



TOOTH DECAY IN ALCOHOL AND TOBACCO ABUSERS AT PATNA

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ABSTRACT

Aim: Alcohol and tobacco abuse are detrimental to general and oral health. Though the effects of these harmful habits on oral mucosa had been demonstrated, their independent and combined effect on the dental caries experience is unknown and worthy of investigation. **Materials and Methods:** 674 patients considered for the study to test the hypothesis that various components of their dental caries experience are significantly different. Clinical examination, Decay, Missing, Filled Teeth (DMFT) Index and Oral Hygiene Index - Simplified were measured in a predetermined format. Descriptive statistics, Chi-square test and one-way ANOVA analysis were done using SPSS Version 16.0. **Result:** The mean DMFT were 3.31, 3.24, 4.09, 2.89 for alcohol-only abusers, alcohol and chewing tobacco abusers, smoking tobacco and alcohol abusers, and those who abused tobacco in smoke and smokeless forms respectively. There was no significant difference between the oral hygiene care measures between the study groups. Presence of attrition among chewers and those with extrinsic stains experienced less caries than others. **Conclusion:** The entire study population exhibited a higher incidence of caries experience. Use of tobacco in any form appears to substantially increase the risk for dental caries. Attrition with use of chewing tobacco and presence of extrinsic stains with tobacco use appear to provide a protective effect from caries. The changes in oral microflora owing to tobacco use and alcohol may play a critical role in the initiation and progression of dental caries.

KEYWORDS: India, Dental caries, tobacco, alcohol.

INTRODUCTION

Dental caries (DC) is a common oral disease that affects any age group and is dependent on a number of factors. It has been reported that the prevalence of dental caries in North India varies with the type of Habitual 'psychoactive substance (PS). Habitual 'psychoactive substance (PS) use' is defined as the repeated use of a PS despite the knowledge of its negative health consequences while 'PS abuse' is referred to a pattern of PS use that causes damage to physical or mental health. The common PS use that is of interest to a dentist in India includes alcohol, tobacco and areca nut.^[1]

Alcohol has been thought to influence DC via the microbial oxidation of ethanol in saliva in alcohol abusers resulting in the formation of acetaldehyde that inhibits the carcinogenic oral flora. Alcohol enhances fluoride release from certain restorative materials.^[2] Oral

health neglect is a common feature of PS abuse.^[3,4] Nicotine, a major constituent of tobacco, is known to limit the proliferation of *Streptococcus viridians*.^[5]

It is considered that frequent chewing of areca nut confers a protection against DC. Areca nut by itself lacks ingredients that have cariostatic properties. The extrinsic stain formed by the chronic habit acts as a laminate preventing adherence and colonization of the cariogenic microbes. The gritty consistency of the areca nut mediates a mechanical cleansing activity eliminating the food debris. Repeated chewing stimulus results in an increased salivary flow rate that also aids in the removal of organisms and food debris. The tannins in this bolus have antimicrobial properties. Attrition in chewers makes the teeth surface smooth and reduces the risk of pit and fissure caries. The sclerosis of dentin by repeated masticatory trauma renders the dentin resistant to the microbial invasion.^[6]

The understanding of the influence of PS on DC will help to limit the overall oral disease burden as well have a huge impact on the socioeconomic component of the dental disease burden in this vulnerable population. In India, the most common PSs abused are alcohol and tobacco.^[1,4] Given the large percentage of Indian population abusing PSs, It is still unclear how different PS use influences the overall DC experience in the Indian population. Hence this study was undertaken with the objective to evaluate the effect of different PS use in different combination, for understanding the association between PS uses and different components of the dental caries experience.

MATERIALS AND METHODS

A retrospective study of consecutive first-visit persons who attended the dental clinics at Patna Dental College and Hospital, Patna-4, India formed the study group.

Trained dental surgeons calibrated and examined the patients. Their clinical findings were recorded in a predetermined format, which included detailed recording of the patients' habits (alcohol and tobacco (with/without areca nut)) as per earlier published protocols and clinical observations including Oral Hygiene Index-Simplified (OHI-S) and Dental Caries, Missing, Filled Tooth (DMFT) index. Tobacco use was measured as pack/years. Smoking tobacco pack/ years were calculated as published in the literature and smokeless tobacco (2 gm per pack) used per year as pack/years.

Based on their PS habits, the study group was broadly divided into four groups without any overlap. They were alcohol-only abusers (A), alcohol and smoking tobacco abusers (AS), alcohol and chewing tobacco abusers (AC) and smoking, chewing tobacco with alcohol abusers (ASC). Tobacco use was considered as abuse when the subject used any form and quantity of tobacco

continuously for three months. Alcohol abuse was considered as per standard definitions.

Data were entered and analyzed using the Statistical Package for Social Services. Statistics were presented for all variables. Pearson's Chi-square test was performed to determine the significance of associations between demographic characters and habits. One-way ANOVA was employed to find the difference in the mean of DC experience among the groups. *P* value < 0.05 was considered to be statistically significant.

