (PI), gingival index (GI), probing pocket depth (PPD), clinical attachment loss (CAL), and gingival recession (GR). **Results:** PI, GI, CAL, and GR were significantly higher in khaini users than gutka users or in subjects with no habits, which were found to be statistically significant ($P < 0.05$). The mean PPD was higher in gutka users than in khaini users, which was also found to be statistically significant. **Conclusion:** Based on the observational facts, the authors draw the conclusion that PI, GI, CAL, and GR were higher in khaini users whereas PPD was higher in gutka users.

Keywords: Gutka, Khaini, Nicotine, Periodontal disease.

INTRODUCTION

It's no secret that smoking or chewing tobacco is dangerous for your health. Many people try to quit and are successful; the rest fail. That may be due to the addictive nature of nicotine, the main ingredient in tobacco products. Tobacco use is currently recognized as the most important risk factor for periodontal disease as it negatively affects both disease evolution and therapeutic strategies.^[1] Several studies have shown that the outcomes of non-surgical and surgical periodontal therapies are compromised in tobacco users compared to those who have never used it.^[2,3]

Smokeless tobacco (SLT) is a kind of tobacco product that's not burned so it doesn't produce smoke. Instead, it is chewed, sucked on, or even sniffed into the nose. It is obtained from the leaves of an annual plant (*Nicotiana tabacum*). Its use in the form of chewable products has been recorded since ancient times particularly in the Southeast Asia region

though some prevalence of its use in the form of chewable forms is also found in the European region too.^[4] Usage of these products is extremely harmful as they contain nearly 4000 chemicals, most of which are mutagenic and carcinogenic and can adversely affect the health status.^[5] In India, the following SLT products are most popular-betel quid with tobacco, khaini, gutka, mishri, mawa, gul, bajjar, and gudhaku among others.^[6] Although there is sufficient evidence in the literature on the deleterious effects of tobacco on periodontal health, studies on the harmful effects of SLT

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in the population of Burdwan are scarce thus inspiring us for the study.

MATERIALS AND METHODS

A total of 300 subjects in the age range of 21–50 years were chosen for this cross-sectional study from the outpatient department of Periodontia, Burdwan Dental College and Hospital, Burdwan, West Bengal, India. Among the selected subjects, 100 were gutka users, 100 were khaini users, and the rest were non-users. This study was conducted from January 2022 to January 2023 in accordance with the Helsinki Declaration of 1975, as revised in 2000. The inclusion criteria included subjects who had the full set of teeth (third molars not included), using either gutka or khaini (but not both), at least 2 times a day for the past 1 year or more, and provided us with written informed consent. Patients using tobacco in any form other than gutka and khaini, alcoholics, patients with known systemic disease, patients with a history of periodontal treatment in the past 6 months, and patients on antibiotic therapy in the past 3 months were excluded from the study. The clinical parameters recorded included plaque index (PI),^[7] gingival index (GI),^[8] probing pocket depth (PPD), clinical attachment loss (CAL), and gingival recession (GR). GR was assessed as present or absent only. All the parameters were recorded using a UNC-15 probe by a single examiner.

RESULTS

The subjects in the study were categorized into three groups of 100 subjects each khaini users, gutka users, and subjects with no habit. The comparison was done on the basis of the age of the subjects, frequency of khaini/gutka consumption, and duration of khaini/gutka consumption. The results are presented in Tables 1-3.

DISCUSSION

The use of tobacco is one of the major risk factors for several oral diseases such as oral cancer, oral mucosal lesions, gingival, and periodontal diseases.^[9] Tobacco contains a large number of carcinogens, which are more in cigarette smoke than in smokeless ones.^[10,11] In SLT, nitrosamines are the strongest, whereas in cigarette smoke benzo[a]pyrene and other polycyclic aromatic carcinogens are the main and strongest carcinogenic agents.^[12]

