Effect of chewing gutkha on oral hygiene, gingival and periodontal status

Arun Kumar MS, Mythri S, Shashikanth Hegde, Rajesh KS

Abstract

Aim: To compare the effect of chewing gutkha on oral hygiene, gingival and periodontal status. Methods: The oral hygiene status, gingival and periodontal status of 100 subjects (50 were gutkha chewers and 50 were non-chewers) was evaluated and compared using Simplified Oral Hygiene Index (OHI-S), gingival index (GI) and Community periodontal index (CPI) respectively. Results: The mean OHI-S score in gutkha chewers was 2.1596 which was approximately three fold greater than 0.8160 observed in non-chewers. The number of subjects with good oral hygiene (82%) was significantly higher among non-chewing subjects when compared with gutkha chewers where none of the subjects had good oral hygiene. The number of subjects with mild and moderate gingivitis was significantly higher among non-chewers when compared with gutkha chewers. Less than half (46%) had periodontal pocket of 4-5mm and 66% had LOA of 4-5mm in gutkha chewers when compared to non-chewers where 10% subjects had 4-5mm periodontal pocket and 24% had loss of attachment of 4-5mm. Conclusions: Chewing gutkha has been found to have a role in deterioration of oral hygiene, gingival status and periodontal status and also development of oral lesions.

Key words: Gingival status; Gutkha chewers; Oral hygiene; Periodontal status.
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Introduction

The rate of tobacco consumption in various forms has been increasing in recent years. Tobacco is used mainly in the form of smoking, chewing and as snuff. Betel nut and tobacco chewing is a common practice in south-east Asia and 40% of the tobacco consumed in India is in its smokeless form (1). The term smokeless tobacco is used to describe tobacco that is consumed without burning or heating at the time of consumption (2).

Use of smokeless tobacco in any forms like loose leaf chewing tobacco, dry snuff, moist snuff, plug chewing tobacco, fine cut tobacco etc. are the greatest threat to the global health today. It increases the risk of oral cancers, induce oral lesions at the site where tobacco is placed, foster nicotine addiction and dependence, and contribute to systemic vascular diseases (3).

Nearly three decades ago, a change occurred in the betel quid / areca nut use with the advent of “gutkha” (4). Gutkha consists of tobacco, areca nut and catechu mixed together with several other ingredients believed to be highly addictive, flavored and sweetened, held in the mouth and chewed (5). The content is generally spit out, but sometimes swallowed. Gutkha has a high concentration of nicotine and other ‘addictive’ additives. This is why gutkha chewers often become addicted to the product, and thus fall prey to the dual harmful effects of areca nut and tobacco (1).

In India, gutkha is popular among all socio-economic groups, since it is available easily and is of less cost. Numerous studies have shown the carcinogenic potential of smokeless tobacco. They are also known to have deleterious effects on the oral tissues. However, very few studies on periodontal conditions in gutkha-chewers have been documented.

Hence the present study was conducted to evaluate the effect of chewing gutkha on oral hygiene, gingival and periodontal status.

Material and methods

Ethical clearance was obtained from the Institutional ethical committee and informed consent was obtained from the subjects prior to the study. A total of 100 patients of both the genders (fifty gutkha chewers and 50 non chewers) aged between 15 to 60 years were selected from the outpatients attending the Department of Periodontics at our institute based on the predetermined inclusion and exclusion criteria. 

Inclusion criteria: Subjects with at least 20 permanent teeth including all the index teeth. In case of chewers - presence of chewing habit for a minimum of 3 months duration and consuming at least 4 packets a day.

Exclusion criteria: Patients who have undertaken periodontal therapy and those who had taken antibiotics in past 3 months. Patients with systemic illness, pregnant women, and those using tobacco in any form other than gutkha chewing were also excluded (smoking, snuff, chewing pan with tobacco and chewing tobacco leaf).

