Prevalence of dental caries among smoked and smokeless tobacco users: A cross sectional study

Original Research

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Abstract: Background : Dental caries is a polymicrobial multifactorial disease caused by various associations. Tobacco usage also affects the occurrence of dental caries.

Aim and objective : To assess the prevalence of dental caries in smokers and smokeless tobacco users.

Materials and methods : A sample of 312 patients of both genders within 18–75 years formed the study population and were categorized as follows : Group 1 - 175 patients who smoked tobacco, Group B - 137 patients who used chewable form of tobacco. A clinical examination of dental caries was conducted using Black’s criteria, and habit duration, frequency, form, and the type of tobacco used were recorded. The obtained data was descriptively analyzed.

Results : Of the 312 enrolled subjects, 183 were males while 129 were females, thus showing male predilection. Of the 312 tobacco dependents, 175 (56.09%) belonged to group A (smokers) and 137 (43.91%) belonged to group B (smokeless tobacco users).Dental caries was encountered in 98 (71.53%) of the smokeless tobacco users and 87 (49.71%) of the smoked tobacco users.

Conclusion : Individuals who use chewable form of tobacco are more affected by dental caries than the individuals who smoke tobacco. This may be due to the increased sweetening and flavouring agents used in the commercial smokeless tobacco preparations. Thus, individuals should be educated about this dreadful consequence of tobacco usage which could ultimately result in loss of teeth, difficulty in mastication and other esthetic issues, thus desecrating the quality of life.

Keywords : Dental caries, Prevalence, Smoked tobacco users, Smokeless tobacco users.

INTRODUCTION

The use of tobacco and its products adversely affects the entire human body and has resulted in a myriad of health complications including cancer, chronic obstructive pulmonary disorder, cardiovascular diseases, strokes and several other entities. Around 7 million deaths occur worldwide annually due to tobacco usage. The tobacco burden in India is no less with 28.6% of the adult population (>15 years) and 14.6% of the youth (13-15 years) having this addiction.

Tobacco is consumed in various forms in India, with the consumption pattern being affected by several factors like demographic area, socioeconomic status, socio-cultural and religious influences. Surveys have shown that of the estimated 28.6% tobacco use in India, 10.7% of the total tobacco consumption is in smokable form as cigarettes and bidis, while 21.4% is used in the form of smokeless tobacco products such as paan, gutkha, paan masala and mishri.

Tobacco usage wrecks havoc on the whole body including the oral cavity, wherein the most significant effects seen are : oral cancers and oral potentially malignant disorders, increased severity and extent of periodontal diseases along with poor healing. Tobacco is also considered as a major risk factor for dental caries and oral mucosal lesions and adult periodontal diseases. Tobacco use also suppresses the immune system’s response to oral infections.

There is a general consensus that tobacco is associated with increased caries rate but this cause and effect relationship is not firmly proven. Therefore, the aim of this study was to assess the influence of smoked as well as smokeless tobacco on dental caries development in individuals of all age groups.
MATERIALS AND METHODS

The present observational study was conducted to estimate the prevalence of dental caries in individuals who used tobacco either in smoking or smokeless form. Individuals who gave their consent, were current tobacco users and consumed tobacco either in smoked or chewable form formed the study population. Subjects having less than 10 teeth in one arch, with history of major systemic disease or subjects who had undergone past oral prophylaxis were excluded from the study. Moreover, individuals on antibiotic medication within 6 months prior to the study, individuals who used tobacco in both smoked and chewable form and subjects diagnosed with dental fluorosis were also not included in the study.

Data related to the subject’s dietary habits, oral hygiene habits (brushing frequency, paste used and mouth rinsing habit was recorded) and tobacco history (habit duration, type, frequency and form) was obtained after receiving informed consent from the patient. A thorough clinical examination was performed on 312 individuals using WHO guidelines using adequate illumination, mouth mirror and an explorer. Patients were asked to rinse mouth thoroughly before examination, then the teeth were dried with cotton swab and dental caries were recorded. The criteria to diagnose decayed tooth was: catch with explorer, discontinuity of enamel surface, definite cavitation and soft base. All the examination was done by a single calibrated examiner and trained assistant recorded the clinical findings as dictated by the examiner.

