Original Article

Periodontal Health Status of Paan (Betel Quid)/ Gutka Users

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ABSTRACT

Background: Paan (Betel quid) with tobacco and gutkha chewing is common practice amongst north Indian population. Therefore, this study was performed to evaluate the association of Gutkha and Paan (Betel quid) with tobacco chewing on periodontal tissue status.

Methods: A total of 1455 male subjects were involved. Amongst them, 541 men were found to be having paan/gutkha chewing habit. Clinical data on periodontal tissues, plaque index (PI), gingival index (GI), calculus index, clinical attachment level (CAL), probing pocket depth (PPD), mobility, furcation involvement were collected to assess periodontal condition.

Results: The oral hygiene status of non-users was significantly better than that of paan (betel quid)/ gutkha users. The frequency of calculus, as well as severity of calculus, were significantly higher amongst users as compared to non-users ($p<0.001$). Number of males with the severe deposition of calculus (29.8%), CAL more than 5 mm (39%) and gingival recession (73.2%) were higher in paan/gutkha users as compared to non-users 20.5%, 22.5% and 46.9% respectively. Similar observations were made for mobility, furcation and mucosal lesions were significantly higher amongst paan/gutkha users as compared to non-users ($p<0.05$). The mean values for PI, GI and PPD, were 1.23±0.73, 1.35±0.69 and 3.87±2.19 mm respectively for non-users as compared to 1.47±0.76, 1.52±0.68 and 5.08±3.01 mm respectively for paan/gutkha users, thereby showing a statistically significant difference between users and non-users ($p<0.001$).

Conclusion: The present study demonstrated greater destructive changes of periodontium in paan/ gutkha chewers as compared to non-chewers.

INTRODUCTION

Tobacco has been used in India since its introduction in year 1600 by Portuguese traders. In 1989, Sanghvi *et al*. reported that amongst 400 million individuals of age 15 years and above, 47% use tobacco and 16% use smokeless form of tobacco. It was further reported that each year about 250 million kg of tobacco has been consumed, of which 13% was consumed in smokeless form other than snuff.[1]

Amongst various forms of tobacco, smoking is most common, and the relationship between smoking and oral tissues as well as periodontal diseases is well documented. It is an established fact that smoking is a major risk factor for periodontal health, affecting the prevalence, extent and severity of periodontal disease, in addition to clinical outcomes of non-surgical and surgical treatment including long-term success of implant therapy.[2]

Besides smoking, smokeless tobacco has also evidently shown its effect on various oral tissues. In South Asia, use of smokeless tobacco is the frequent practice.[3] Paan (betel quid) with tobacco is often erroneously referred to as betel nut chewing and consists of betel leaf (Piper

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Figure 1: Commercial Paan available showing its ingredient

Figure 2: Commercially available Gutkha

betel), areca nut (Areca catechu), slaked lime [Ca(OH2)] and catechu (Acacia catechu). Sometime after its introduction, tobacco became an important constituent of paan, and currently most habitual paan chewers include tobacco (Fig. 1). Gutkha or paan masala contains almost all the ingredients that go into the making of a paan, but are dehydrated so that the final product is not perishable (Fig. 2). It comes in attractive sachets and tins and paan masala is very popular in urban areas and is fast becoming popular in rural areas.[4]

Epidemiological and clinical studies in various parts of the world with demographic variations have shown the effect of smokeless tobacco on oral tissues. Paan (betel quid) with tobacco and gutkha chewing is common practice amongst north Indian population. Data is limited to support an association between use of Paan (Betel quid) with tobacco and gutkha chewing and periodontitis, and thus there is a gap in knowledge regarding the effect of smokeless tobacco on periodontal diseases.[5,6] Thus, this study was designed primarily with the objective to assess the risk of paan (betel quid)/gutkha with tobacco chewing on periodontal health and test the hypothesis that periodontal health status of the paan (betel quid)/gutkha chewers will be different from non-chewers.

