

Prevalence of Dental Caries Among Smoking and Smokeless Tobacco Users Attending A Dental Hospital

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ABSTRACT

Objective: To determine the prevalence of dental caries among smoking and smokeless tobacco users attending a dental hospital.

Study design: Randomized Controlled Trial.

Study Setting: The study was conducted at Oral & Maxillofacial Surgery Department, Akhtar Saeed Medical & Dental College, Lahore from November 2021 to April 2022.

Methods: Patients were instructed to brush their teeth and gargle with water before their examinations, after which a cotton swab was used to dry the teeth and note any instances of dental caries. We utilised an index called DMFT, where D stands for decaying teeth, M for missing teeth, F for filled teeth, and T for tooth health

Results: There were 42 chewers and 42 non-chewers in the age between 20 – 60 yrs. Subjects of same age groups were selected in both the groups. 73.8% of the study subjects in both the groups were males and the remaining 26.2% were females. Results shows the distribution of the study subjects according to DMFS scores. Among the chewers, 38.1% of study subjects were caries free (DMFS = 0) and 61.9% were caries affected (DMFS = 1 or more). In the non-chewers group, 9.5% were caries free and 90.5% were caries affected.

Conclusion: A greater incidence of dental caries has been linked to tobacco use. Those who smoked cigarettes had a higher DMFT score. They also had a higher caries index, which is an indicator of poor oral hygiene.

Keywords: Prevalence, Dental Caries, Smokeless Tobacco Users

INTRODUCTION

Tobacco has long been used as a recreational drug and as a staple in the diets of many people in rural parts of Asia and elsewhere.¹ Tobacco is the agricultural products of the leaves of the plant of the genus "Nicotiana," species "Nicotiana tabacum." The annual death toll attributable to tobacco use is 5 million. It is projected that by 2030, the global death toll will exceed 10 million, with 70% of those deaths occurring in low and middle-income nations. The smoked and smokeless forms of it are the most common.²

The most common methods of consuming tobacco include cigarettes, cigars, and pipes. Cigarettes are the most popular form of smoked tobacco in the world.³ About 1.1 billion adults (29% of the adult population) around the world currently consume tobacco products.⁴

Products that can be smoked without lighting a match are classified as smokeless tobacco (ST). There are two primary kinds, snuff and chew. Both moist and dry bolus forms of snuff exist, with the former being used as oral snuff and the latter typically breathed through the nostrils.⁵ The ST variant is the most common to be used in the buccal vestibule of the mouth during chewing. It has three distinct forms—loose leaf, plug, and twist—and goes by the name "chaw" or "quid."⁶ Both zarda (chewing tobacco flakes flavoured with sandalwood oil, slaked lime silver, herbs and saffron) and khaini (tobacco leaves mixed in slaked lime) are available commercially.⁷ Some people use smokeless tobacco products for hours at a time, holding them between their cheeks and gums or in the back of their throat. Tobacco is still widely smoked, especially in the form of cigarettes, beedis (locals smoking unfiltered cigarettes made from dried leaves) & hookahs. When people smoke cigarettes, it has negative effects on their gums and gum tissue, leading to periodontal disease.^{8,9}

More than two billion people around the world suffer from dental caries, making it the most common non-communicable disease in human history. Over time, caries can eat away at enamel and dentine, causing discomfort, infections, abscesses, and even sepsis in severe cases.¹⁰

When someone smokes cigarettes, their microbiome changes both in terms of composition and diversity. Smokers with

minimal caries revealed an elevated *S. mutans* count in subgingival plaque, while *Lactobacilli* were seen to be higher in smokers with moderate to high caries. Tobacco use is linked to an increase in caries prevalence because nicotine promotes bacterial growth and metabolic activity.¹¹ This could be linked to the degenerative effect of smoke on salivary glands, causing caries. There is evidence that the chemicals in smokeless tobacco products can reduce saliva's protective buffering ability, leaving the user more susceptible to dental caries.¹²

The relationship between cigarette consumption and tooth caries has generated various interpretations. Thiocyanate is a component of tobacco smoke, and it was previously thought that a larger concentration of this compound might reduce the risk of caries.¹³

There was a gap in knowledge on the rate of dental caries in tobacco users. While research into the state of oral health has been conducted in a number of other countries, the United States still lags far behind. As a result, researchers in Pakistan set out to determine whether or not there was a connection between cigarette and smokeless tobacco use and the incidence of dental caries.

