STATISTICAL SURVEY OF RURAL AND URBAN POPULATION OF THANE DISTRICT FOR PUTATIVE DENTAL PLAQUE RISK FACTORS

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Abstract: The oral cavity is considered as a common route for the pathogens to enter the host body. The microorganisms found in dental plaque are dependent on the host immunity and several other factors. The present study was initiated to estimate the possible factors which are associated with the dental plaque formation in the people of Thane district from rural and urban region. Total fifty eight subjects from rural and urban region of the thane district were included for the study. The dental hygiene methods, food habits, addictions of tobacco, alcohol consumption and presence of diabetic conditions were factors considered for conducting a survey. The statistical analysis was carried out to find out the factors affecting the dental plaque formation among the rural and urban population. It was observed that among rural patients the factors related with the dental plaque were found to be tobacco addiction, drinking excessive tea and one time brushing the teeth. While in case of urban patients excessive sweet and tea consumption, vegetarian food were found to be the risk factors for dental plaque formation. This supports the hypothesis that the variation in food and drinking habits are major influencing risk factors for dental plaque formation.

Key words: Dental plaque, Statistical survey, Food habits, Tea, Tobacco addiction.

Introduction: From several years the challenge of dental plaque control has been accepted by the scientist worldwide. An efficient therapeutic strategy for dental plaque control and periodontal disease has not been established yet. Removing plaque has been carried out as the treatment for periodontal disease. In spite of this treatment, however, plaque development recurs. The currently available anti-plaque products are mostly antimicrobial compounds. Long-time therapy with antibiotics, however, may cause the appearance of resistant bacteria.

Similarly the control of dental plaque risk factors has been considered to be very important in prevention of the dental diseases. Thus it indicates the necessity of understanding the scenario of risk factors within the different population. The relationship of oral health status and general health is of integral importance in dental research.

The present study includes survey of rural and urban population of Thane district having dental plaque and periodontal infections. The district has diverse group of population comprising of different religions and food habits. Being a part of India's Economic Hub, people from urban regions of this district have stressful life style, which have considerable impact on their oral health. Hence along with food habits, oral hygiene and history of recent medication were also considered.

Materials and Methods:

Study population: Total 58 patients were selected for the study, 30 patients from urban region i.e. Dombivli and 28 patients from rural region i.e. Mulgaon and Kulgaon. From this survey an attempt was made to correlate the food habits, oral hygiene and their influence in

dental plaque formation. The data obtained from the patients from rural and urban region were compared with the type of biofilm and the type of clinical symptoms. Frequency of each individual parameter was calculated and it was checked for its relation with the dental plaque formation.

A questionnaire was designed which included gender, age, food habit, frequency of tea and sweet consumption, tobacco addiction and occurrence of diabetes. With the help of the survey, each factor and the occurrence of clinical symptoms like gingivitis and periodontitis were correlated.

Rural and urban population follows different diets and use different types of dental health care products. e.g. in urban population toothpaste, tooth powder were observed while rural population mainly uses charcoal powder. Also, frequency of cleaning the teeth affects the oral health status. Immuno- compromised persons with an old age and the presence of diabetes were also considered as important factors while conducting a survey. Intake of tobacco in any form (i.e. smoking and chewing) damages gingiva and provide easy access to bacteria.

Statistical Analysis:

This biostatistical analysis of the survey reports was carried out using software SPSS Statistic Version 17 [1, 2, 3]. The relatedness of each factor was estimated were by using cross tabulation and Chi-square tests. As the data reported in the survey was nominal and ordinal data rather than numerical data, it was necessary to calculate the contingency coefficient, uncertainty coefficient and the Lambda value. The contingency coefficient value near to 1 indicates relatedness and association between the factors. While the values of uncertainty coefficient and the Lambda represents the degree of the reduction in error by one of the individual factor value, where coefficient value near to one represent the high degree of the reduction in error. All these coefficients are measures of association based on chi-square. In case of chi-square test, significance value (i.e. p-value) was used to confirm the relatedness of each factor. P-value less than 0.05 i.e. 5% probability of error, were considered to be significant.

