Assessment of role of areca nut and smokeless tobacco-related habit in altering physical properties of saliva

Dr Atoofa Zargar, Dr Dheeraj Sharma

1,2Senior Resident, Department of Dentistry, Govt. Medical College, Doda, J&K, India

Keywords: salivary flow, areca nut, tobacco-related habits.

Background: Areca nut and tobacco products are reported to be substances that can cause mucosal changes. Areca nut contains many minerals, namely, copper, manganese, zinc, nickel, and lead. The present study was conducted to assess role of areca nut and smokeless tobacco-related habit in altering physical properties of saliva.

Materials & Methods: 60 subjects with habit of using smokeless tobacco and areca nut of both genders (Group I) and controls (group II) were enrolled. Stimulated saliva was collected and stimulated salivary flow rate, pH, and buffering capacity of the selected subjects were determined using the GC saliva check – buffer kit.

Results: Group I had 40 males and 20 females and group II had 30 males and 30 females. The mean salivary flow rate in group I was 3.56 ml/min and in group II was 4.12 ml/min. The mean pH was 6.31 in group I and 7.82 in group II. The difference was significant (P<0.05). The buffering capacity was very low in 14% in group I and 2% in group II, low in 30% in group I and 28% in group II and normal in 56% in group I and 70% in group II. The difference was significant (P<0.05).

Conclusion: There was reduction in salivary flow and change in the pH as well as the buffering capacity of the salivary flow in subjects with areca nut and tobacco-related habits.

Introduction:

Oral fluid is mainly composed of saliva. Other components of saliva include gingival cervical fluids, mucosal transudate, dead cells, bacteria, and food remains. Saliva is secreted from salivary glands.1 The source of saliva is interstitial fluid through blood capillaries, which enters the salivary glands and gets modified from isotonic to hypotonic fluid. Saliva is essential for protection, lubrication of oral mucosal tissue remineralization of teeth, digestion, taste sensation, stimulation, washed-out effect, pH balance, and phonation.2 Salivary nucleus in the medulla oblongata is the salivary center which is regulated by the control center in the hypothalamus. As the salivary gland is innervated by autonomic nervous system, it responds to both parasympathetic and sympathetic stimulus but differently. Parasympathetic impulses are more common and mostly isolated, with varying degree of expulsion from the acinar cells causing salivary secretion.3

Areca nut and tobacco products are reported to be substances that can cause mucosal changes. Areca nut contains many minerals, namely, copper, manganese, zinc, nickel, and lead. Within moments of chewing, gutkha begins to dissolve and turns deep red in color. Copper content of betel nut products is strongly associated with oral submucous fibrosis (OSMF). AN also contains four very important alkaloids, namely, Arecoline, arecaidine, guvacoline, and guvacine.4 Arecoline has parasympathomimetic activity, which increases salivary flow rate in AN chewers which further increases the pH of saliva. The common oral lesions associated with AN chewing include dental attrition, staining, dental caries, periodontal diseases, lichenoid lesions, betel chewers mucosa, oral leukoplakia, OSMF, and oral squamous cell carcinoma.5 The present study was conducted to assess role of areca nut and smokeless...
tobacco-related habit in altering physical properties of saliva.

**Materials & methods:**

The present study comprised of 60 subjects with habit of using smokeless tobacco and areca nut of both genders. Equal number of normal non-tobacco users were also enrolled. All gave their written consent for the participation in the study.

**Results:**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Tobacco users</td>
<td>Control</td>
</tr>
<tr>
<td>M:F</td>
<td>40:20</td>
<td>30:30</td>
</tr>
</tbody>
</table>

**Table I Distribution of patients**

Table I shows that group I had 40 males and 20 females and group II had 30 males and 30 females.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group I</th>
<th>Group II</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salivary flow rate</td>
<td>3.56</td>
<td>4.12</td>
<td>0.05</td>
</tr>
<tr>
<td>Salivary pH</td>
<td>6.31</td>
<td>7.82</td>
<td>0.08</td>
</tr>
</tbody>
</table>

**Table II Comparison of salivary parameters**

Table II, graph I shows that mean salivary flow rate in group I was 3.56 ml/min and in group II was 4.12 ml/min. The mean pH was 6.31 in group I and 7.82 in group II. The difference was significant (P< 0.05).
Graph I Comparison of salivary parameters