MATERIAL AND METHODS

The study was conducted at Oral & Maxillofacial Surgery Department, Akhtar Saeed Medical & Dental College, Lahore from November 2021 to April 2022. Patient informed permission was obtained after the study protocol was reviewed and approved by the institution's ethics committee. When selecting candidates, a basic random sample method was used. The duration and frequency were meticulously recorded in a standard form. Conversely, patients who had a dental fluorosis diagnosis were not included in the study.

Like Group A, Group B consisted of 84 people who regularly used smokeless tobacco and had been doing so for at least 6 months. Black's classification of dental caries was used in conjunction with a comprehensive clinical examination. Catch with explorer, discontinuity of enamel surface, obvious cavitation, and soft base were used to make the diagnosis of decaying teeth. Patients were instructed to brush their teeth and gargle with water

before their examinations, after which a cotton swab was used to dry the teeth and note any instances of dental caries. We utilised an index called DMFT, where D stands for decaying teeth, M for missing teeth, F for filled teeth, and T for tooth health.

The information was collected using Microsoft Excel and analysed in SPSS 17.0. Chi-square t-test was employed for descriptive statistics. The cutoff for statistical significance was set at $P < 0.05$.

RESULTS

A total of 84 people participated in the study; half of them chewed smokeless tobacco of various kinds, while the other half did not. There were 42 chewers and 42 non-chewers in the age between 20 – 60 yrs. The age of the study subjects were divided into 7 age groups with 5 years of frequency distribution. Subjects of same age groups were selected in both the groups. 73.8% of the study subjects in both the groups were males and the remaining 26.2% were females. The occupation of the study subjects were divided into 4 groups which consisted of 52.4% of employed subjects, 23.8% of unemployed, 7.14% of students and 16.66% of agriculturist study subjects in both the groups. Table 4 shows the distribution of the study subjects according to DMFS scores. Among the chewers, 38.1% of study subjects were caries free (DMFS = 0) and 61.9% were caries affected (DMFS = 1 or more). In the non-chewers group, 9.5% were caries free and 90.5% were caries affected. Table 3 shows the comparison of the mean DMFS scores among chewers and non-chewers using student 't' test. There was a statistically significant difference in caries experience between the two groups with non-chewers having the mean DMFS score more than the chewers ($p = < 0.05$). And comparison of caries experience of the chewers with duration of their chewing habit. Although the mean DMFS score was found to decrease with increase in duration, there was no significant difference of caries experience between the two groups of duration.

Table 1: Distribution of study participants based on demographic factors

Demographic variables	Characteristics	Chewers	Non-chewers
Age	20-24	4 (9.52)	4 (9.52)
	25-29	9 (21.42)	9 (21.42)
	30-34	9 (21.42)	9 (21.42)
	35-39	7 (16.70)	7 (16.70)
	40-44	9 (21.42)	9 (21.42)
	45-49	1 (2.38)	1 (2.38)
	50+	3 (7.14)	3 (7.14)
Gender	Male	31 (73.80)	31 (73.80)
	Female	11 (26.20)	11 (26.20)
Occupation	Employed	22 (52.40)	22 (52.40)
	Unemployed	10 (23.80)	10 (23.80)
	Student	3 (7.14)	3 (7.14)
	Agriculture	7 (16.66)	7 (16.66)