A simple random sampling was performed during subject recruitment. All 312 patients of both gender, aged between 18 and 75 years were categorized into two groups.

Group A : Smokers (subjects consuming only smoked form of tobacco).
Group B : Chewers (subjects consuming only smokeless form of tobacco).

Group A and B included subjects who had history of tobacco consumption (smoked and smokeless form, respectively) at least for the past six months.

Data was charted and descriptively analysed.

RESULTS

Table 1 shows patient distribution according to gender and habit. Of the 312 enrolled subjects, 183 (58.65%) were males while 129 (41.35%) were females, thus showing male predilection. Of the 312 tobacco dependents, 175 (56.09%) belonged to group A (smokers) and 137 (43.91%) belonged to group B (smokeless tobacco users).

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>183</td>
<td>58.65</td>
</tr>
<tr>
<td>Female</td>
<td>129</td>
<td>41.35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Habit</th>
<th>Smokers (Group I)</th>
<th>175</th>
<th>56.09</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Chewers (Group II)</td>
<td>137</td>
<td>43.91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prevalence of caries</th>
<th>Smokers (Group I)</th>
<th>87</th>
<th>49.7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chewers (Group II)</td>
<td>98</td>
<td>71.53</td>
</tr>
</tbody>
</table>

Table 1 : Distribution of study participants according to gender, habit and caries prevalence.

Dental caries was encountered in 98 (71.53%) of the smokeless tobacco users and 87 (49.71%) of the smoked tobacco users (Table 1). This shows that the prevalence of dental caries was more in individuals who used smokeless forms of tobacco than the individuals who smoked tobacco.

Data analysis also revealed that among smokers, bidi was more commonly used than cigarettes and in smokeless tobacco users gutkha was used by majority of the study subjects followed by khaini, tambaku and zarda. Among smokers, majority of the subjects smoked 1-5 times in a day followed by 6-10 times and very few used more than 10 times in a day. Among smokeless tobacco users, majority of the subjects used 1-5 times in a day followed by more than 10 times in a day. Amongst smokers, a larger population smoked for more than a decade, followed by 5-10 years while very few had been smoking for less than 5 years. A different trend was observed in the chewing category wherein maximum of the participants had been chewing tobacco for the past 5-10 years followed by individuals who had been chewing tobacco for less than 5 years and >10 years, respectively (Table 2).

Parameters | Smokers | Chewers

<table>
<thead>
<tr>
<th>Types</th>
<th>Bidi</th>
<th>Gutkha</th>
<th>52</th>
</tr>
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<tbody>
<tr>
<td>Khaini</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigarette</td>
<td>62</td>
<td>Tambaku</td>
<td>29</td>
</tr>
</tbody>
</table>
Zarda 18

Frequency per day
1-5 113 76
6-10 48 22
> 10 14 39

Duration in years
< 5 21 40
5-10 66 73
> 10 88 24

Table 2: Table depicting the distribution of study participants based on type, frequency and duration of tobacco consumption.

Table 3 shows the distribution of caries affected and caries free individuals based on age group distribution (<25 years, 25-50 years, >50 years). Among smokers, maximum of the caries affected individuals belonged to 25-50 years, <25 years and >50 years. Whereas amongst chewers, most caries affected individuals belonged to <25 years age group followed by 25-50 year group followed by >50 years age group (Table 3).

<table>
<thead>
<tr>
<th>Age group</th>
<th>Smokers</th>
<th></th>
<th></th>
<th>Chewers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With caries</td>
<td>Without caries</td>
<td>With caries</td>
<td>Without caries</td>
</tr>
<tr>
<td>&lt; 25</td>
<td>27</td>
<td>31</td>
<td>43</td>
<td>08</td>
</tr>
<tr>
<td>25-50</td>
<td>39</td>
<td>22</td>
<td>37</td>
<td>15</td>
</tr>
<tr>
<td>&gt; 50</td>
<td>21</td>
<td>35</td>
<td>18</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 3: Distribution of study subjects according to age group and presence or absence of caries.

