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Influence of Sociodemographic Factors and Behavioral Habits on Periodontal Disease Status

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Abstract

Aim The aim of this study is to asses the influence of sociodemographic factors and behavioral habits on the periodontal disease status of the population in a selected region.

Methodology Data were collected using a self-structured questionnaire and clinical examination. Various sociodemographic variables such as gender, age, and socioeconomic status and behavioral habits, such as tobacco usage and oral hygiene practices, were factored into the questionnaire. Factors determining the socioeconomic status were education, work profile, and salary. The data were analyzed using Statistical Package for Social Sciences (SPSS 21, IBM Corp, 2015 Virginia, United States).

Results The total prevalence of periodontal disease was 94.6%, out of which 90% had gingivitis and 4.6% had periodontitis. Only 5.4% of the population was healthy. In the present study, sociodemographic factors such as socioeconomic status, age, and gender were found to have a positive correlation with the periodontal disease status.

Conclusion Since the treatment of periodontal disease is not simple and is expensive, it needs early intervention for its prevention.

Keywords
- gingivitis
- periodontal status
- socioeconomic status

Introduction

Changes in our knowledge of the etiology of periodontal disease, and the recognition of the potential importance of susceptibility factors as they affect initiation and progression of periodontal disease, have led to intense study of specific risk factors for periodontal diseases.[1] It was previously believed that the population was universally susceptible to periodontal disease.[2] Epidemiologic studies, such as the survey conducted by the National Centre for Health Statistics and those of the National Institute of Dental Research, along with additional studies, have created a mountain of data with regard to the various risk factors, indicators, and determinants of periodontal disease. However, the relationship and the association of these factors may vary in different geographical regions.[3]

Therefore, this epidemiological study was undertaken among the population of Greater Noida with the aim to assess the influence of the sociodemographic factors and behavioral habits on the periodontal disease status of the population in this region.

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Materials and Methods

This cross-sectional study was conducted in the Department of Periodontics to determine the influence of sociodemographic factors and behavioral habits on periodontal health status among representative sample population of Greater Noida. Subjects in the age group of 18 to 75 years coming to institutional outpatient department were included in the study. Subjects undergoing or undergone any form of periodontal therapy in last 3 months or pregnant and lactating women or subjects with any systemic illness were excluded from the study.

Tobacco smokers were classified based on Centers for Disease Control and Prevention (CDC)'s classification for lifetime smoking habits. Tobacco smokers were classified based on CDC's classification for lifetime smoking status: as nonsmokers who had never smoked a cigarette or smoked fewer than 100 cigarettes in their entire lifetime; as former smokers who had smoked at least 100 cigarettes in their lifetime, but currently did not smoke currently; and lastly, as current smokers.

Sample Size

Assuming that the prevalence of periodontal diseases as per the previous epidemiological studies conducted is 75 to 85%[2,3] in the Indian population and particularly in the western Uttar Pradesh region.[3] The sample size was calculated using formula:

$N=Z^2\alpha/2*P*(1-P)*D/E^2$

As per the formula, a minimum of 823 subjects were required to be assessed for finding the periodontal disease prevalence, where *P* is the prevalence, *E* is the precision, *Z*α is normal deviation, and *D* is design effect.

The subjects were classified into healthy, gingivitis, and periodontitis participants based on the modification of American Academy of Periodontology–Centers for Disease Control (AAP-CDC)'s classification of periodontal disease 2007.[4] As per their oral hygiene practices, subjects were classified into two groups. Group I consisted of subjects who used a toothbrush and dentifrice, and group II consisted of subjects who used other indigenous methods such as *daatun* and mango leaf.

Data Collection

Data were collected using self-structured questionnaire and clinical examination. A self-structured questionnaire was devised and subjects were asked about various sociodemographic variables such as gender, age, socioeconomic status (SES; monthly income, education, occupation) and behavioral habits such as tobacco usage and oral hygiene practices. The factors determining the SES were education, work profile, and salary. The subjects were classified based on the Modified Kuppuswamy's socioeconomic scale.[5] Convenience sampling was used for sample collection.

The clinical parameters taken were pocket probing depth (PPD), clinical attachment level (CAL), gingival index (GI),[6] and oral hygiene index (simplified) by Greene and Vermillion.[7] Means of PPD, CAL, and GI were calculated for each subject and used for the further statistical analysis.

Statistical Analysis

The data were analyzed using Statistical Package for Social Sciences (SPSS 21) (IBM Corp) for relevant statistical comparisons. One way analysis of variance (ANOVA) test was followed by Bonferroni's correction for posthoc comparison while comparing more than two groups on continuous, normally distributed variables. Multivariate logistic regression was performed for the calculation of odd's ratio, and chi-squared test was used for categorical variables. A level of $p < 0.05$ was considered statistically significant.

Results

A total of 1,023 subjects were recruited in the study. Periodontal status of female subjects was found to be better as lesser number of female subjects were having periodontitis ($p < 0.05$) when compared using chi-squared test (►**Table 1**).

After obtaining overall significant difference using one-way ANOVA test, on posthoc evaluation (Bonferroni's test) of all the groups, a statistically significant difference was found between the healthy and gingivitis group as well as the healthy to periodontitis group and gingivitis and periodontitis group with a *p*-value ≤ 0.001 that was statistically significant for mean GI, mean clinical attachment, mean pocket probing death w.r.t age, gender, SES, oral hygiene habits, and tobacco habits (►**Table 2**). According to gender, the odds ratio in gingivitis group for females was 1: 1.52 with *p*-value of 0.154 and in the periodontitis group, odds ratio was 1: 0.62 with a *p*-value of 0.300 that was not statistically significant.

Table 1 Periodontal status according to gender

Periodontal status	Male, *n* (%)	Female, *n* (%)	Total, *n* (%)	*p*-Value
Healthy	37 (6.1%)	18 (4.3%)	55 (5.4%)	0.014*
Gingivitis	529 (87.9%)	392 (93.1%)	921 (90.0%)	0.014*
Periodontitis	36 (6.0%)	11 (2.6%)	47 (4.6%)	0.014*
Total	602 (100.0%)	421 (100.0%)	1023 (100.0)	

Note: * highly significant

Table 2 Distribution of means ± standard deviation of GI, PD, and CAL based on periodontal status and factors influencing periodontal status

	Healthy			Gingivitis			Periodontitis		
	MGI	MCAL	MPD	MGI	MCAL	MPD	MGI	MCAL	MPD
Male	0.0270 ± 0.16440	1.192 ± 1.140	1.495 ± 1.410	1.29 ± 0.45	1.28 ± 0.16	1.96 ± 0.28	1.40 ± 0.36	1.61 ± 0.38	2.21 ± 0.53
Female	0.0556 ± 0.23570	1.095 ± 0.0576	1.516 ± 0.1525	1.02 ± 0.37	1.25 ± 0.15	1.90 ± 0.29	1.47 ± 0.36	1.76 ± 0.79	2.13 ± 0.47
Age (y)									
15–24	0.00 ± 0.00	1.16 ± 0.12	1.50 ± 0.25	0.87 ± 0.37	1.23 ± 0.16	1.81 ± 0.26	1.34 ± 0.20	1.59 ± 0.41	1.87 ± 0.34
25–34	0.00 ± 0.00	1.15 ± 0.13	1.49 ± 0.15	1.22 ± 0.40	1.26 ± 0.16	1.96 ± 0.29	1.29 ± 0.33	1.66 ± 0.60	2.11 ± 0.52
35–44	0.12 ± 0.35	1.17 ± 0.15	1.5 ± 0.19	1.28 ± 0.32	1.33 ± 0.14	2.04 ± 0.29	1.38 ± 0.31	1.59 ± 0.31	2.29 ± 0.40
45–74	0.50 ± 0.70	1.09 ± 0.12	1.49 ± 0.10	1.54 ± 0.40	1.28 ± 0.13	1.96 ± 0.22	1.78 ± 0.30	1.71 ± 0.55	2.40 ± 0.64
SES group									
Upper	0.00 ± 0.00	1.18 ± 0.11	1.45 ± 0.07	0.85 ± 0.16	1.16 ± 0.05	1.87 ± 0.17	1.16 ± 0.26	1.62 ± 0.00	1.76 ± 0.05
Upper middle	0.06 ± 0.25	1.19 ± 0.16	1.54 ± 0.26	1.06 ± 0.42	1.28 ± 0.20	1.86 ± 0.26	1.30 ± 0.38	1.55 ± 0.31	2.15 ± 0.61
Lower middle	0.05 ± 0.24	1.10 ± 0.08	1.47 ± 0.016	1.00 ± 0.46	1.23 ± 0.16	1.83 ± 0.23	1.48 ± 0.19	1.46 ± 0.26	2.23 ± 0.22
Upper lower	0.00 ± 0.00	1.17 ± 0.12	1.51 ± 0.20	1.44 ± 0.31	1.32 ± 0.14	2.07 ± 0.31	1.44 ± 0.40	1.79 ± 0.71	2.18 ± 0.60
Lower	–	–	–	1.35 ± 0.05	1.26 ± 0.07	1.76 ± 0.20	1.78 ± 0.65	2.38 ± 0.24	2.68 ± 0.89
Tobacco habits									
Cigarette	0.33 ± 0.57	1.28 ± 0.08	1.43 ± 0.12	1.51 ± 0.36	1.29 ± 0.10	2.02 ± 0.28	1.70 ± 0.33	1.65 ± 0.52	2.23 ± 0.64
Pan masala	0.00	1.00	1.42	1.25 ± 0.43	1.27 ± 0.08	2.02 ± 0.30	1.32	2.21	2.05
Khaini	0.00	1.27	1.14	0.97 ± 0.43	1.39 ± 0.22	1.86 ± 0.32	1.26 ± 0.28	1.49 ± 0.19	2.04 ± 0.37
Oral hygiene aids									
Used	0.03± 0.18	1.16 ± 0.20	1.50 ± 0.20	1.17 ± 0.44	1.27 ± 0.16	1.93 ± 0.28	1.41 ± 0.35	1.64 ± 0.50	2.19 ± 0.51
Not used	–	–	–	1.00	1.99	1.07	–	–	–