Subjects were examined under artificial light using mouth mirror, explorer, William's periodontal probe, and CPI probe by a single examiner. Intraoral examination was carried out to evaluate oral hygiene, gingival and periodontal status using OHI-S (6), Loe and Silness gingival index (7) and CPI (8) respectively. OHI-S by Greene and Vermillion determines the amount of debris and calculus on six pre-selected tooth surfaces. GI estimates the severity of gingivitis by evaluating gum color,
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consistency and bleeding during probing by the use of a periodontal probe on mesial, vestibular, distal and lingual marginal gingiva of six index teeth. In order to assess CPI (8), oral cavity was divided into six sextants and the highest code for each sextant was recorded. Both CPI and Loss of attachment were assessed in each sextant. The highest code for CPI and loss of attachment, among all sextants, was recorded as the CPI and Loss of attachment (LOA) score for the subject. The assessment was done using a CPI probe. Data obtained was entered on to Microsoft Excel and statistically analyzed using statistical package for social sciences (SPSS), version 17.0 software. Students unpaired ‘t’ test, Fishers exact test and Chi-square test were used wherever applicable. A p value of <0.05 was considered to be statistically significant.

Results
A total of 100 subjects participated in the study. Mean age of gutkha chewing subjects was 28.22 years while it was 26.78 years among non-chewers.

Table 1: OHI-S scores among the study groups

<table>
<thead>
<tr>
<th>Study group</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gutkha chewers</td>
<td>2.15</td>
<td>0.47</td>
</tr>
<tr>
<td>Non-chewers</td>
<td>0.81</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Approximately half (44%) and a quarter (24%) of gutkha chewers had white band in buccal mucosa and ulcer respectively, whereas in non-chewers 94% subjects had normal oral mucosa. The intraoral findings were significantly different between chewers and non-chewers (not presented in tables).

Table 1 depicts that the mean OHI-S score in gutkha chewing subjects was 2.15 which was approximately three fold greater than 0.81 observed in non-chewers (P<0.001).

Figure 1: Oral hygiene status of gutkha chewers and non-chewers

Figure 1 demonstrates that the number of subjects with good oral hygiene (82%) was significantly higher among non-chewers when compared with gutkha chewing subjects where none of the subjects had good oral hygiene. The number of subjects with mild gingivitis was significantly higher among non-chewers (98%) when compared with gutkha chewers. Similarly, a significantly higher prevalence of moderate gingivitis was seen in chewers (84%) when compared with non-chewers (Table 2).

Table 2: Gingival bleeding assessed using Loe and Sillness Gingival index among the study population

<table>
<thead>
<tr>
<th>Gingival bleeding</th>
<th>Gutkha chewers</th>
<th>Non-chewers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>8(16%)</td>
<td>49(98%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>42(84%)</td>
<td>1(2%)</td>
</tr>
<tr>
<td>Severe</td>
<td>0(0%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>Total</td>
<td>50(100%)</td>
<td>50(100%)</td>
</tr>
</tbody>
</table>

Chi-square test, p=0.0001

Mean GI score of 1.08 in gutkha chewers was significantly greater (p<0.001) than 0.19 in non-chewers. (Not presented in tables). Higher prevalence (16%) of bleeding on probing was seen in chewers compared to 8% in non-chewers. Less
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than half (46%) had periodontal pocket of 4-5mm and 66% had LOA of 4-5mm in gutkha chewers, when compared to the comparative group where 10% subjects had 4-5mm periodontal pocket and 24% had loss of attachment of 4-5mm. (Tables 3 and 4)

Table 3: Comparison of CPI scores between the gutkha chewers and non-chewers

<table>
<thead>
<tr>
<th>CPI scores</th>
<th>Gutkha chewers</th>
<th>Non-chewers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bleeding</td>
<td>8(16%)</td>
<td>4(8%)</td>
</tr>
<tr>
<td>Calculus</td>
<td>19(38%)</td>
<td>41(82%)</td>
</tr>
<tr>
<td>Shallow pockets</td>
<td>23(46%)</td>
<td>5(10%)</td>
</tr>
<tr>
<td>Deep pockets</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Chi-square test, p=0.0001

Table 4: Loss of attachment scores in gutkha chewers and non-chewers

<table>
<thead>
<tr>
<th>LOA scores</th>
<th>Gutkha chewers</th>
<th>Non-chewers</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOA 0-3 mm</td>
<td>16(32%)</td>
<td>38(76%)</td>
</tr>
<tr>
<td>LOA 4-5 mm</td>
<td>33(66%)</td>
<td>12(24%)</td>
</tr>
<tr>
<td>LOA 6-8 mm</td>
<td>1(2%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>LOA 9-11 mm</td>
<td>0(0%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>LAO 12 mm or more</td>
<td>0(0%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>Total</td>
<td>50(100%)</td>
<td>50(100%)</td>
</tr>
</tbody>
</table>

Chi-square test, p=0.0001

Discussion

With the emergence of commercial pan masala and gutkha about three decades ago, not only did the Indian market witness massive growth in the sales of smokeless tobacco and areca nut products, but also a huge worldwide export market developed. The packaging revolution has made these products portable, cheap and convenient, with the added advantage of a long shelf-life. Tobacco products which were usually consumed by a small section of the population are today part of the modern urban and rural lifestyle (4).