DISCUSSION

The results of the present study showed that individuals who chewed tobacco were more affected by dental caries than the individuals who smoked tobacco. Moreover, a male predilection was seen. It was also observed that majority of the caries affected individuals who smoked tobacco belonged to 25-50 years age group while majority of the caries affected chewers belonged to young age group i.e <25 years.

Zitterbart in the year 1990 reported that smokers had significantly higher decayed, missing, and filled teeth (DMFT) score, thus suggesting an association between smoking and prevalence of dental caries in adult males. He also correlated frequency of smoking with missing teeth, and reported that with more number of cigarettes were smoked per day, more were the missing teeth noted in a smoker’s mouth.[6] Some other studies have also suggested that smoking actually reduces dental caries.[7-10] The results of these studies are not in concordance with ours. The reasoning given for this observation was that thiocyanate, a component of tobacco smoke is increased in smokers saliva which is believed to have anti caries effect, thus reducing the incidence of dental caries in these individuals.[11] However, some studies have also stated increased susceptibility to dental caries in individuals who smoked tobacco due to possible lower pH levels, a decreased buffering capacity of smoker’s saliva, and higher number of lactobacilli and Streptococcus mutans, caries causing bacteria.[11,12]

Campus et al, Sitzes L Jr reported the evidence linking smokeless tobacco use with increased prevalence of dental caries, a finding similar to ours.[13,14] Data from the multipurpose health survey (Third National Health and Nutrition Examination Survey) conducted in the USA from 1988 to 1994 was used to examine the relationship between chewing tobacco and the other forms of tobacco use and decayed or filled coronal or root surface caries. The results of the study stated that tobacco chewers had a slightly higher mean for decayed and filled coronal surfaces than individuals using the other forms of tobacco. In addition, the mean number of decayed and filled root surface for those who used chewing tobacco was four times higher than nonusers.[15] All of these findings are in concordance with our study. Thus, it can be considered that smokless tobacco plays a significant role in the promotion and development of dental caries.
Chaitanya et al assessed the prevalence of dental caries in smokers and smokeless tobacco users and compared it with that of nonusers. They reported a high prevalence of caries in control patients followed by smokeless tobacco users when compared to the group with smoking habit.[16] Nidhi et al assessed the prevalence of dental caries among smokers and smokeless tobacco users and reported higher presence of caries in the smokeless tobacco user group.[17] Sharma et al conducted a study to determine the influence of tobacco dependence on caries development in young male adults, and concluded that DMFT index was higher for smokeless tobacco users than smoked tobacco users.[18] The findings of all these studies were in concordance with our study. The higher presence of caries in the smokeless tobacco usage group might be due to the presence of sweeteners in tobacco-chewing agents, which acts a substrate for the caries promoting bacteria.[16] Moreover, it may also be considered that chewing tobacco may reduce the salivary flow, which reduces the flushing action of saliva and the other caries inhibiting salivary actions.

On the contrary, Hegde et al compared the dental caries experience and count of Streptococcus mutans, Streptococcus sanguis and Candida among tobacco users and concluded that dental caries experience and growth of microbes was found higher among smokers compared to smokeless users and non-users.[19] Similarly, Rooban et al evaluated the effect of different psychoactive substances (tobacco and alcohol) use in different combination to understand the association between psychoactive substance uses and different components of the dental caries experience. They summarized that the entire study population exhibited a higher incidence of caries experience and use of tobacco in any form substantially increased the risk for dental caries. However, attrition with use of chewing tobacco and presence of extrinsic stains with tobacco use appeared to provide a protective effect from caries.[20] The findings of both these studies were in concordance with ours. Similarly, Zitterbart et al did not find any evidence of dental caries in the area where quid was placed.[6]

CONCLUSION

Individuals who use chewable form of tobacco are more affected by dental caries than the individuals who smoke tobacco. This may be due to the increased sweetening and flavouring agents used in the commercial smokeless tobacco preparations. Thus, individuals should be educated about this dreadful consequence of tobacco usage which could ultimately result in loss of teeth, difficulty in mastication and other esthetic issues, thus desecrating the quality of life.

REFERENCES