Results and Discussion: From rural region 17 patients (60.7%) were men while 11 patients (39.3%) were women. Most of the patients (i.e. 65%) belong to age group between 21 years to 40 years. Food habit of 16 cases (57%) were non vegetarian while 12 cases (43%) had vegetarian food habit. Also 27 patients (97%) were had habit of tea consumption, of which 50% patients were use to drink the tea more than 4 time per day. Incidence of tobacco addiction was found in 12 patients (43%) and only 6 patients (22%) were found diabetic. Sweet consumption was observed in 20 patients (75%), which were used to eat sweets more than one time per day.

Total 3 patients (10%) were using mouthwash for cleaning their teeth and 24 patients (85%) were brushing their teeth only once in a day using toothpaste. Although most of the patients had no symptoms, but gingivitis, pain, swelling in gingivum, bleeding gums were observed in the patients from rural region.

Biostatistical analysis was carried out to study the association of each factor with the type of dental plaque (biofilm formation). Table 1 represents the biostatistical analysis of the survey of the patients from urban region.

Based on the contingency coefficient value it was observed that “age, gender, food habit, diabetes, use of toothpowder, mouthwash” were least associated factor that influences the type of biofilm formation in patients from rural region.

High contingency coefficient value (0.56) and 0.026 Pearson Chi-square p value of factor “clinical symptoms” suggests that clinical

symptoms are closely associated and vary with the type of dental plaque. Hence the factors like "tea", "sweet", "tobacco" and "toothpaste" which showed little relatedness with type of dental plaque biofilm formation were again biostatistically analyzed by layering, where association of biofilm type , clinical symptoms with these factors were tested.

In urban area, 16 patients (53%) were men and 14 patients (47%) were women. All the cases were belongs to the age group more than 21 years.19 patients (63%) were vegetarian in food habit while only 11 patients were non vegetarians.

The proportion of tea consumers was lesser in patients from urban area. 24 patients (80%) were drinking the tea at least once in a day. 6 patients (20%) were diabetic and 16patients (53%) were eating sweets more than one time per day. Only 16% patients were found tobacco addicted. 23 patients (76%) were using toothpaste and brushing their teeth once in a day.

While none of the patients was found cleaning their teeth more than twice in a day. 14% patients from urban region were using toothpowder for dental cleaning. Mouthwash was not used by any of the patients from urban region. Although most of the patients were with no symptoms, but gingivitis, pain, swelling in gingiva, bleeding gums also observed in the patients from urban region. Unlike rural patients, patients from urban region have shown the occurrence of severe plaque formation, carious dentine, tooth mobility and dental caries.

To correlate the frequency data along with the dental plaque biofilm formation, biostatistical analysis was carried out to find out most related factor. The relatedness was decided with the reference of the Chi-square p value, contingency coefficient value, uncertainty coefficient value and lambda value. The p value less than 0.05 was considered as significant, indicating the 5% probability of error. The non vegetarian as well as vegetarian food habit both categories have shown the same degree of association with the dental plaque biofilm formation. As contingency coefficient values of both are similar. But if we consider uncertainty coefficient (0.3) and Lambda value (0.2), which shows less error reduction in vegetarian food habit category influences dental plaque biofilm formation. The risk factor giving significant results and the high contingency coefficient were considered to be related with the dental plaque formation.

Table no.1: Biostatistical analysis of the survey of the patients from rural region of Thane district.