MATERIALS AND METHOD

This retrospective cross-sectional study investigated the effect of paan/ gutkha (smokeless tobacco) on periodontal health in the local population of North India. This was secondary analysis of the data which was primarily collected to evaluate the effects of commonly used smokeless tobacco forms on periodontal health.[6]

The present study sample consisted of 1455 males volunteered with at least one mandibular and one maxillary tooth in each arch. Patients attending the outpatient department of the institution and camps organised in schools, local community centres and nearby villages were assimilated for the study. Included participants were retrospectively selected on the basis of voluntary history about use of paan/gutkha, and completed a questionnaire, which was prepared after ethical clearance from Institutional Human Research Ethics Committee that included patient's demographics, routine oral hygiene practices, past and present paan/gutkha tobacco use history (current users, former users and non-users), duration (in years) and quantity (no of packets).

Records of periodontal status examined in the department of periodontology for the following parameters: plaque index (PI), calculus index (CI), gingival index (GI), bleeding on probing using a periodontal probe around Ramjford teeth (BOP), probing pocket depth (PPD), gingival recession (GR), clinical attachment level (CAL), mobility, and furcation involvement.[6]

Statistical analysis was done by employing SPSS (Statistical Package for Social Sciences) version 15. The following tests were used for the study; Chi-square test to determine the presence of association between the risk factor and the outcome, Odds ratio/cross product ratio to deduce

the strength of association between the risk factor and outcome. Students "t" test to test the significance of two means. The level of significance was set at ($p<0.05$).

RESULTS

Age-wise distribution of subjects has been provided in Table 1. The age of patients ranged from 10 to 60 years with a mean age of 32.68 ± 11.92 years. Maximum numbers of subjects were in the age-group 21-30 years. There were only 141 (9.69%) subjects in the age-group 51-60 years. Majority of subjects reported cleaning their teeth once daily (69.5%). There were 430 (29.6%) respondents who used to clean their teeth twice daily while 14 participants used to clean their teeth thrice times or more a day. Proportion of paan/gutkha users was highest in the age group 31- 40 years (46.7%) and lowest in the age group 10-20 years (21.2%). Overall the proportion of paan/ gutkha users was 37.2% (n=541).

Table 1: Age-wise Distribution of Studied Subjects

S. No.	Age group	Total No. Subjects (%)	Total No. of Subjects with Paan/gutkha Chewing Habit (%)
1.	10-20 Yrs	193 (13.26%)	41 (21.2%)
2.	21-30 Yrs	588 (40.41%)	228 (38.8%)
3.	31-40 Yrs	338 (23.23%)	158 (46.7%)
4.	41-50 Yrs	195 (13.40%)	65 (33.3%)
5.	51-60 Yrs	141 (9.69%)	49 (34.8%)

Soft toothbrush was the most common brush type in use (53.1%) followed by medium (38.1%) and hard (4.1%) toothbrush. Datoon was being used by 30 (2.1%) subjects and finger was used by 39 (2.7%) subjects. There were 69 (4.7%) respondents (users of datoon and finger) who could not specify the method of cleaning their teeth. A total of 618 (42.5%) practiced the horizontal cleaning method. A total 556 (38.2%) used to follow a combination of horizontal and vertical cleaning method. Vertical and circular method of cleaning the teeth was the least practiced method of cleaning the teeth (0.5%). There were 30 (2.1%) subjects who did not specify the medium used for cleaning the teeth (all datoon users). Toothpaste alone was used by 1182 (81.8%) subjects while toothpowder alone was used by 145 (10%) subjects. A total of 98

Figure 3: Photographs showing effect of paan/gutkha on different periodontal health indicators: The association of paan/gutkha with different periodontal health indicators (a) Calculus deposits