RESULTS

There were 674 patients considered for the study. The demographic details of the study groups are detailed in Table 1, with a mean age of 38.49±8.27 years (18 to 70 years) with the majority of them belonging to the 36 to 40 years age group (24.1%). The mean age and age group across study groups were statistically significant. The majority of the study population was married (Table-2). The duration of tobacco habit was as follows: smoking tobacco use ranged from three months to 41 years with a mean of 13.5±8.12 years, chewing tobacco, six months to 40 years with a mean of 7.48±5.6 years while raw tobacco use was for a period of 13.3±8.95 years. The mean pack years for alcohol abusers chewing tobacco was 265.54, for smoking alcohol abusers was 588.81 and for those alcohol abusers who smoked and chewed tobacco was 575.08.

Across study groups, prevalence of at least one DC was not statistically significant (*P*=0.113), while at least one missing tooth (*P*=0.000) was significant. The mean difference in DMFT, OHI-S, DC, missing and filled teeth across study groups was significant. Mean years of alcohol abuse and units of alcohol consumed per week were significantly different across the study groups (*P* =0.001 and 0.000 respectively).

Table 1: Demographic characteristics of the study population (Age group).

Age group	Alcohol (<i>n</i> = 268) (%)	Alcohol + Chewing (<i>n</i> =691) <i>n</i> (%)	Alcohol + Smoking (<i>n</i> = 1056) <i>n</i> (%)	Alcohol + Chewing + Smoking (<i>n</i> = 679) <i>n</i> (%)
Below	0	20 2 (0.29)	1 (.09)	3 (.44)
21-25	4 (1.49)	18 (2.6)	21 (1.99)	48 (7.07)
26-30	20 (7.46)	103 (14.91)	98 (9.28)	154 (22.68)
31-35	32 (11.94)	172 (24.89)	196 (18.56)	179 (26.36)
36-40	57 (21.27)	194 (28.08)	239 (22.63)	160 (23.56)
41-45	58 (21.64)	107 (15.48)	211 (19.98)	77 (11.34)
46-50	42 (15.67)	66 (9.55)	151 (14.3)	38 (5.6)
51-55	32 (11.94)	22 (3.18)	93 (8.81)	11 (1.62)
55-60	8 (6.72)	5 (.72)	41 (3.88)	9 (1.33)
above 61	5 (1.87)	2 (0.29)	5 (0.47)	0

Table 2: Demographic characteristics of the study population (Marital status).

Marital status	Alcohol (n = 268) (%)	Alcohol + Chewing (n = 691) n (%)	Alcohol + Smoking (n = 1056) n (%)	Alcohol + Chewing + Smoking (n = 679) n (%)
married	252 (94.4)	605 (87.6)	952 (90.2)	530 (78.3)
Unmarried	15 (5.6)	82 (11.9)	98 (9.3)	145 (21.4)
Separated	0	4 ((0.6)	5 (0.5)	2 (0.3)

The oral hygiene measures adopted by the study population and were not significantly different across groups. Outcome of oral hygiene measures was measured as caries experience. Material and methods used for oral hygiene were significantly associated with OHI-S and DMFT as well as missing teeth.

Table 3, 4, 5 depicts the results of one-way ANOVA for DMFT, DC and filled teeth. The means of filled and dental caries-affected teeth were significantly different across the group. Pack/years did not influence the DMFT scores.

Table 3: One-way ANOVA of mean dental caries experience in study group (DMFT).

DMFT	Mean	Std. Deviation	P value
A	3.306	3.78491	0.000
AC	3.2417	3.43693	0.000
AS	4.0938	4.45043	0.000
ACS	2.8881	3.42072	0.000

A - alcohol, C - chewing, S - smoking; *statistically significant

Table 4: One-way ANOVA of mean dental caries experience in study group (Dental caries).

Dental caries	Mean	Std. Deviation	P value
A	1.7164	2.22216	0.049
AC	2.1809	2.56238	0.049
AS	2.0578	2.62425	0.049
ACS	1.9102	2.64729	0.049

A - alcohol, C - chewing, S - smoking; statistically highly significant

Table 5: One-way ANOVA of mean dental caries experience in study group (Filled teeth).

Filled teeth	Mean	Std. Deviation	P value
A	0.153	0.63224	0.030*
AC	0.1245	0.57395	0.030*
AS	0.2367	1.15968	0.030*
ACS	0.1384	0.6707	0.030*

A - alcohol, C - chewing, S - smoking; *statistically significant

There was a statistical significance between the prevalence of DMFT, missing teeth and filled teeth

between chewers and non-chewers while filled teeth was only significant between those with and without pouching habit. There was a statistically significant difference in the caries experience between those with and without attrition with a *P* value of 0.021. The mean DC in patients having attrition was 1.56 while for patients with no attrition it was 2.05.