Table 2: Distribution of study subjects according to their caries experience

Subjects	Total	Caries free individuals	Caries affected individuals
Chewers	42	16 (38.1)	26 (61.9)
Non-chewers	42	4 (9.5)	38 (90.5)

Table 3: Comparison of DMFS scores in chewers and non-chewers

Variable	Chewers		Non-chewers		t-value	P value	Signi.
	Mean	S.D	Mean	S.D			
DMFS	3.4762	3.8713	5.4524	3.7234	2.3844	0.0194	S

Table 4: Comparison of mean DMFS score in chewers with their duration of chewing habit

variable	Duration of chewing habit				t value	p value	Signi
	1 – 5 years		Above 5 years				
	Mean	S.D	Mean	S.D			
DMFS	3.4138	3.8593	1.3750	2.0658	1.4286	> 0.05	NS

Table 5: Distribution of study subjects according to Loss of Attachment scores.

Subjects	Total	LOA 0	LOA 1	LOA 2	LOA 3	LOA 4
Chewers	42	20 (47.6)	18 (42.9)	4 (9.5)	0 (0)	0 (0)
Non-chewers	42	24 (57.1)	17 (40.5)	1 (2.4)	0 (0)	0 (0)

LOA = Loss of attachment

DISCUSSION

Caries in the teeth are a complex condition caused by a number of factors, including but not limited to Cavitation is the result of the inorganic portion of the tooth's calcified tissue being demineralized and the organic substance being destroyed.

The study population consisted of 42 chewers and 42 non-chewers (Table-1 and Graph-1). Smokeless tobacco chewing habit was usually seen to start in the young age of 16-18 years. Similar reasons for the selection of the study subjects have been stated by Nagarajappa.¹⁴ The age of the study subjects were divided into age-groups of 5 years interval so that a few age groups in this study represent the WHO age-group of 35-44 years.¹⁵

There was an inconsistent relationship reported in the past between the smokeless tobacco chewing and dental caries. In the present study, the DMFS scores were significantly lower in chewers compared to non-chewers. This result was similar to the results of studies by Nidhi et al.¹⁶ and Nagarajappa et al.¹⁴ Nagarajappa et al. have discussed the probable reasons of low incidence of dental caries in betel with tobacco chewers as to be because of alkaline nature of lime and alkaloids, excessive salivary flow, physical action of chewing habit and elimination of caries susceptible pits and fissures by attrition, which is seen more in chewers.¹⁴

Both smokeless and smoked tobacco products had higher DMFT scores compared to controls in this study. Previous research by Rooban¹⁷ and Moller et al.¹⁸ shows that long-term tobacco use is associated with a smoothing out of the occlusal surfaces of teeth and a reduction in pits and fissures, both of which contribute to a reduction in tooth decay. Suggesting that thiocyanate in the saliva of smokers may have an impact similar to that of a caries inhibitor, a small but significant body of studies [36] supports this idea, which may explain why smokers tend to have lower DMFT scores. Our research suggests that citric acid presence and sweets in smokeless type of tobacco may be to blame for the high rates of caries reported by their users. Smokeless tobacco contains a variety of sweeteners and lime both of which can influence the local environment of the oral cavity.¹⁹

As dental caries are caused by a combination of factors, it is challenging to draw a connection between a single positive factor, such as cigarette smoking, and caries prevalence in this population. Our findings may be confirmed and validated by future prospective investigations of larger populations. The negative health effects of tobacco use can be mitigated through state-, community-, and healthcare provider-level public health programmes aimed at helping people quit smoking. Tobacco use and dependence can be reduced in both adults and children if public health policy shifts toward a tobacco-free society via economic, regulatory and educational initiatives.

CONCLUSIONS

A greater incidence of dental caries has been linked to tobacco use. Those who smoked cigarettes had a higher DMFT score. They also had a higher caries index, which is an indicator of poor oral hygiene. Dental caries are more common in people who use smokeless tobacco products. In high-risk communities, dentists are in a prime position to educate and inspire patients to reduce or quit their tobacco use.

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