COMPARISON OF PREVALENCE OF PERIODONTITIS WITH DIFFERENT INDICES IN POPULATION OF DISTRICT GHAZIABAD

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ABSTRACT

Objective: To estimate the prevalence of periodontal disease with different indices. **Methods & Materials:** The study population consisted of multistage stratified random sample of 1300 subjects from total population of district Ghaziabad. A cross-sectional study was conducted with multi stage stratified random sampling techniques to select the sample population. The subjects were divided into different age groups and the periodontal assessment was made on the basis of CPITN index and ESI Index. **Results:** The CPITN has shown to estimate incorrect periodontal disease prevalence because of its underestimation of the disease severity. A huge difference was noticed in the prevalence rate of periodontitis when subjects were examined with ESI index. **Conclusion:** Periodontal disease was found to be highly prevalent in the study population and severity of disease increased with age. More number of subjects in younger age group were found to be healthy.

Keywords: CPITN, ESI, Periodontal disease, Prevalence

INTRODUCTION

Periodontal disease and dental caries are the main chronic infectious diseases of the oral cavity and the principal cause of tooth loss in humans. Periodontal diseases include a group of chronic inflammatory diseases that affect the periodontal supporting tissues of teeth and encompass destructive and nondestructive diseases.¹

Periodontal diseases have a number of characteristics that must be considered in conducting epidemiological studies. Periodontitis appears to be an infectious disease that has many characteristics of a chronic disease; there is a need for dental prophylaxis and instruction in the use of oral hygiene procedures. Most forms progress slowly and some aspects are not reversible, even if the infective agent is removed. Thus, the incidence and prevalence rates of periodontitis may be quite different. In addition, the disease

exhibits a pattern of multiple attacks, often affecting one or more sites around one or more teeth resulting in the epidemiological measures of the disease being very sensitive to tooth loss and creates a problem of repeated non-independent measures. The way, in which the disease progresses is not clear, creating problems in measurement of active disease and in defining a case.^{2,3}

Ainamo J et al⁴ raised the question of validity of the indices used to measure periodontal diseases at community level. Definite differences were showed on comparing the three indices: full mouth six site examination, Ramfjord index and Community Periodontal Index for Treatment Needs.

National surveys have estimated that moderate periodontitis affected about one half of the United States population. More advanced periodontal destruction (>5 mm

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Received: 3rd November 2015

Accepted: 10th April 2016

Online: 2nd May 2016

loss of attachment in one site) affected only about 1 in 8 people. Advanced destruction was almost nonexistent among younger adults but increased with age, reaching a prevalence of over one third among people aged 55-64 years. These estimates, based on the 1985-1986 NIDR survey, are probably lower than the actual prevalence due to the impact of partial recording. The amount of the underestimate is unknown, but even if the true prevalence is double the estimate, only 25% of the population had advanced periodontitis in 1985-1986. Periodontitis may not be as widespread as once thought, and perhaps we are entering an era when almost everyone can maintain their dentition throughout their life.⁵ Very few recent studies conducted in India have compared prevalence of periodontal diseases in urban and rural areas. Rao et al⁶ carried out one such study in Sewagram in urban, rural and tribal school children. Bleeding, calculus and abscess were taken as prevalence criteria. It was found that there was no significant difference in prevalence of periodontal diseases in urban & rural areas for the age group studied.

Thus in this epidemiological study an attempt has been made to compare the accuracy and reliability of Community Periodontal Index of Treatment Needs (C.P.I.T.N) and Extent and Severity Index (E.S.I) among the population of district Ghaziabad (Uttar Pradesh, India).

MATERIALS AND METHOD

A cross-sectional study was conducted in which multi stage stratified random sampling techniques were used to select the sample population as under:

1) First Stage

Out of four Tehsils of District Ghaziabad, two were selected by simple randomization (Modi Nagar and Hapur).

2) Second Stage

The selected Tehsils were further divided into three zones by the systemic randomization. (Modi Nagar, Bhojpur and Hapur).