DISCUSSION

Dental caries is a multi-factorial, microbial, universal disease affecting all geographic regions, races, both the sexes and all age groups. The prevalence of DC is generally estimated at the ages of 5, 12, 15, 35–44 and 65–74 years for global monitoring of trends and international comparisons. Prevalence of DC in India in these age groups is 56.72, 47.39, 49.59, 42.24 and 70.65 respectively. DMFT in the same ages are 2.1, 1.6, 1.37, 1.39 and not recorded for the 65–74 years.⁷ Reports of DC among PS users from various parts of the globe have been documented, A smaller group of alcoholics in Maryland, USA had a higher number of missing teeth.^[8] In a case-control study of 85 volunteer Finnish alcoholics, there were significantly fewer teeth and more remaining teeth with DC.^[9] In a survey of hospitalized alcoholic patients in Wyoming, USA, alcohol abusers had a three times higher permanent tooth loss than the USA's national average for corresponding ages.^[10] Use of tobacco and or areca nut in various forms and its interaction is known to cause abnormality in salivary pH, flow rate^[11] as well as the oral micro-flora thereby influencing the initiation and progression of DC. Mean age, DC, DC point prevalence and DMFT in the entire study population was 38.49 years, 2.02±2.6, 58.6% and 3.49±3.93 respectively. These values are comparatively higher than the Indian national average of DC - 42.24% and DMFT of 1.39. This indicates that PS use has a larger role to play in poor oral health. This has been in accordance with previous reports such as those of Dasanayake *et al.*, from London.^[2]

In the present study, there was a significant statistical difference when the mean remaining teeth, DC, filled teeth and DMFT were compared across the various types of PS abuse. This indicates that the type of PS abused would probably influence the DC experience and oral hygiene status. About 95% of all subjects in each study group used toothpaste, more than 80% of them brushed once a day and more than 97% used a toothbrush to maintain oral hygiene.

The oral hygiene measures were not significantly different between the study groups. On the contrary, the type of PS abuse differed with respect to current DMFT status. The brushing material (toothpaste/toothpowder/others) used and mode of oral hygiene care (toothbrush/fingers/others) had a significant difference in terms of current DMFT and OHI-S scores. This finding also explains that the type of PS would probably be a major factor in determining the DC, DMFT. The method of oral hygiene care used by the subjects in the present study did not significantly differ among study groups indicating that the PS abused is an important factor that differed in the study population. Though tobacco abuse was prevalent for longer periods among the study groups, as indicated by the higher mean duration, it was not contributory.

Tobacco usage in any form immediately increases salivary flow, but the effect of long-term use is poorly understood. The pH of saliva tends to rise during smoking tobacco, which in the long term reduces marginally. There are reports of Lower cystatin activities have been reported in tobacco smokers. Cystatins are believed to contribute to balanced oral health by inhibiting certain proteolytic enzymes.^[12] as well as there are reports of increasing concentration of thiocyanate I saliva, probably from the smoked form of tobacco.^[13] There have been contradictory reports of DC in tobacco smokers. A few studies show a higher incidence of DC in smokers^[14] while some show decreased activity of *Streptococci* and other oral commensals^[5] and other studies failed to show any differences.^[12] Our study is in concurrence with previous findings of increased incidence of DC among smokers.^[2] Offenbacher and Weathers^[15] reported on the dental effects of smokeless tobacco use among school-aged males from Georgia. In their study, DMFT scores for smokeless tobacco users with gingivitis were higher than for those who did not use smokeless tobacco and did not have gingivitis. From their findings they concluded that the presence of gingivitis was an indicator of oral hygiene and that poor oral hygiene was a cofactor with smokeless tobacco use in the development of dental caries.^[15] However, the smokeless tobacco in Western countries^[16] and several areca nut preparations in India^[17] contained varying amount of sugars which could be responsible for root caries rather than coronal caries as well as an increased amount of gingival recession in smokeless tobacco users.^[16]

The higher incidence of missing teeth due to DC, particularly in alcoholic smokers is another indicator of the synergistic effect of tobacco use and poor oral hygiene that has been reported earlier.^[17]

DMFT between those with significant extrinsic stain and without it were not significantly different while the incidence of DC classified on the presence and absence of attrition had a statistically significant difference. These findings reiterate the fact that chewing forms

could cause attrition, and DC in such situations is less. Moreover, extrinsic stains could act as a protective laminated covering and aid in prevention of DC.^[6,11] In the present study, the difference between the incidence of DMFT score and missing teeth was significantly higher in subjects with > two-thirds of surface with extrinsic stains than with others.

Several limitations of the study design have to be considered when interpreting the findings from this present study. Data on tobacco use are based on the survey participants' self reported information. This carries an inherent potential for bias. However, several such cross-sectional surveys of tobacco use by adults, have shown that such studies have relatively low rates of misreporting.^[18] the data used in this study were cross-sectional in nature. Therefore, establishing the temporal sequence of exposure and DC— that is, use of chewing tobacco preceded DC development is practically impossible. Non-use of radiographic diagnostic aids would have understated the actual incidence of DC.

CONCLUSION

The present study, to the best of our knowledge, is the first study to document and compare the till date experience of dental caries and compare it across various commonly abused PSs, viz., alcohol, chewing tobacco and smoking tobacco forms. Poorer OHI observed among PS users indicates the physical neglect of oral hygiene measures and warrants a detailed exploration of the phenomenon. The higher prevalence of dental caries indicates the fact that dentists should be a part of the team that treats the PS abuse and this would help the patients to greatly improve their quality of life after successful cessation of PS abuse.

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