The India Global Adult Tobacco Survey (2009–10) revealed that 26% of all adults use SLT in some form, 21.4% daily and 4.5% occasionally. Prevalence in men (32.9%) is higher than in women (18.4%) and is higher in rural (29.3%) than in urban areas (17.7%). Large variations are detected between States, from around 5% in Himachal Pradesh, Goa, and Chandigarh to 49% in Bihar (India GATS Report, 2009–10).^[13] Khaini is the most commonly used SLT product (11.6%), followed by gutka (8.2%). Prevalence of khaini chewing is significantly higher among men (18%) than among women (5%); 13.1% men and 2.9% women chew gutka; 6.2% (7.5% men, 4.9%

women) of adults use betel quid with tobacco; 4.7% (3.3% men, 6.3% women) use tobacco products such as mishri, gul, and gudakhu for oral application (dentifrice); and 4.4% uses some other products, such as snuff for nasal application and some local products.^[13] The proportion of dual tobacco users (smoking + smokeless) is 19.4% among men and 5.3% among women.^[14]

Our study was planned to analyze the effect of gutka and khaini on the periodontium of SLT users and to gauge and compare the severity of destruction of the periodontium among the test groups in comparison with the non-tobacco users (control group) on the parameters of age group, frequency and duration of consumption. In our study, 14% of the subjects ($n = 42$) who consumed SLT were females which is in accordance with the findings of many past studies.^[15-17] Of the 42 females in our study, 30 consumed khaini while 4% ($n = 12$) belonged to the gutka group. This is in contrast to previous studies by Gupta *et al.* and Saxena *et al.* who reported zero female subjects consuming gutka in their studies.^[18,19] In our study, the age group of 41–50 years showed maximum consumers of khaini and gutka. Our results are in contrast to a study by Saranya and Sudha (2014) who reported peak incidence of khaini users in the 18–25 years age group.^[20] However, our results match those by Verma *et al.* who reported that maximum gutka users were in the 36–50 years age group.^[21]

GI and PI scores were best in the group that abstained from the habit followed by the gutka group and then the khaini group; thus, signifying that khaini caused greater gingival inflammation. Our results are similar to several studies in the past.^[14,22,23] A study by Parmar *et al.* showed that the incidence of bleeding gums was significantly higher in quid-chewers than in non-chewers.^[24] Our results show that CAL and GR were more in the khaini users than in the gutka group and least in non-users. Similar results were reported by Chu *et al.*, Parmar *et al.*, and Baelum *et al.*^[24-26] However PPD was noted to be more in gutka users than in khaini users, the sole instance where gutka users showed more destruction than khaini users.

From the viewpoint of frequency- (consuming more than 5 times per day) and duration-wise (consuming for more than 10 years), the subjects of both the khaini and gutka groups showed nearly similar GI, PI, CAL, PPD, and GR; thus, proving the destructive effects of both the agents on the periodontium in the long run. Kumar *et al.* reported that the risk of PPD increased with the duration and frequency of tobacco consumption which is similar to the findings of our study.^[27] Singh *et al.*, in their study, compared the different types of SLT users and concluded that members having the habit for >5 years showed a higher incidence of PI, GI, and PPD compared to those having the habit for <5 years which is similar to our study.^[14]

It is believed that tobacco (nicotine) increases the risk, pathogenesis, and exacerbation of periodontal disease by a combination of these mechanisms: (1) Diminished gingival perfusion, which confines nutrients and oxygen delivery as

Table 1: Age-wise comparison of the subjects in the three study groups

Age groups	Khaini users		Gutka users		Non-users		P-value
	Mean	SD	Mean	SD	Mean	SD	
Plaque index (years)							
21–30	0.7	0.1	0.4	0.1	0.2	0.1	0.021
31–40	1.6	0.3	1.3	0.2	0.9	0.2	
41–50	2.6	0.8	2.3	0.9	1.5	0.4	
Gingival index (years)							
21–30	0.6	0.1	0.4	0.1	0.3	0.1	0.037
31–40	1.2	0.4	1.1	0.5	0.8	0.3	
41–50	2.9	1.2	2.6	1.1	1.7	1.1	
Clinical attachment loss (years)							
21–30	1.8	0.2	1.6	0.1	1.1	0.1	0.041
31–40	3.1	1.4	2.9	1.1	1.2	0.1	
41–50	5.8	2.1	5.5	1.8	1.6	0.4	
Periodontal pocket depth (years)							
21–30	1.8	1.2	2.2	0.9	0.6	0.1	0.002
31–40	2.4	1.4	2.9	1.2	1.1	0.7	
41–50	5.3	2.2	5.6	2.3	1.8	1.1	
Gingival recession (years), n (%)							
21–30	15 (15)		12 (12)		10 (10)		0.018
31–40	35 (35)		30 (30)		14 (14)		
41–50	50 (50)		45 (45)		30 (30)		