3) Third Stage

Six wards were selected (Multanipura, Fafranabasti, Adarshnagar, Modipone, Govindpuri, Modisteel Colony) from Modinagar, Ten villages (Sara, Yakutpurmavi, Kadrabad, Rori, Saidpur, Phaphrana,

Sikrikhurd, Bhakharwa, Khanjarpur and Bhojpur) from Bhojpur, and Seven villages (Anwarpur, Abdullahpur Mori, Upada, kurana-kamalpur, Nizampur, Firozpur and Firozabad) from Hapur by Fisher and Yates table of Random Numbers.⁶

4) Fourth Stage

Full information was collected from the ward members and village Pradhans about the areas to be examined like the total number of residents, age groups etc. The study population consisted of random sample of 1300 subjects from total population of district Ghaziabad. The selected subjects for the study were informed briefly about the study plans and were asked to sign a consent form. Valuable information from every patient was collected via structured questionnaire which consisted of questions of our interests like age, gender, area etc. Every individual, along with routine dental examination, was assessed for the periodontal disease status by using sterilized Mouth Mirror; CPITN-C Probe for Community Periodontal Index of Treatment Needs (introduced by Jukka Ainamo, George Beagrie, David Bormas, Jean Martin and Jennifer Sardo-Infirri in 1982)⁸ and Williams graduated Periodontal probe for Extent and Severity Index (introduced by Carlos JP et al in 1986).⁹

The statistical analysis was done using the Chi-Square test; Significant association was observed between males and females in rural and urban area. The formula used for CHI-square test was:

$$\chi^2 = \frac{\sum (O-E)^2}{E}$$

Where: O = Observed Value and E = Expected Value

RESULTS

The study sample was divided into 4 age groups - in the range of 20-30 years, 30-40 years, 40-50 years and 50 years and above. Total sample size was 1300, out of this; 642 subjects were from rural areas and 658 subjects were from urban areas. Selected subjects were further distributed according to area, age and gender into different severities of C.P.I.T.N. and E.S.I.index.

When a comparison of C.P.I.T.N scores {Table No 1(A) & (B)} in rural and urban areas among 20-30 yrs

Table No. 1(A): Area, Age and Gender Wise Distribution of Study Sample for Scores of Cpitn in Rural Population

Age group	0		1		2		3		4	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
20-30yrs	8 (7.2%)	7 (6.4%)	14 (6%)	24 (22.2%)	66 (59%)	50 (46%)	9 (8.1%)	9 (8.3%)	19 (17.7%)	18 (16.6%)
30-40 yrs	12 (12.3%)	2 (2.3%)	17 (12.1%)	9 (10.1%)	39 (43.3%)	40 (47.1%)	11 (7.1%)	6 (7.5%)	25 (25.2%)	20 (32.9%)
40-50 yrs	7 (12.5%)	4 (6.7%)	5 (8.6%)	6 (10%)	20 (34.5%)	22 (36.6%)	11 (12.9%)	4 (6.7%)	18 (31.5%)	24 (40%)
50 and above yrs	0 (0%)	0 (0%)	7 (11%)	7 (12%)	20 (31%)	17 (26%)	7 (12.1%)	9 (14.2%)	26 (46%)	23 (41%)
	$\chi^2_{(cal)}=11.923$ $\chi^2_{(3,01)}=11.14$ p<.01*(sig)		$\chi^2_{(cal)}=11.5923$ $\chi^2_{(3,01)}=11.345$ p<.01*(sig)		$\chi^2_{(cal)}=12.0321$ $\chi^2_{(3,01)}=11.34$ p<.01*(sig)		$\chi^2_{(cal)}=13.581$ $\chi^2_{(3,01)}=11.345$ p<.01*(sig)		$\chi^2_{(cal)}=18.1129$ $\chi^2_{(3,01)}=11.345$ p<.01*(sig)	

Table No.1 (B): Area, Age and Gender Wise Distribution of Study Sample for Scores of Cpitn in Urban Population