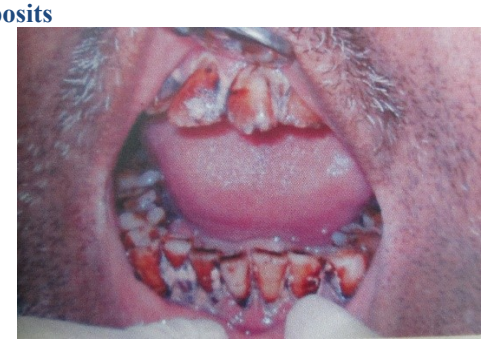

Figure 3(b): poor oral hygiene status

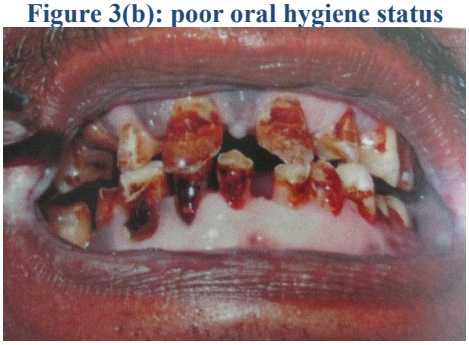

Figure 3 (c): gingival recession and keratosis

Figure 3 (d): severe periodontitis

(7.3%) subjects used both toothpaste as well as toothpowder.

Table 2: Association of Paan/gutkha with different periodontal health indicators in comparison to non-users.

Parameters	Paan/gutkha Non-Users (Mean±SD)	Paan/gutkha Users (Mean±SD)
PI, t=6.025; p<0.001	1.23±0.73	1.47±0.76
GI, t=4.677; p<0.001	1.35±0.69	1.52±0.68
PPD (in mm) t=8.872; p<0.001	3.87±2.19	5.08±3.01
Calculus	No. (%)	No. (%)
No calculus (n=91)	74 (8.1%)	17 (3.1%)
Mild (n=448)	298 (32.6%)	150 (27.7%)
Moderate (n=568)	355 (38.8%)	213 (39.4%)
Severe (n=348)	187 (20.5%)	161 (29.8%)
χ^2=28.276; p<0.001		
CAL	No. (%)	No. (%)
CAL=0 (n=457)	374 (40.9%)	83 (15.3%)
CAL1-2 mm (n=210)	119 (13.0%)	91 (16.8%)
CAL3-4 mm (n=371)	215 (23.5%)	156 (28.8%)
CAL≥5 mm (n=417)	206 (22.5%)	211 (39.0%)
χ^2=110.087; p<0.001		
Gingival recession	No. (%)	No. (%)
Absent (n=630)	485 (53.1%)	145 (26.8%)
Present (n=825)	429 (46.9%)	396 (73.2%)
χ^2=95.465; p<0.001		
Mobility	No. (%)	No. (%)
Score 0	719 (78.7%)	398 (73.6%)
Score 1	84 (9.2%)	48 (8.9%)
Score 2	62 (6.8%)	53 (9.8%)
Score 3	49 (5.4%)	42 (7.8%)
χ^2=8.228; p=0.042		
Furcation	No. (%)	No. (%)
Score 0	727 (79.5%)	355 (65.6%)
Score 1	109 (11.9%)	79 (14.6%)
Score 2	59 (6.5%)	61 (11.3%)
Score 3	16 (1.8%)	36 (6.7%)
Score 4	3 (0.3%)	10 (1.8%)
χ^2=51.973; p<0.001		
Oral Lesion	No. (%)	No. (%)
Absent	806 (88.2%)	356 (65.8%)
Present	108 (11.8%)	185(34.2%)
χ^2=105.84; p<0.001		

Table 2 shows the association of paan/gutkha with different periodontal health indicators [Figure 3 (a), (b), (c)]. Among non-users, there were 125 (11.4%) subjects with no calculus whereas only 35 (3.7%) of those using paan/gutkha had no calculus. In the severe category, there were 212 (19.3%) non-users and 267 (28.2%) users. Both the frequency of calculus as well as severity of calculus were significantly higher amongst users as compared to non-users (p<0.001). Similar observations were made for mobility, furcation and oral-mucosal lesions which were significantly higher amongst paan/gutkha users as compared to non-users (p<0.05). The mean values for PI, GI and PPD were 1.23±0.73, 1.35±0.69 and 3.87±2.19 respectively for non-users as compared to 1.47±0.76, 1.52±0.68 and 5.08±3.01 respectively for paan/gutkha users, thereby showing a significant difference between users and non-users (p<0.001).