<table>
<thead>
<tr>
<th>Buffering capacity</th>
<th>Group I</th>
<th>Group II</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>14%</td>
<td>2%</td>
<td>0.02</td>
</tr>
<tr>
<td>Low</td>
<td>30%</td>
<td>28%</td>
<td>0.94</td>
</tr>
<tr>
<td>Normal</td>
<td>56%</td>
<td>70%</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Table III Comparison of buffering capacity

Table III, graph II shows that buffering capacity was very low in 14% in group I and 2% in group II, low in 30% in group I and 28% in group II and normal in 56% in group I and 70% in group II. The difference was significant (P < 0.05).
Discussion:

It has been estimated that, worldwide, ~600,000,000 people are areca nut chewers. It is the fourth most commonly abused social drug, ranking after nicotine, ethanol, and caffeine. The areca fruits are sun dried for several weeks, after which the fibrous shells are removed and the hard, dry nuts, commonly called betel nut or “supari” in India, are ready for use. Such sun dried varieties of BN are very hard and are cut into small pieces to make it easier to masticate. A flavored and sweetened dry mixture of betel nut, catechu, and slaked lime has become increasingly popular either with tobacco (gutkha or khaini) or without tobacco (pan masala). These products are packaged in small, attractive, and inexpensive sachets. BN chewing leads to increased salivary secretion in chewers only by chemical stimulation but not on mechanical. The chewers showed lower levels of potassium, sodium, and salivary amylase. The present study was conducted to assess role of areca nut and smokeless tobacco-related habit in altering physical properties of saliva.

We found that group I had 40 males and 20 females and group II had 30 males and 30 females. The mean salivary flow rate in group I was 3.56 ml/min and in group II was 4.12 ml/min. The mean pH was 6.31 in group I and 7.82 in group II. Patel et al. aimed to compare the alteration in the salivary properties like stimulated salivary flow rate, pH, and buffering capacity between subjects with areca nut and smokeless tobacco habit and without in subjects without habit. The sample size constituted of 50 subjects (group A) with a habit of areca nut and smokeless tobacco and 50 subjects (group B) without any habit. Salivary properties like salivary flow rate, buffering capacity, and pH were analyzed in both groups to test a hypothesis that the habit results in changes in the salivary properties and that there is a correlation between the changes and the frequency, duration, and exposure of the habit. The mean stimulated salivary flow rate among group A was 3.34 ± 1.32 and pH was 6.50 ± 0.54. The mean stimulated salivary flow rate among group B was

Graph II Comparison of buffering capacity
4.42 ± 1.48 and the pH was 7.04 ± 0.47. The difference in these values was found to be statistically significant.

We observed that the buffering capacity was very low in 14% in group I and 2% in group II, low in 30% in group I and 28% in group II and normal in 56% in group I and 70% in group II. Sahu et al measured the effect of habitual chewing of areca nut and various tobacco products on salivary pH. The present study included 360 individuals (chewers and nonchewers) of age group between 20 and 30 years. It was observed that, in all the groups of chewers, pH decreased after chewing except in the gutkha and lime chewing group, where pH increased (pH before chewing was 7.43 ± 0.41 and after chewing was 7.51 ± 0.399), the difference was strongly significant (P < 0.001). pH was found to be less in lime and tobacco chewers (6.83 ± 0.33) and more in tobacco, betel nut, and lime chewers (7.50 ± 0.41) in comparison to other groups before chewing; the difference was strongly significant.

In the mean ± standard deviation, increase in pH was found among chewers (7.32 ± 0.49) as compared to nonchewers (6.99 ± 0.14), which is the control group, and the data were statically significant.

Kanwar et al in a study divided sixty participants equally into three groups – tobacco smokers A, chewers B, and controls C. The mean pH for Group A – 6.8, B – 6.7, and C – 7.04 when compared and a nonsignificant relation was obtained though, Group A and B showed lower salivary pH. The results show that normal salivary pH was changed to alkaline in chewers because the process of chewing itself brings copious amounts of saliva to the mouth and in the presence of added slaked lime may increase the pH in the oral environment.

The limitation the study is small sample size.

Conclusion:

Authors found that there was reduction in salivary flow and change in the pH as well as the buffering capacity of the salivary flow in subjects with areca nut and tobacco-related habits.

References:


