



Individual Sociodemographic and Oral Health Related Behavioural Variables Influencing Periodontal Treatment Needs in Adults: A Cross Sectional Study.

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KEYWORDS

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ABSTRACT:

Introduction: Oral disease is a major health concern which is highly prevalent in low socioeconomic sectors and developing countries. In depth knowledge of importance of oral hygiene and its effect on overall systemic health has become the need of hour. This study focuses on need of dental awareness and its correlation with treatment needs.

Objectives: 1. To evaluate the impact of socio-demographic variables on periodontal treatment needs. 2. To evaluate the impact of socio-economic status on periodontal treatment needs. 3. To evaluate the impact of oral health behavioral factors on periodontal treatment needs. 4. To evaluate the correlation of with periodontal risk assessment model with treatment needs.

Methods: The cross-sectional study was carried out on the patients from out patient department ITS Dental college Greater Noida with an informed consent. 300 Subjects were evaluated for a period of 9 months based on AAP classification 2017. A Questionnaire was distributed to evaluate the dental awareness amongst the patients. The modified Kuppuswamy's index is used to measure the socio economic scale in urban and rural areas. Parameters such as calculus index, pocket probing depth, cpitn index were evaluated and compared with kuppuswamys index. ANOVA, Chi-Square test, Fischers Exact test is used to compare the demographic variables and oral health behaviour.

Results: Results have shown that income occupation and education has a high impact on oral health and its treatment needs. A significantly better Oral hygiene was seen to be in individuals with higher income and good socioeconomic background.

Conclusions: The study clearly highlights the fact that lack of awareness and knowledge of periodontal problems and their associated effect on overall health has a direct correlation with negligence of patients towards periodontal treatment.

1. Introduction

Oral health is an aperture to overall health problems. Individual care and perception of oral health has a vital role in periodontium as well as systemic health. Socio-demographic and socio-economic sectors has become a risk factor for periodontal disease. Periodontal disease is a multifactorial disease affecting supporting tissues of teeth with a high prevalence in the world especially the developing countries.¹ Factors like income, occupation, education, unemployment, social class,

living conditions and race, lack of government funding and policies to provide sufficient oral health care workers are important basic parameters that limit the implementation of proper oral hygiene practices in these countries.¹ This has been documented by the WHO which has had a substantial influence on global public health. The FDI (World Dental Federations General Assembly) also strongly supports oral health education promotion.¹In India 90% to 95% increased prevalence of the periodontal disease is seen in different population groups classified as rural, semi-urban, urban



and metropolitan.² Studies revealed that rural populations mostly use traditional therapy when they suffer from dental problems rather than pursuing professional treatment (Diouf et al.).² Borrell et al. conducted a study with the North American population and found that socioeconomic conditions influence the prevalence of periodontitis among elderly people.³ There are studies that reveal that inequality among ethnic groups and difficulties which are faced by non-white individuals in pursuing dental care facilities.^{3,4} Illiteracy prevailing in these developing countries affects the individual in all areas of their life. In most of the developing countries, undereducated people are likely to have more unhealthy practices like tobacco chewing, improper tooth brushing, use of traditional items to maintain oral hygiene such as charcoal, 'datoon' (twigs of the 'neem' plant), and salt. Oral health education is necessary to be provided in schools and dental setups situated in different parts of these

The modified Kuppuswamy scale (1976) is commonly used to measure socioeconomic status (SES) in urban and rural areas. The scoring criteria include the education and occupation of the Family Head along with income per month of the family. These scales help in research to find out the socio-economic status of a population. Socio-demographic variables such as gender, age, and nationality of the study population were also considered to be of interest in periodontal treatment needs. Various epidemiological investigations have been a precursor to investigating the role of factors other than Dental Plaque to be modifying the periodontal disease process and thereby affecting the treatment needs of particular subsets of the population.

This study aims to evaluate the impact of socio-demographic and oral health behavioural factors on periodontal treatment needs.