	Patients from Rural region: **Kulgaon and Mulgaon**				Patients from Urban region: **Dombivli**			
Factor	**Pearson Chi-Square Significance p value**	**Contingency Coefficient value**	**Uncertainty Coefficient Value**	**Lambda Value**	**Pearson Chi-Square Significance p value**	**Contingency Coefficient value**	**Uncertainty Coefficient Value**	**Lambda value**
Age	0.422	0.067	0.276	0.235	0.32	0.068	0.359	0.346
Gender	0.7	0.073	0.004	0	0.65	0.1	0.007	0.053

Food habit	0.9	0.02	0	0	0.008	0.512	0.275	0.556
Tea	0.49	0.32	0.74	0.43	0.376	0.45	0.153	0.182
Sweets	0.513	0.32	0.069	0.08	0.904	0.1	0.006	0
Tobacco	0.592	0.302	0.059	0.05	0.099	0.35	0.171	0.182
Diabetes	0.36	0.171	0.29	0	0.413	0.18	0.03	0.08
Toothpaste	0.331	0.271	0.109	0	0.115	0.421	0.181	0.2
Toothpowder	NA				0.116	0.421	0.22	0.25
Mouthwash	0.96	0.009	0	0	NA			
Clinical symptoms	0.026	0.56	0.278	0.32	0.042	0.68	0.162	0.136

NA: No statistics are computed because factor was constant. All risk factors for the dental plaque formation and dental diseases were correlated with the help of Chi-Square test and Crosstabulation tests by using biostatical software SPSS v.17. The most significant results are highlighted with dark background

Tea consumption: Tea is the common hot beverage, available in rural as well as urban population. For most of the people tea is the regular part of their breakfasts, which has variable amount of sugar in it. Hence its frequency of consumption was considered as an important factor which can be linked with the development of dental plaque. Among rural patients frequency of tea consumption was found to be more than four times per day, indicating its closeness with dental plaque development (Table 2a). The p value found to be significant in case of two categories, i.e. 0.05 for "Four times per day" and 0.047 for "more than four times tea consumption per day". Other variables in this category showed insignificant p value (0.55) and high probability of error (59%), hence considered as unrelated category.

Among the tea drinkers, type of dental plaque biofilm and clinical symptoms are highly reflected by those who had habit of tea drinking four times and more than four times per day.

The urban patients belonging to the categories between "Twice per day" and "More than four times" was found to be more associated with the dental plaque formation. It intends that the tea consumption more than two times per day affects the dental plaque biofilm formation (Table 2b).

It also implies the possibility of existence of other cofactors along with the tea consumption, supporting dental biofilm formation.

Table 2a. Estimation of the related factors enhancing the dental plaque formation among Rural patients of Thane district

Factor	Pearson Chi Square p value	Contingency coefficient value	Uncertainty coefficient value	Lambda value
Tea				
No tea consumption	NA			
Once per day	0.59	0.552	0.244	0
Twice per day	NA			
Four times per day	0.05	0.59	0.5	0.417
> four times	0.047	0.6	0.529	0.67
Sweet				
None per day	0.118	0.616	0.6	0.571
Once per day	0.113	0.564	0.33	0.4
Three times per day	NA			
Four times per day	0.155	0.59	0.38	0.33
> four times	NA			
Tobacco				
No addiction	0.178	0.52	0.4	0.07
Once per day	0.157	0.7	1	1
Three times per day	NA			
Four times per day	0.08	0.7	0.68	0.67
> four times	0.223	0.7	0.73	0.67
Toothpaste				
Once per day	0.037	0.575	0.299	0.304

The significant results were considered as the related risk factors, hence further analyzed biostatistically.

Sweet consumption: From the readings, it was observed that patients who do not eat sweet, had come across the plaque formation, but those who had habit of eating sweet once or four times per day have similar degree of correlation (i.e. contingency coefficient value is around (0.60). Hence it can be stated that the patients from rural region were showing same tendency towards dental plaque formation, irrespective of their sweet consumption habit.

While for the urban patients from the category of excess sweet consumption have shown the high contingency coefficient value (0.77), indicating the strong relationship among the variables, supported by the uncertainty coefficient value and Lambda value. It also shows the least degree of error lowest p value

among all the categories in this factor.