Table 3 shows the association of frequency of paan/gutkha use with different periodontal health indicators. No significant difference among different frequency categories was observed as regard the frequency and severity of calculus. However, the incidence and severity of clinical attachment loss, mobility, gingival recession, furcation and oral-mucosal lesions was significantly higher among subjects with higher usage of paan/gutkha. Mean GI was also observed to be having an association with increasing frequency of use, however, no significant association with frequency of use was observed for PI and PPD.

Association of duration of paan/gutkha chewers with different periodontal health indicators has been shown in Table 4. The incidence and severity of clinical attachment loss, gingival recession, mobility, furcation and lesions were found to be significantly higher amongst subjects with longer (>5 years) duration of use as compared to shorter (< 5 years) duration of use (p<0.05). No statistically significant difference in incidence and severity of calculus was seen among different duration categories (p>0.05). Similar trends were obtained for PI, GI and PPD too.

Table 3: Association of Frequency of Paan/Gutkha Chewing habit with different Periodontal Health indicators (n=541)

Parameter	≤5 times /day (n=311)	6-10 times /day (n=124)	>10 times /day (n=106)
	Mean±SD	Mean±SD	Mean±SD
PI	1.41±0.76	1.53±0.76	1.58±0.77
F=2.510; p=0.082			
GI	1.42±0.69	1.59±0.60	1.75±0.69
F=9.939; p<0.001			
PPD (in mm)	5.00±3.43	5.06±2.27	5.36±2.40
F=0.573; p=0.564			
Calculus	No. (%)	No. (%)	No. (%)
No calculus	13 (4.2%)	1 (0.8%)	3 (2.8%)
Mild	89 (28.6%)	39 (31.5%)	22 (20.8%)
Moderate	119 (38.3%)	47 (37.9%)	47 (44.3%)
Severe	90 (28.9%)	37 (29.8%)	34 (32.1%)
χ^2=6.911; p=0.329 (NS)			
CAL	No. (%)	No. (%)	No. (%)
CAL=0	65 (20.9%)	10 (8.1%)	8 (7.5%)
CAL=1-2 mm	54 (17.4%)	18 (14.5%)	19 (17.9%)
CAL=3-4 mm	84 (27.0%)	42 (33.9%)	30 (28.3%)
CAL≥5 mm	108 (34.7%)	54 (43.5%)	49 (46.2%)
χ^2=20.258; p=0.002			
Gingival recession	No. (%)	No. (%)	No. (%)
Absent	97 (31.2%)	23 (18.5%)	25 (23.6%)
Present	214 (68.8%)	101 (81.5%)	81 (76.4%)
χ^2=7.917; p=0.019			
Mobility	No. (%)	No. (%)	No. (%)
Score 0	241 (77.5%)	88 (71.0%)	69 (65.1%)
Score 1	2 (8.4%)	10 (8.1%)	12 (11.3%)
Score 2	29 (9.3%)	10 (8.1%)	14 (13.2%)
Score 3	15 (4.8%)	16 (12.9%)	11 (10.4%)
χ^2=13.024; p=0.043			
Furcation	No. (%)	No. (%)	No. (%)
Score 0	212 (68.2%)	78 (62.9%)	65 (61.3%)
Score 1	44 (14.1%)	17 (13.7%)	18 (17.0%)
Score 2	30 (9.6%)	12 (9.7%)	19 (17.9%)
Score 3	19 (6.1%)	15 (12.1%)	2 (1.9%)
Score 4	6 (1.9%)	2 (1.6%)	2 (1.9%)
χ^2=15.765; p=0.046			
Lesion	No. (%)	No. (%)	No. (%)
Absent	237 (76.2%)	56 (45.2%)	63 (59.4%)
Present	74 (23.8%)	68 (54.8%)	43 (40.6%)
χ^2=40.347; p<0.001			

DISCUSSION

The present study was conducted to evaluate the impact of paan/gutkha habits on periodontal health status of males in hospital based population of a North-Indian city. The primary aim of this cross-sectional survey was to examine the effect of paan (betel quid) with tobacco, and gutkha on periodontal health in males in a hospital-based community in the city of Nawab, Lucknow. Near about forty percent (37.2%) of men were having the habit of paan/gutkha chewing.