Promoted by a slick, high profile advertising campaign in televisions and other mass media and aggressive marketing by the manufacturer, these products have become very popular with all sections of the society (4). The extensive marketing of gutkha has led to widespread addiction amongst young generation especially in low economic status people (1).

Betel nut/arecanut use has been common in South East Asia. Areca nut is the fourth most common psychoactive substance in the world. Areca nut, a main ingredient in gutkha, contains alkaloids such as arecoline, which might have a significant causative role in periodontal diseases along with other variable such as level of oral hygiene, dietary factors, general health and dental status (9). One of the limitations of this study is that matching was not done between the groups. The present study was conducted to compare the effect of chewing gutkha on oral hygiene status, gingival and periodontal status of chewers and non-chewers.

The present study revealed highly significant difference between chewers and non-chewers with respect to intraoral lesion and burning sensation of mouth. Parmar et al., (10) reported that difficulty in mouth opening and burning sensation in soft tissue is significantly higher in chewers.

The present study showed that the non-chewers have better oral hygiene compared to chewers. Similar results were seen in the study by Parmar et al., (10). In their study oral hygiene status significantly deteriorated in persons having deleterious oral habits compared to controls.

A study conducted by Robertson et al., (11) showed that sites adjacent to mucosal lesions in smokeless tobacco users showed significantly greater recession and attachment loss than in the sites not adjacent to lesions in users or comparable sites in non-users. Though,
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gingival recession or oral mucosal lesions were not considered in the present study. It was observed that gutkha chewers had significantly greater gingival bleeding than non-chewers. Johnson and his colleagues (12) in their animal experiment disclosed that topical application of nicotine on gingiva, which was considered as a stimulation of smokeless tobacco use significantly enhanced gingival blood flow.

Present study revealed periodontal pockets of 4-5mm among all the gutkha chewers. Loss of attachment of 4-5mm was also found. This was in confirmation with the study by Amarasena et al., (13). Moreover, Sumanth et al., (14) reported that higher incidence of periodontal diseases in pan chewers with tobacco. Study also showed that addition of tobacco during pan chewing leads to synergistic effect of pan and tobacco on the periodontal tissues. In another study it was suggested that adults currently using smokeless tobacco are twice more likely to have severe active periodontal disease than adults who never used smokeless tobacco (15). In an invitro study by Chang et al (16) they stated that areca extracts containing arecoline inhibit the growth and attachment of and protein synthesis in, human cultured periodontal fibroblasts. This indicated that gutkha which essentially contains betel nut might be another risk factor in the pathogenesis of periodontal diseases.

Payne et al., (17) revealed that smokeless tobacco is capable of stimulating monocyte secretion of PGE2 and IL1 beta, which play a role in destruction of periodontium. Nicotine also has a deleterious effect on human periodontal ligament fibroblast growth, proliferation and protein synthesis, and thus may have a role in periodontal diseases (18). Blood nicotine levels reached by using gutkha chewing are dramatically higher than that reached from cigarette smoking. Thus, the use of tobacco products may exacerbate periodontal disease (19).

Areca nut chewing is known to cause local trauma and injury to the oral mucosa due to its abrasive nature. This continuous local irritation by gutkha can lead to injury-related chronic inflammation, oxidative stress and cytokine production. During chronic exposure, these can lead to pre-neoplastic lesions in the oral cavity and subsequently to malignancy (4).

Conclusions

Based on the present study findings, gutkha chewers show poor oral hygiene, increased gingival inflammation and increased loss of attachment compared to non-chewers. It can be concluded that chewing gutkha has a role in deterioration of oral hygiene, gingival status and periodontal status and also development of oral lesions.

Further studies should be carried out to identify the deleterious effect caused by various other smokeless tobacco products available in the market on oral and systemic health and also a detailed study has to be conducted on other contents used in gutkha other than tobacco and arecanut and their effects.

References

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