Table 2b: Estimation of the related factors enhancing the dental plaque formation among urban patients of Thane district:

Factor	Pearson Chi Square p value	Contingency coefficient value	Uncertainty coefficient value	Lambda value
Food Habit				
Vegetarian	0.26	0.64	0.3	0.2
Nonvegetarian	0.16	0.66	0.364	0.42
Tea consumption				
None	0.248	0.5	0.34	0.33
Once per day	NA			
Twice per day	0.337	0.62	0.37	0.28
Three times per day	NA			
Four times per day	NA			
> Four times per day	0.405	0.6	0.39	0.2
Sweet consumption				
None	0.58	0.52	0.22	0.1
Once per day	0.44	0.5	0.22	0.33
Twice per day	NA			
> twice per day	0.15	0.77	1	1
Use of Toothpaste				
Once per day	0.59	0.457	0.154	0.071
Two times per day	0.22	0.07	0.73	0.607

Tobacco addiction:

As per the statistical analysis the patients having tobacco addiction, either smoking or chewing once or more than one time in a day are at equal risk of forming a dental plaque biofilm. A 0.7 coefficient value represents the strong relationship between the factors. The uncertainty coefficient and lambda values for categories “Four times per day” and “More than four times per day”, implied that the patients belonging to these categories are higher risk than others.

Dental hygiene:

The category of brushing their teeth once in a day is highly related to the factor dental plaque biofilm formation in patients from rural region. The lower p value (0.037) and high contingency coefficient (0.575) were obtained, indicating the most related category among all variables which influence the dental plaque formation.

The biostatistical analysis of data obtained from the patients of rural region indicates that, the incidence of plaque formation in rural area was higher in patients who brush their teeth only once in a day, smoke or chew tobacco and drinks excess tea i.e. four times or more than four times in a day.

The dental plaque biofilm formation in the patients from urban area is more frequent in those who brushes teeth only once in a day as suggested by the values of coefficient value, uncertainty coefficient and lambda value. High P value suggests that the category does not directly influence the dental plaque biofilm formation, but indirectly with other factors like food habit.

The statistical findings suggest that the dental plaque biofilm formation and the clinical symptoms among the patients of urban region is related with vegetarian food habit, brushing teeth only once in a day, excess of sweet consumption and excess of tea drinking habit.

The results obtained in this study are supported by various survey reports that have been previously published, which indicate that women and urban populations are affected more severely than men and rural people [2] [4]-10].

The study by Veranne et al also supports that the consumption of free sugars is more in urban areas than in rural population [2]. In china the national survey was carried out to study the oral health status [3]. It revealed the presence of many discrepancies in rural and urban area that are associated with dental problems. The association between the eating habits of overweight students with the development of dental plaque formation has been studied [11]. Preference of fatty foods over vegetables increases the possibility of development of dental plaque.

In urban area it was found that the occurrence of dental caries was more in Chinese young adolescent, indicating their susceptibility toward plaque formation. While old age people were more to carry dental problems in rural population. Also it was found that the caries experience was more in woman than men [3].

Microorganisms from water, coffee and wine drinkers were found, suggesting the impact of various drinks on the dental plaque persistence and its ecology [12].

Conclusion:

The dental plaque formation in oral cavity is thought to be affected greatly by factors such as distinct food habits of the people. It is also associated with the addictions such tobacco. These know factors found to play major role in development of dental plaque and its progress towards the carious symptoms.

In present study variation among the frequency of these factors between two distinct population was correlated with the occurrence of dental plaque.

It was observed that, among rural population the major factor associated with the plaque formation was poor attention towards dental hygiene. It was associated with excessive consumption of tea, which indicates increased uptake of sugar supporting oral bacteria to develop a dental biofilm.

Along with poor dental hygiene and tea consumption, tobacco chewing was found as related factor with the plaque development.

Among urban population eating vegetarian food, poor dental hygiene and excessive sweet consumption were the major factors found to be related with the dental plaque formation.

The current study revealed the risk factors for development of dental plaque formation among two distinct populations.

The comparative study explored poor dental hygiene, excessive tea consumption and tobacco addiction as key risk factors associated with

dental plaque formation.

This knowledge of the possible risk factors will help the community to prevent the further incidences of dental plaque development and healthy status.

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