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Association between Smoking and Dental Caries among People of Kolhapur District, Maharashtra, India

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INTRODUCTION: Smoking as a public health problem, harms one's general and oral well-being leading to increased morbidity and mortality. **AIM:** To find out the association between dental caries and smokers (current and past) with non-smokers among people of Kolhapur District, Maharashtra, India.

MATERIALS AND METHODS: The present cross-sectional study was conducted among 1366 (449 smokers, 440 past smokers and 447 non-smokers), and the patients were divided among three age groups (35-44, 45-60 and >60 years). Data was recorded using a pre-tested, pre-validated questionnaire recording the demographic details and modified DMFT index. The data was analyzed using t-test, calculation of Odd's Ratio (OR) and logistic regression was applied to find out association, if any using a licensed SPSS version 22.0.

RESULTS: It was revealed that the highest mean DMFT was seen among smokers (3.66±5.78) followed by past smokers (3.01±2.66) and non-smokers (3.01±2.66). Also, the maximum DMFT was seen among 35-44 years (3.82±2.4), which was found out to be significant as compared to past-smokers and non-smokers. Odd's ratio analysis revealed that as compared to non-smokers, current smokers and past smokers were 1.6 and 1.1 respectively. The multiple regression analysis revealed that significant difference was seen between smoking (.01) and age (0.02) with respect to DMFT.

CONCLUSION: Efforts are required by clinicians to educate people about the ill-effects of tobacco and provide tobacco cessation counselling to reduce the burden of morbidity and mortality caused by tobacco.

KEYWORDS: Tobacco, Caries, DMFT

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INTRODUCTION

The entire scientific community through proven research has pointed out the menace of tobacco consumption, also termed as "a public health nightmare" prevalent among people across the globe.¹ The CDC (Centers for Disease Control and Prevention) and WHO proclaim that tobacco use causes nearly 6 million deaths per year and if these trends continue at the same pace, this will cause more than 8 million deaths annually by the year 2030 with 70% of deaths occurring in the low economy countries.^{2,3,4}

The use of tobacco leads to various ill effects, namely cancer, low birth weight, pulmonary, cardiovascular, renal diseases and other dental diseases such as extrinsic stains, halitosis, gingivitis, periodontitis etc.⁵ In addition, second hand smoke and Environmental Tobacco Smoke (ETS) also affect the person around a smoker and thus, cause harm to an otherwise non-smoking population. In India, WHO estimates show that approximately 12% of global smokers belong to India with hukkah smoking more prevalent in rural areas and cigarette smoking more common in urban areas.⁶ Alarming, smoking prevalence is on the rise among the young population in India, according to Gavarsana et al. highlighting that 18% of boys in their respective

study sample of college students were found to be smokers.⁷

Dental diseases due to smoking hamper holistic oral health. One of the effects of smoking is dental caries which can progress to complete tooth decay if left unchecked. This condition is undesired and severely compromises the oral health status of the individual. Moreover, dental caries is often a disease that goes undetected until the patient complains of pain in his oral cavity. In India, where the prevalence of dental caries is reported to be 50-60%,⁸ certain researches report the prevalence to be as high as 82.4 % (urban)⁹ and 80%(rural)¹⁰ within the age group of 35-44 years. There have been various instances that link the presence of dental caries to smoking. While certain authors^{11,12} state that increased smoking results in lesser prevalence of caries which is mainly attributed to the presence of thiocyanate in saliva. On the contrary, Ludwick W et al. highlighted that amongst those who smoked more than 15 cigarettes per day, the result was an increase in the number of decayed, missing, and filled teeth.¹³

A thorough literature search around the geographic location of Maharashtra found little or no data associating the relationship between smoking and

dental caries.

Hence, the present study was conducted with the aim to find out the association between dental caries and smokers (current and past) with non-smokers among people of Kolhapur District, Maharashtra, India.

MATERIALS AND METHOD

The present cross-sectional study was conducted among 1366 (449 smokers, 440 past smokers and 447 non-smokers) people visiting a dental college in Kolhapur District, Maharashtra, India from 1st October 2017 to 31st December, 2017. Prior to conduction of the study, and ethical consent was obtained. The patients were assured of the confidentiality of their data and demographic details and DMFT status were entered in a pre-tested, pre-validated questionnaire by an assistant who stood close to the examiner during the study. The study was conducted by two standardized examiners and two recording clerks.

Inclusion criteria included smokers, past smokers and non-smokers aged more than 35 years. For inclusion in the past smoker's category, it was essential that the patient reported of quitting smoking for more than two years. Patients suffering from any systemic diseases were excluded from the study to avoid the presence of confounding factor(s). Sample size calculation was done by a certified statistician who estimated the sample as 396-400 people in each group. Therefore, to include maximum number of people in each group, the target sample was kept at 480 as to compensate for loss of data due to improper recording and various other factors. The study followed a convenience sampling and the modified DMFT index was used to record the DMFT (Knutson, Klein and Palmer, 1997) status of the patient. The examinations were carried out using a CPITN probe and mouth mirrors in the dental chair using artificial light. Descriptive statistics were applied and the t- test, calculation of Odd's Ratio (OR) and logistic regression was applied to find out association, if any using a licensed SPSS 22.0 software.

RESULTS

Table 1. depicts the characteristics of the study population. It was seen that while almost an equal number of people were seen in all the groups, the

youngest population was seen in the current smoker group (154, 34.3%) while the oldest were seen in the non-smoker group (217, 48.5%). The majority of the population in all three groups was males and the highest percentage of people in all the three groups reported brushing once a day. The highest number of people in the non-smoking group also reported brushing once a day (27,6%). Continuing the same trend, the maximum number of patients who visited a dentist before belonged to the non-smoker group (153, 30.2%).