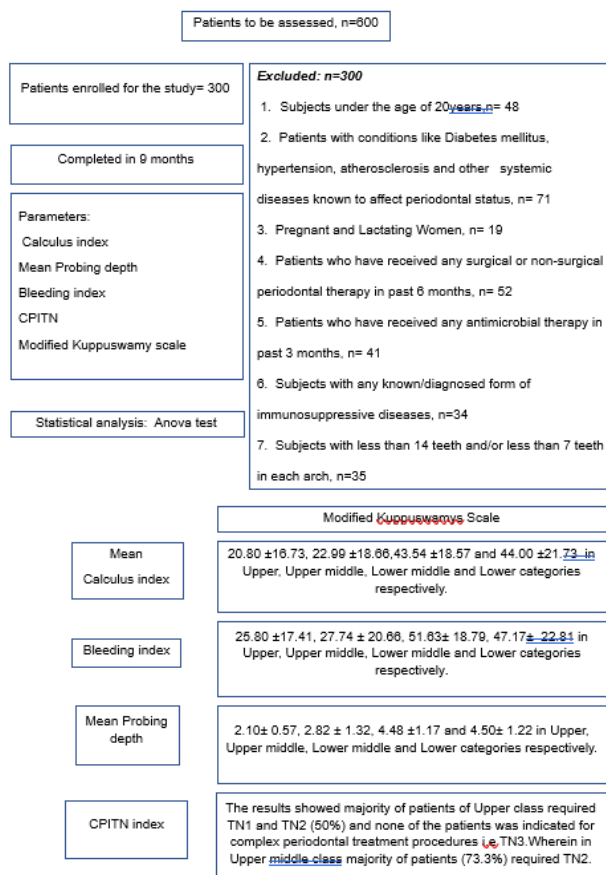
2. Materials and Methods

Description of Participants

The cross-sectional study included a total of 300 subjects of both genders reporting to outpatient department of ITS Dental College Greater Noida, to evaluate the impact of socio-demographic, socio-economic and oral health behavioral factors on periodontal treatment needs. The study was duly approved by Institutional Ethics Committee Reference No. IEC/PERIO/11/20.

Data Collection

300 Systemically healthy individuals aged between 20-75 years based on W.H.O criteria of age groups with permanent dentition with no missing teeth excluding third molars willing to give informed consent were incorporated in the study. Patients were included and grouped based on AAP classification 2017.⁸ Patients with conditions like Diabetes mellitus, hypertension, atherosclerosis and other systemic diseases and immunosuppressive diseases known to affect periodontal status, Pregnant and Lactating Women or those who have received any surgical or non-surgical periodontal therapy or antimicrobial therapy in past 6 months were excluded from the study. (Flowchart 1)



developing countries to maintain the expectancy of life and combat periodontal disease.³



Flowchart 1: STROBE chart of study design

QUESTIONNAIRE

[Standardized and Validated]

Q1. How frequently do **you** visit a dentist?

- 1) Once every year
- 2) Twice every year
- 3) Every month
- 4) Never

Q2. Do you think **you** should regularly visit a dentist?

- 1) Yes
- 2) No

Q3. Reasons why **you** avoid regular visits to dentist?

- 1) Money issues
- 2) Time constraint
- 3) You feel it is not necessary

Q4. Common reasons for **your** visit to dentist?

- 1) Pain
- 2) Regular check up
- 3) Cleaning
- 4) Denture/Prosthesis
- 5) Any other

Q5. What do **you** use to clean teeth?

- 1) Toothbrush and tooth paste
- 2) Neem stick
- 3) Finger only
- 4) Just rinse with water
- 5) Any other

Q6. How many times do **you** brush?

- 1) Once daily
- 2) Twice daily
- 3) Never

Q7. Any other cleaning aid used by **you**?

- 1) Yes
- 2) No

If yes which cleaning aid?

Probing Depth, CPITN - Community Periodontal Index

Q8. Do **you** use any interdental cleaning aids?

- 1) Yes
- 2) No

If yes which interdental cleaning aid?.....

Behavioural HabitQ9. Do **you** use any form of tobacco? Yes/No

If yes, which form

- | | |
|-------------------------|--------------------------|
| Cigarette/Bidi/Hookah | <input type="checkbox"/> |
| Pan masala with tobacco | <input type="checkbox"/> |
| Khaini | <input type="checkbox"/> |
| Gutkha | <input type="checkbox"/> |

How many times in a day?.....

How long **you** have been using?.....

Q10. Do you consume Alcohol? Yes/No

Clinical Assessment

The subjects eligible to participate in the study according to inclusion criteria were thoroughly examined clinically and a detailed case history was recorded individually. The Clinical parameters assessed for each patient were: Gingival Bleeding Index(Ainamo and Bay 1975)(Fig 1), Calculus Surface Index by (Ramfjord 1961), Pocket Probing Depth, CPITN - Community Periodontal Index of Treatment needs (Ainamo J. Barmes , Beagrie G, Cutress T, Martin J, Sardo Infirri J. 1982) (Fig 2), Deans Fluorosis Index (Trendly H dean 1942), Modified Kuppuswamy scale (Kuppuswamy in 1976), Periodontal Risk Assessment Model (Lang and Tonnetti 2003). Each patient was required to fill the questionnaire. (Fig 3)

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Statistical tests to be used - ANOVA, Chi -Square test, Fischers Exact test , multifactorial logistic regression analysis. The Chi-square test, Fisher's Exact Test, and an analysis of variance (ANOVA) test for comparisons of demographic variables and oral health behaviour between the groups. The effect of socio-demographic variables and oral health behaviour on the periodontal treatment need will be assessed by using multifactorial logistic regression analysis.



Fig 1 A picture of 20years Female patient depicting Bleeding on Probing



Fig 2 CPITN probe marking ≥ 8.5 mm depicting presence of Sub-gingival Calculus.

3. Results

A cross-sectional study was done in 300 patients reporting to outpatient department of ITS Dental College Greater Noida, to evaluate the impact of socio-demographic, socio-economic and oral health behavioral factors on periodontal treatment needs. The study included 188 (62.7%) males and 112(37.3%) females with the mean age being 36.32 ± 9.62 . As per kuppuswamy's index 3.3% belonged to the upper group, 48.7% belonged to upper middle group, 46% belonged to lower middle, 2% belonged to lower group and none of the patients fallen into the category of upper lower. So, this category was omitted in presentation of the results. The data collected was statistically interpreted and showed no statistical difference in the distribution of demographic data when compared with different groups of kuppuswamy's index. (Table1)

Table 1: Demographic Distribution of the participants

Demographics		Kuppuswamys Index (n=%)				p value
		Upper 10 (3.3%)	Upper Middle 146 (48.7%)	Lower Middle 138 (46.0%)	Lower 6 (2.0%)	
Age (Years) Mean \pm SD		37.40 \pm 10.06	36.42 \pm 10.04	36.15 \pm 9.33	36.17 \pm 7.83	0.927
Gender	Male	6 (60.0%)	96 (65.8%)	80 (58.0%)	6 (100.0%)	0.134
	Female	4 (40.0%)	50 (34.2%)	58 (42.0%)	0 (0.0%)	

The results exhibited that the mean calculus index scores was 20.80 ± 16.73 , 22.99 ± 18.66 , 43.54 ± 18.57 and 44.00 ± 21.73 in Upper, Upper middle, Lower middle and Lower categories respectively. Calculus scores were statistically higher in Lower and Lower middle groups as compared to Upper and Upper middle groups. ($p = <0.001$) (Table 2) .

The bleeding index scores depicted the mean values as 25.80 ± 17.41 , 27.74 ± 20.66 , 51.63 ± 18.79 , 47.17 ± 22.81 in Upper, Upper middle, Lower middle and Lower categories respectively. The percentage of bleeding scores were significantly higher in Lower middle group when compared to Upper middle group. ($p = <0.001$). (Table 2)

Dean Fluorosis index showed there was no significant difference between the various groups in terms of distribution of the Index group when compared with Kuppuswamy's groups. ($\chi^2 = 5.215$, $p = 0.720$). (Table 2)

Table 2: Comparison of Kuppuswamy's index with Bleeding, Calculus and Dean's Fluorosis index

Parameters		Kuppuswamys Index (n=%)				p value
		Upper	Upper Middle	Lower Middle	Lower	
Bleeding (%) Mean \pm SD		25.80 \pm 17.41	27.74 \pm 20.66	51.63 \pm 18.79	47.17 \pm 22.81	<0.001
Calculus (%)		20.80 \pm 16.73	22.99 \pm 18.66	43.54 \pm 18.57	44.00 \pm 21.73	
Dean Fluorosis	Absent	5 (50.0%)	72 (49.3%)	62 (44.9%)	2 (33.3%)	0.720
	Mild	2 (20.0%)	50 (34.2%)	43 (31.2%)	3 (50.0%)	
	Moderate	3 (30.0%)	23 (15.8%)	30 (21.7%)	1 (16.7%)	
	Severe	0 (0.0%)	1 (0.7%)	3 (2.2%)	0 (0.0%)	

The Mean Pocket Probing Depth was 2.10 ± 0.57 , 2.82 ± 1.32 , 4.48 ± 1.17 and 4.50 ± 1.22 in Upper, Upper middle, Lower middle and Lower categories respectively. Mean Probing scores were statistically higher in Lower and Lower middle group when compared to Upper and Upper middle groups. ($p = <0.001$). (Table 3)



Table 3: Comparison of Kuppuswamy's index with Probing depth

Mean Probing Depth (mm)	Kuppuswamy's Index				p value
	Upper	Upper Middle	Lower Middle	Lower	
Mean ± SD	2.10±0.57	2.82 ± 1.32	4.48 ±1.17	4.50±1.22	<0.001

CPITN index: The results showed majority of patients of Upper class required TN1 and TN2 (50%) and none of the patients was indicated for complex periodontal treatment procedures i.e TN3. Wherein in Upper middle class majority of patients (73.3%) required TN2. (Table 4)

Table 4: Comparison of Kuppuswamy's index with CPITN index

CPITN	Kuppuswamy's Index				P Value
	Upper	Upper Middle	Lower Middle	Lower	
TN1	5 (50.0%)	22 (15.1%)	2 (1.4%)	0 (0.0%)	<0.001
TN2	5 (50.0%)	107 (73.3%)	70 (50.7%)	2 (33.3%)	
TN3	0 (0.0%)	17 (11.6%)	66 (47.8%)	4 (66.7%)	

In Lower middle class and Lower class only 2% and 0% patients respectively required TN1 whereas for majority of patients TN2 and TN3 was indicated. The need for TN3 was significantly higher in Lower class group when compared to the Upper class group ($p = <0.001$). (Table 5)

Table 5: Comparison of PRA model with CPITN and Kuppuswamy's index

Kuppuswamy's Index	PRA Model			P Value	
	Low Risk	Moderate Risk	High Risk		
Upper	3 (11.5%)	5 (3.2%)	2 (1.7%)	0.124	
Upper Middle	14 (53.8%)	82 (52.2%)	49 (42.2%)		
Lower Middle	9 (34.6%)	67 (42.7%)	62 (53.4%)		
Lower	0 (0.0%)	3 (1.9%)	3 (2.6%)		
CPITN	TN1	12 (46.2%)	11 (7.0%)	6 (5.2%)	<0.001
	TN2	8 (30.8%)	118 (75.2%)	57 (49.1%)	
	TN3	6 (23.1%)	28 (17.8%)	53 (45.7%)	