$P < 0.05$ was considered as statistically significant. SD: Standard deviation, n: Number

Table 2: Frequency-wise comparison of the subjects consuming smokeless tobacco

Frequency	Khaini users		Gutka users		P-value
	Mean	SD	Mean	SD	
Plaque index (times)					
1–2	0.6	0.1	0.4	0.1	0.001
3–4	1.8	0.2	1.7	0.4	
>5	2.2	0.9	2.1	1.1	
Gingival index (times)					
1–2	0.5	0.1	0.3	0.1	0.031
3–4	1.9	0.3	1.8	0.6	
>5	2.7	1.1	2.5	0.9	
Clinical attachment loss (times)					
1–2	1.5	0.4	1.1	0.2	0.029
3–4	3.2	1.1	3.0	1.2	
>5	6.1	2.2	5.8	2.1	
Periodontal pocket depth (times)					
1–2	1.9	0.9	2.1	1.1	0.008
3–4	2.5	1.1	2.7	1.4	
>5	5.5	1.9	5.7	2.1	
Gingival recession (times), n (%)					
1–2	17 (17)		12 (12)		0.011
3–4	27 (27)		23 (23)		
>5	56 (56)		52 (52)		

$P < 0.05$ was considered as statistically significant. SD: Standard deviation, n: Number

Table 3: Duration-wise comparison of the subjects consuming smokeless tobacco

Duration	Khaini users		Gutka users		P-value
	Mean	SD	Mean	SD	
Plaque index (years)					
1–5	0.5	0.1	0.4	0.1	0.025
5–10	1.9	0.6	1.8	0.3	
>10	2.4	1.1	2.3	1.2	
Gingival index (years)					
1–5	0.8	0.1	0.7	0.1	0.006
5–10	1.9	0.4	1.8	0.5	
>10	2.7	0.9	2.6	1.1	
Clinical attachment loss (years)					
1–5	1.7	0.3	1.3	0.1	0.043
5–10	3.4	1.2	3.1	0.9	
>10	5.9	2.1	5.7	1.9	
Periodontal pocket depth (years)					
1–5	2.1	1.8	2.3	1.3	0.041
5–10	2.3	1.2	2.5	1.4	
>10	6.1	2.4	6.2	2.1	
Gingival recession (years), n (%)					
1–5	14 (14)		10 (10)		0.038
5–10	26 (26)		22 (22)		
>10	60 (60)		55 (55)		

$P < 0.05$ was considered as statistically significant. SD: Standard deviation, n: Number

well as the elimination of waste products; (2) immune response suppression, especially inflammation; (3) clampdown of the

periodontium's morphological and functional recovery; and (4) dysbiosis and augmented infectivity of oral microbiota.

These combined factors impair wound healing and accelerate periodontal disease.^[28] Nicotine exposure has been shown to result in vasoconstriction^[29] and impaired angiogenesis.^[30] Its effects on neutrophil function include increased shedding of adhesion molecules^[31] and alteration of f-actin kinetics,^[32] resulting in reduced migration of neutrophils into the oral tissues^[33] and inhibition of phagocytosis and oxidative killing.^[34,35] Nicotine exposure also results in reduced proliferation and function of T-lymphocytes,^[36] decreased phagocytosis and production of pro-inflammatory cytokines, and oxygen radicals by monocytes^[37] increased levels of tissue-destructive cytokine such as TNF- α ,^[38] reduction in levels of antibodies to periodontal pathogens,^[39-42] and impaired attachment of human periodontal ligament fibroblasts.^[43] Nicotine dependence and withdrawal symptoms have been shown to be higher among oral SLT users than smokers.^[44] In the context of such widespread use of SLT products, the consequences of the effects of such habits on periodontal and oral health and on oral health-related quality of life cannot be overlooked.

CONCLUSION

Further studies need to be carried out in high-risk populations with improved methodology and integrating additional parameters such as type of SLT product used, alveolar bone level, and microbial factors to better understand the relationship between oral SLT habits and periodontal diseases. Tobacco-cessation programs in a dental setting should also include smokeless forms. Only then the dentist especially a periodontist will be able to play a greater role in tackling this social menace of SLT consumption.

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