Gujarat State has shown a downward shift in the age of initiation of tobacco habits and reports have suggested a variation in the prevalence of tobacco use among school students aged 11-19 years. Smoking/tobacco rates vary greatly among different states of India; for example, 1.9 per cent in Delhi to 75.3 per cent (Mizoram).[7] Christen[8] and Glover *et al*.[9] reported that peer pressure on young people contributes to increased use of smokeless tobacco. Youthful sporting images on widely available advertised products with attractive packaging as well as habits promoting a sense of masculinity has resulted in the establishment of physiological addiction.[10]

The present study demonstrated greater destructive changes in paan/ gutkha chewers as compared to non-chewers. Oral hygiene indicators (PI, GI and the calculus index) and periodontal health parameters (CAL, PPD, mobility, gingival recession and furcation involvement) showed more destructive changes in paan/gutkha chewers as compared to non-chewers, showing casual attitude towards oral health. Similar to earlier studies, paan/gutkha smokeless tobacco users also showed poorer oral hygiene and greater gingival inflammation as compared to non-users.[6]

Guthka users usually keep it in buccal vestibule chew and then swallowed it. Rarely patients only chew it and spitted it out.[11] The present study also resulted in higher gingival inflammation at smokeless tobacco placement sites as compared to non-smokeless tobacco

Table 4: Association of Duration of Paan/Gutkha Use with different Periodontal Health Indicators (n=541)

Parameter	≤1 Year (n=22)	1-5 Years (n=253)	>5 Years (n=266)
Calculus	No. (%)	No. (%)	No. (%)
No calculus	0 (0.0%)	10 (4.0%)	7 (2.6%)
Mild	8 (36.4%)	72 (28.5%)	70 (26.3%)
Moderate	12 (54.5%)	104 (41.1%)	97 (36.5%)
Severe	2 (9.1%)	67 (26.5%)	92 (34.6%)
χ^2=10.477; p=0.106			
CAL	No. (%)	No. (%)	No. (%)
CAL=0	4 (18.2%)	63 (24.9%)	16 (6.0%)
CAL1-2 mm	10 (45.5%)	44 (17.4%)	37 (13.9%)
CAL3-4 mm	0 (0.0%)	74 (29.2%)	82 (30.8%)
CAL≥5 mm	8 (36.4%)	72 (28.5%)	131 (49.2%)
χ^2=63.55; p<0.001			
Gingival recession	No. (%)	No. (%)	No. (%)
No	4 (18.2%)	101 (39.9%)	40 (15.0%)
Yes	18 (81.8%)	152 (60.1%)	226 (85.0%)
χ^2=41.793; p<0.001			
	Mean±SD	Mean±SD	Mean±SD
Plaque index (PI)	1.40±0.58	1.35±0.72	1.59±0.80
F=6.821; p=0.001			
Gingival index (GI)	1.43±0.75	1.44±0.65	1.62±0.70
F=10.783; p=0.009			
PPD (in mm)	4.73±2.93	4.71±2.38	5.47±3.48
F=4.287; p=0.014			
Mobility	No. (%)	No. (%)	No. (%)
Score 0	22 (100.0)	205 (81.0%)	171 (64.3%)
Score 1	0 (0.0%)	16 (6.3%)	32 (12.0%)
Score 2	0 (0.0%)	14 (5.5%)	39 (14.7%)
Score 3	0 (0.0%)	18 (7.1%)	24 (9.0%)
χ^2=29.575; p<0.001			
Furcation	No. (%)	No. (%)	No. (%)
Score 0	18 (81.8%	192 (75.9%)	145 (54.5%)
Score 1	2 (9.1%)	34 (13.4%)	43 (16.2%)
Score 2	2 (9.1%)	18 (7.1%)	41 (15.4%)
Score 3	0 (0.0%)	7 (2.8%)	29 (10.9%)
Score 4	0 (0.0%)	2 (0.8%)	8 (3.0%)
χ^2=37.398; p<0.001			
Lesion	No. (%)	No. (%)	No. (%)
No	16 (72.7%)	185 (73.1%)	155 (58.3%)
Yes	6 (27.3%)	68 (26.9%)	111 (41.7%)
χ^2=13.199; p=0.001			

users.[12,13] Also, results of gingival index and hence gingival bleeding on probing is in contrast to the general belief that nicotine causes vasoconstriction. This may be due to increased gingival blood flow caused by marked vasodilatation due to neurogenic inflammation induced by activation of sensory nerves and the subsequent release of vasodilatory peptides from their peripheral endings[6,14] Alternatively, it may be because plaque/calculus or active periodontitis as present at these sites.