4. Discussion

Periodontitis is a multifactorial disease and retention of calcified dental plaque on hard surfaces of the teeth commonly known as dental calculus is a contributing factor to this disease. Gingival bleeding is a sign of inflammation and undergoing periodontal disease. The local cause of inflammation is the build-up plaque causing frequent micro-ulcerations in the epithelium that lines the soft-tissue wall of a periodontal pocket. The pathologic consortium behind the disease is group of red complex bacteria (*P.gingivalis*, *T.denticola* and *T.forsythia*) which creates a chronic polymicrobial challenge to the local host tissues triggering the progression of soft and hard tissue destruction which defines periodontitis. In the present study the mean calculus index scores was found to be highest in Lower middle group when compared to Upper and Upper middle groups and mean bleeding index scores which remains highest in Lower middle group compared to the Upper middle group. The mean probing scores were also significantly higher in Lower and Lower middle group when compared to Upper and Upper middle groups.

CPITN index was invented for rapid and practical assessment of various periodontal treatment needs. CPITN probe helps in easy detection of sub-gingival calculus which helps in diagnosis and assessment of the periodontal therapy. Our study results showed majority of patients in Upper class required limited treatment needs (TN1 and TN2) and none of the patients were indicated for complex treatment procedures wherein a significantly higher number of Lower and Lower middle group individuals showed requirement of complex periodontal surgical procedures (TN3).

The possible cause for higher deposits in lower middle group population may be attributed as due to deprivation from professional dental care facilities, rate of illiteracy as well as income inequality in lower socio-economic status group and use of traditional methods for cleaning of teeth which has lead to increase in local risk factors of periodontal disease.

This evidence followed similar outcomes previously reported in the scientific literature that showed that periodontal disease are potentially associated with socioeconomic factors by Almerich-Silla, Almiñana-



Pastor, Bellot-Arcís & Montiel-Company, 2017, Doddamani AS et al (2010), Addy M et al (1990), Qureish Taani Dafi S (1996), Sogi G.M et al (2002). Similar studies by Goes et al 2012 and Barros et al 2007 also reflected low coverage of oral health due to income inequality as well as educational status of rural population in underdeveloped countries.^{24,25,26,27,28} The results of our study goes in accordance to the studies done by Chandra Shekar et al (2011), Almerich et al (2017) where there is a significantly higher percentage of lower class people affected than the upper with higher scores of bleeding indices. This manifests poor oral hygiene maintenance and lack of awareness in lower socioeconomic group of people.²⁹

On contrary, Persson et al (2004) observed higher levels of bleeding on probing cannot be the predictor of disease progression in lower socioeconomic group of people.³⁹

The study results commensurates with similar studies done by Grover et al (2015), Singh et al(2005), Gupta et al. and Diouf et al (2013) where it is reflected that there was not much need of TN1 in Upper socioeconomic groups and more need of TN2 /TN3 in rural population when compared to the other groups.^{2,34,35}

Questionnaire based studies have always been useful in determining the importance given to oral health care by individuals and their level of knowledge. A total number of 10 questions were included in the present study to evaluate the self-reported cases.

Our study showed a maximum number of participants 67.3% had visited dentist once a year and only about 28% of participants who visits dentist twice a year. A larger group of population 43.7% avoided visit to dentist due to monetary issues and 54.3% of population neglected due to time constraint. As it is already seen that about 46% of participants belonged to Lower middle group in our study. Our study showed about 70% of people brushing twice daily and about 29% of people brushing once daily. As about 48.7% of people belonged to the upper group in our study.(Table 6) This clearly indicates the lack of awareness and limited resources in the population group. This evidently reflects that rural population are deprived of oral health care facilities due to lack of professional health care in remote areas, lack of transportation, low

level dental education and low level income. Smoking is a known risk factor of periodontal disease. Our study showed a majority group of participants 81.2% used Cigarette/Bidi. The possible cause may be due to lack of knowledge regarding the harmful chemicals in these products, low income and stress which leads to dependency in these products. These carcinogens can cause harmful effects to the systemic health as well as to the periodontium due to which there could be down regulation of tissue response system effecting the fibroblast function, migration of neutrophils suppressing the oxidative respiratory bursts initiating the inflammatory response.^{44,45,46}