Abbreviations: CAL, clinical attachment level; GI, gingival Index; MCAL, mean clinical attachment level; MGI, mean gingival index; MPD, mean pocket probing depth; SES Group, socioeconomic status group.

Table 3 Multivariate analysis for odd's ratio by least significant difference (logistic regression)

	Gingivitis		Periodontitis	
	Odds ratio	*p*-Value	Odds ratio	*p*-Value
Gender				
Male	1	–	1	–
Female	1.52	0.154[a]	.62	0.300[a]
Age (y)				
15–24	1	–	1	–
25–34	4.15	0.012[b]	5.26	0.007[b]
35–44	6.30	0.006[b]	8.25	0.003[b]
45–74	17.46	0.023[b]	24.75	0.001[b]
Socioeconomic status				
Upper	1	–	1	–
Upper middle	0.93	0.879[a]	2.84	0.237[a]
Lower middle	2.27	0.080[b]	2.88	0.229[a]
Upper lower-lower	2.68	0.039[b]	4.20	0.101[a]
Smoking tobacco habits				
Group A (users)	1	–	1	–
Group B (nonusers)	1.32	0.014[b]	4.45	0.008[b]
Tobacco products used				
Cigarette	1	–	1	–
Pan masala	4.42	0.013[b]	4.32	0.045[b]
Khaini	0.42	0.436[a]	1.85	0.667[a]
Gutkha	0.71	0.750[a]	16.66	0.009[b]
Oral hygiene practices				
Group I (Subjects using tooth brush and dentifrice)	1	–	1	–
Group II (Subjects using other indigenous methods like datum or mango leaf)	2.26	0.012[b]	3.21	0.023[b]

Note: Least significant difference (logistic regression) 95% confidence interval
[a]Statistically insignificant.
[b]Highly significant.