Sood[15] reported a higher prevalence of periodontal disease in different smokeless tobacco users; however they did not consider the gingival recession, mobility and furcation involvement as well as the severity of the loss of attachment or calculus. They reported 47.1% of subjects presented with loss of attachment in Zarda consumers. Periodontal tissue loss results from chemical injury to thin areas of gingiva which are chronically exposed to the smokeless tobacco along with smokeless tobacco induced epithelial proliferation that bridges the narrow lamina propria of sites with an alveolar dehiscence.[16] Malagi *et al*.[17] also demonstrated that the usage of smokeless tobacco may negatively influence oral hygiene status, gingival health and periodontal status. Anand *et al*.[18] reported that smokeless tobacco users tend to have more severe GR, CAL than never users, and there was greatest increase in severity of CAL was found to be localized to sites on mandibular teeth, buccal surfaces, anteriors and molars, which may be a result of the retention of the smokeless tobacco product in the oral cavity.

Present study reported the effect of frequency and duration in years of paan/gutkha smokeless tobacco use. Thus representing a dose-response relationship between smokeless tobacco use and severity of injury to the periodontium.[13,19,20] Warad *et al*.[21] also reported that CAL, PPD and GI had positive correlation with frequency and duration of gutkha chewing.

Amongst all the males studied, 34.2% of paan/gutkha male users were reported to have oral lesions. Gutkha has been reported to be most commonly used smokeless tobacco associated oral lesions like sub-mucous fibrosis, as well as

site of placement and lesion.[6,11] The significance of the present study is more in the local area, as paan eating is pinnacle of cultural refinement in the pre-partition era of North India, and it became an elaborate social custom as well as seen as a ritual of the utmost sophistication.[6,22] Therefore, education of the population about the health issues of paan/gutkha is essential for significant health benefit to the population.

Limitation of the study:

As observed by Rodu and Cole[23] in a letter to the editor, present study similar to Fisher's study,[5] also did not control the reported association for education and socio-economic status, which are two strongest correlates of periodontal disease. Also, horizontal brushing method in 42.5% of an individual may itself be a source of gingival recession, and may erroneously influence the data collected. Furthermore, use of the wide range of population i.e. between 10 years to 60 years may have the differential impact due to immunology as well as behaviour maturity.

Recently, it has been reported that in India, nearly 1 in 10 adolescents in the age group 13-15 years have ever smoked cigarettes and almost half of these reports initiating some form of tobacco use before 10 years of age,[24] and its use with age resulted in well-established habit. This is an alarming situation for the Lucknowites, and requires immediate attention of the policy makers. Tobacco intervention in school children through education and motivation may play a preventive role in reducing and controlling the destructive effect of tobacco related periodontal risk factors.

Recommendations:

The results of present study can act as a motivation to the users of tobacco to quit the habit of taking smokeless tobacco as well as various health agencies can be suggested to control the use of paan (betel quid), and gutkha. There is a need to evolve appropriate strategies both at statutory as well as dental health planning. At the same time the assessment of periodontal health status in a population will also help to give a direction to the specialty of periodontics in consideration with the local and regional situation.

CONCLUSION

Within the limitation of the present study it may be concluded that nearly 37.2% of the male population of North Indian city between 10 to 60 year age group are in the habit of using paan/gutkha, amongst them maximum users (46.5%) belong to 30 to 40 years age group, and 21.2% are between 10 to 20 years of age group. Results of the present study are based on cross-sectional study with wider age group comparisons, therefore longitudinal studies while controlling sources of biased (brand, type of preparation content of tobacco etc) are required. Nevertheless, these results could serve as pilot survey by providing preliminary data for long-term multicentric large sample studies.

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