The mean DMFT among current smokers, past smokers and non-smokers is shown in table 2. It was observed that the highest mean DMFT was seen among smokers (3.66 ± 5.78) followed by past smokers (3.01 ± 2.66) and non-smokers (3.01 ± 2.66), which was found to be significant ($p=0.02$). Another observation was the highest number of decayed, missing teeth that were seen in current smokers (3.81 ± 7.6 , 3.08 ± 4.3) with the lowest number of filled teeth (0.97 ± 1.2). An almost equal amount of missing teeth was seen among past smokers (2.65 ± 3.9) and non-smokers (2.55 ± 6.6) while past smokers showed the highest number of mean filled teeth (1.2 ± 2.1), with analysis showing a non-significant value.

Table 3 depicts the mean DMFT among the three age groups. It was observed that the highest mean DMFT was seen among age group of 35-44 years (3.82 ± 2.4), which was significant as compared to past-smokers and non-smokers. Odd's ratio analysis revealed that as compared to non-smokers, current smokers and past smokers were 1.6 and 1.1 respectively.

Given the multiplicity of factors affecting the DMFT index, multiple regression analysis was performed (Table 4). Significant difference was seen between smoking (0.01) and age (0.02). It was generally observed that dental caries increased with age among smokers.

DISCUSSION

The present study was done with the aim to find out the association between dental caries and smokers (current and past) and comparison with non-smokers among people of ? region. The study revealed that the mean DMFT in smokers was 3.66 ± 5.78 , 3.01 ± 2.66 in past smokers and 2.32 ± 1.81 among non-smokers.

The mean DMFT recorded among smokers of the present study (3.66 ± 5.78) is lower as compared to Aguilar-Zinser et al. (8.80 ± 6.56)¹⁴ and Badel T et al. (7.32)¹⁵ and in slight agreement with Rooban T et al.¹⁶ (4.09). Such variations can be attributed to differences in smoking practices (hukkah, bidi, kreteks etc.) and genetic makeup of individuals that differ across the globe. Also, the difference of mean DMFT among smokers and non-smokers was found to be significant ($p=0.02$) as supported by Badel T et al.¹⁵ and Shalini P et al.¹⁷ The results of Hart et al.¹⁸ disagreed and stated that no significant difference was seen among DMFT status of smokers and non-smokers.

The findings of the present study also revealed that Smokers were 1.6 times more likely to get caries as compared to non-smokers. This is in agreement to the study by Campus G et al. (OR:1.8).¹⁹ Other confounding factors that can lead to dental caries are related to dietary changes and exposure to fluoridated drinking water.

The present study is also prone to certain limitations. Firstly, both social desirability bias and recall bias among previous smokers regarding the time of their smoke-free period might have been under-reported. Secondly, the results of studies with convenience sampling is difficult to extrapolate for the general population. However, the aim of the present study was to provide an insight to the current status of dental caries among smokers in this region to render information for future studies.

CONCLUSION

To tackle the menace of tobacco smoking, it is important that a multisectoral approach be drafted and the people of Kolhapur District, Maharashtra, India should be educated, motivated and re-inforced regarding the ill effects of tobacco on general as well as one's oral health.

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LEGENDS

Variable	Current Smokers N=554 % or mean(SD)	Past smokers (>2 years)	Non-smokers
N	449	440	447
Age			
35-44 Years	154(34.3)	111(25.2)	126(28.2)
45-60 Years	179(39.9)	187(42.5)	104(23.3)
> 60 years	116(25.8)	142(32.3)	217(48.5)
Gender			
Males	440(98.2)	438(99.5)	440(98.4)
Females	9(1.8)	2(0.5)	7(1.6)
Tooth brushing frequency			
Once	387 (86.2)	286(65)	299(66.9)
Twice	61(13.6)	140(31.9)	121(27.1)
thrice	01(0.2)	14(3.1)	27(6)
Visit to dentist			
Yes	99(22.1)	112(25.4)	312(69.8)
Never	350 (77.9)	328(74.6)	135(30.2)

Table 1. Sociodemographic Profile of the Patients.

	Current smokers	Past Smokers	Non-smokers	P value, t-test
Mean DMFT	3.66±5.78	3.01±2.66	2.32±1.81	0.02*
Mean Decayed teeth	3.81±7.6	3.25±2.22	2.5±5.4	NS;
Mean Missing teeth	3.08±4.3	2.65±3.9	2.55±6.6	NS
Mean Filled Teeth	0.97±1.2	1.2±2.1	1.08±.67	NS

Table 2. The Mean DMFT among Current Smokers, Past Smokers And Non-Smokers

	35-44 Years	45-60 Years	< 60 years	t-test, p value
Smokers	3.82±2.4 (p=0.001)	2.99±4.4	2.23±8.2	0.001 OR: 1.6
Past smokers	3.34±3.77	3.0±1.1	2.31±3.1	NS OR:1.1
Non- smokers	1.08±1.25	2.6±7.1	1.97±2.6	NS -Constant

Table 3. Mean DMFT among the Three Age Groups

Independent variables	DMFT parameter estimate (SE)
Smoking Smokers(p)	0.3(0.05) 0.01
Age p	1.3(0.6) .02

Table 4. Multiple Regression Analysis Linking DMFT with Other Parameters (Non-significant values have been omitted)