Table 4 Association between socioeconomic status and history of smoking

	Socioeconomic status (odds ratio)			
	Upper	Upper middle	Lower middle	Upper lower and lower
History of smokeless tobacco use	0.42*	0.54*	0.77*	0.87*
History of smoking tobacco use	0.22*	0.34*	0.67*	0.65*
No history of tobacco use	1.00	1.00	1.00	1.00

* highly significant

According to age, the odds ratio for gingivitis and periodontitis group was statistically significant. For the last statistical analysis, the upper lower and lower class were clubbed together. According to the socioeconomic scale, the odds ratio in gingivitis group and periodontitis group was not statistically significant. Based on the tobacco usage, the odds ratio in the gingivitis group for Group B when compared with Group A was 1:1.32 (*p*-value = 0.014), 1:4.42 (*p*-value = 0.013) for pan masala, 1:0.42 for khaini (*p*-value = 0.436), 1:0.71 (*p*-value = 0.750) for gutkha (►**Table 3**). Similarly, the odds ratio in the periodontitis group for Group B when compared with Group A was 1:4.45 (*p*-value for 0.008), 1:4.32 (*p*-value = 0.045) for pan masala, 1:1.85 (*p*-value = 0.667) for khaini, and 16.66 (*p*-value = 0.009) for gutkha. For the oral hygiene

practices, the odds ratio for subjects in Group II when compared with Group I was 1:2.26 (p-value = 0.012) in the gingivitis group and 1:3.21 (p-value = 0.023) for the periodontitis group. Subjects with upper lower and lower SES were having the more history of smokeless tobacco use than nonsmoking tobacco (►**Table 4**).

Discussion

Most of the periodontal diseases can be reversed in early stages; however, if they are not treated and progress, they can become painful, irreversible, and their complications usually remain for lifetime.[8]

The total prevalence of periodontal disease was 94.6% out of which 90% had gingivitis and 4.6% had periodontitis. Only 5.4% of the population was healthy. In the present study, sociodemographic factors such as SES, age, and gender were found to have a positive correlation with the periodontal disease status. The results of the present study were corroborated with a study done by Verma et al[9] in another semirural region of Uttar Pradesh that also showed similar prevalence of 90% of periodontal diseases.

Multivariate analysis to compare the genders with respect to gingivitis revealed a greater odds ratio of 1:1.52 for females than males, although it was not statistically significant (p-value = 0.154). According to Aletaha et al,[10] the decreased odds ratio for periodontitis found among females could be attributed to their increased treatment seeking behavior. Higher gingivitis scores could be attributed to the fact that there are gingival inflammatory conditions found in females that are related to hormonal conditions.

The results of this study show a direct correlation between periodontal status and SES with a p-value less than 0.001 (statistically significant). Backlund et al[11] said that analysis of the shape of socioeconomic-health gradient can lead to greater theoretical clarity about the production of health inequalities.

In this study, an attempt was made to evaluate the influence of tobacco on the periodontal status. Both smokeless and smoke tobacco users were clubbed into one group and nontobacco into another. The results of our study revealed a positive correlation between tobacco and periodontal status (p-value < 0.05). These results were in corroboration with an overwhelming body of data from multiple cross-sectional and longitudinal studies conducted by Kamath et al,[12] which have demonstrated that pocket depth and clinical attachment loss were more prevalent and severe in patients who were tobacco users compared with nontobacco users. In the present study, we found that out of 1,023 subjects only one subject (0.1%) did not practice any oral hygiene method whether it is tooth brushing or indigenous method. Keeping this in view, the subject was not assessed for data interpretation.

It has been documented that that occasional tooth brushing is associated with increased severity and extent of periodontal inflammation. On the other hand, periodontal inflammation and bleeding can affect the ability to clean the teeth effectively.

Since the effect of various adverse habits on GI, CAL, and probing depth was minimal, the confounding and modifying effect of smoking considered to be a risk of periodontal disease becomes limited.

Limitations

Despite larger sample size, a major limitation of the present study is underestimation of healthy subjects and overestimation of diseases because of convenience sampling design of the study.

Conclusion

To conclude the present study, it was seen that there was a statistically significant relation between the sociodemographic factors and behavioral habits on the periodontal status of the population. Certain striking associations were noted like an increase in the periodontal disease severity with decreasing socioeconomic level, old age associated with periodontal disease, and the gender bias shown by periodontal disease. Tobacco usage and use of indigenous aids for maintaining oral hygiene go hand-in-hand in causing periodontal disease.

A new generation of studies is needed not only to identify other potential risk factors for periodontal diseases but also to determine the effective interventions directed at modulating important risk factors and to assess their effects on the initiation and progression of periodontal disease, and their effects on periodontal therapy. Hence, the health policies by the government can be designed accordingly so as to maximally effect the different strata of the society.

Conflict of Interest

Nil.

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