This study also has some limitations which should be acknowledged. As the present study was cross-sectional in nature the results of the study cannot be generalized with other geographic areas, as there are differences in health and hygiene practices, culture, lifestyle and income variability. So, a longitudinal study will give much more strength and evidence with a larger sample size. As it was a questionnaire based study, there must be bias in the results with regard to self-perception of oral health and habits.

Questionnaire	Mean ± SD Median (IQR) Min-Max Frequency (%)
Q1. How Frequently Do You Visit A Dentist	
Once	202 (67.3%)
Twice	84 (28.0%)
Every Month	6 (2.0%)
Never	8 (2.7%)
Q2. Do You Think You Should Regularly Visit A Dentist (Yes)	168 (56.0%)
Q3. Reasons Why You Avoid Regular Visits To Dentist	
Money Issues	131 (43.7%)
Time Constraint	163 (54.3%)
Not Necessary	6 (2.0%)
Q4. Common Reasons For Your Visit To Dentist	
Pain	37 (12.3%)
Regular Check Up	204 (68.0%)
Cleaning	51 (17.0%)
Denture Prosthesis	0 (0.0%)
Others	8 (2.7%)
Q5. What Do You Use To Clean Teeth	
Toothbrush+Toothpaste	277 (92.3%)
Neem Stick	18 (6.0%)
Finger Only	0 (0.0%)
Rinse With Water	1 (0.3%)
Any Other	4 (1.3%)
Q6. How Many Times Do You Brush In A Day Is It Used	
Once	87 (29.0%)
Twice	210 (70.0%)
Never	3 (1.0%)
Q7. Any Other Cleaning Aid Used By You (Yes)	254 (84.7%)
Q8. Do You Use Any Interdental Cleaning Aids (Yes)	93 (31.0%)
Q9. Do You Use Any Form Of Tobacco (Yes)	112 (37.3%)
Q9a. If Yes On Q9. Any Form of Tobacco is Used	
Cigarette/Bidi	91 (81.2%)
Paan/Gutkha/Khaini	21 (18.8%)
Q9b. If Yes On Q9. How Many Times In A Day Is It Used	2.54 ± 0.79 2.00 (2.00-3.00) 2.00 - 6.00
Q9c. If Yes On Q9. How Long Has Tobacco Been Used (in Years)	10.39 ± 3.38 10.00 (8.00-12.00) 3.00 - 20.00
Q10. Do You Consume Alcohol (Yes)	118 (39.3%)

Table 6: Distribution of participants according to various responses for questions asked on oral hygiene practices and oral health information



Conclusion

This study has emphasized on importance of socioeconomic and sociodemographic factors on periodontal treatment needs. The findings of the present study showed oral hygiene habits and level of dental education is inadequate in our society. Programmes on oral hygiene and preventive care, dental camps, mobile dental clinic in rural areas can help in improving the current status and guide the patients regarding beneficial effects of professional treatment care. There is a need to design and develop health care strategies to improve oral, systemic, social as well as environmental conditions.

Clinical Significance

This study enlightens the importance of oral hygiene awareness and education among all individuals keeping in mind the different sociodemographic, socioeconomic and oral behavioural habits. It is important to understand that different individuals in a population and divided on the basis of these factors and hence have different treatment needs based on the based on the periodontal problems. Also, all subjects have different accessibility and beliefs to both oral hygiene practices and treatments. Therefore, education of these is of utmost importance and should be delivered by clinicians in the best possible way keeping in mind the needs and understanding of individuals belonging to different groups of the society.

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