Age Group	0		1		2		3		4	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
20-30 yrs	15 (14.8%)	10 (12.2%)	18 (17.9%)	12 (19.5%)	56 (55%)	30 (32.2%)	10 (9.9%)	13 (14.1%)	21 (2.7%)	27 (22%)
30-40 yrs	5 (5.5%)	2 (2.8%)	11 (10.7%)	11 (15.7%)	37 (36.3%)	27 (38.6%)	15 (14.7%)	14 (20%)	34 (33.3%)	16 (22.8%)
40-50 yrs	6 (5.6%)	3 (6.9%)	6 (5.6%)	4 (9.3%)	46 (41.3%)	19 (44.1%)	6 (5.6%)	2 (4.6%)	44 (41.5%)	15 (34.8%)
50 and above yrs	1 (1.5%)	0 (0%)	8 (18.4%)	10 (15.8%)	18 (28%)	28 (44.4%)	9 (14.3%)	4 (6.3%)	24 (38%)	21 (33.3%)
	$\chi^2_{(cal)}=13.198$ $\chi^2_{(3,01)}=11.345$ p<.01*(sig)		$\chi^2_{(cal)}=14.119$ $\chi^2_{(3,01)}=11.345$ p<.01*(sig)		$\chi^2_{(cal)}=17.592$ $\chi^2_{(3,01)}=11.345$ p<.01*(sig)		$\chi^2_{(cal)}=18.211$ $\chi^2_{(3,01)}=11.345$ p<.01*(sig)		$\chi^2_{(cal)}=14.311$ $\chi^2_{(3,01)}=11.345$ p<.01*(sig)	

By applying CHI-square statistics; significant association was observed between males and females having different scores of C.P.I.T.N from rural and urban areas in different age groups

age group was made it was found that 55% of males; and 32.2% of females from urban areas and 59% of males and 46% of females from rural areas had C.P.I.T.N code 2. Again in 30-40 yrs age group; 43.3% of males and 47.1% of females and 36.3% of males and 38.6% of females had CPITN code 2 from rural and urban areas; respectively.

In 40-50yrs age group CPITN code 2 along with CPITN code 4 was found to be significantly higher in both the urban and rural areas; but 46% of males and 41% of females from rural areas and 42% of males and 33.3% of females from urban areas had code 4 in 50 years and above age group.

In rural areas; 17.7% of males had CPITN code 4 in comparison to urban males (2.7%) in the age group of 20-30 years. In urban areas, CPITN code 0 for females was significantly higher as compared to rural females. In both the rural and urban areas code 3 and 4 showed higher values with increase in age.

When the subjects were examined for different severity scores of E.S.I {Table No 2(A) & (B)} it was noticed that in the age group of 20-30 years; only 19.8% of males; and 18.5% of females had attachment loss of 1-3mm. while 15.3% of males and 12% of females had attachment loss of more than 3mm in rural areas. 22.8%

Table No 2(A): Area, Age and Gender Wise Distribution of Study Sample for Scores of E.S.I in Rural Population

Age Group	Gender	1-3 mm		>3mm		0mm	
		= 30%	>30%	= 30%	>30%		
20-30 yrs	Male	1 (0.9%)	22 (19.8%)	0 (0%)	17 (15.3%)	71 (63.9%)	p<.01*(sig)
	Female	0 (0%)	20 (18.5%)	0 (0%)	13 (12%)	75 (69.4%)	
30-40 yrs	Male	3 (3%)	24 (24%)	0 (0%)	11 (11.8%)	61 (61.2%)	p<.01*(sig)
	Female	3 (3.5%)	24 (28.2%)	0 (0%)	16 (18.8%)	42 (49.4%)	
40-50 yrs	Male	3 (5.2%)	20 (34.5%)	0 (0%)	10 (17.2%)	25 (43.1%)	p<.01*(sig)
	Female	0 (0%)	25 (41.7%)	0 (0%)	14 (23.3%)	21 (35%)	
50 yrs and above	Male	11 (15%)	25 (34.2%)	0 (0%)	19 (26%)	18 (24.6%)	p<.01*(sig)
	Female	0 (0%)	10 (20.8%)	0 (0%)	25 (52%)	13 (27%)	

Table No 2(B): Area, Age and Gender Wise Distribution of Study Sample for Scores of E.S.I in Urban Population

Age Groups	Gender	1-3 mm		>3mm		0mm	
		= 30% of sites	>30% of sites	= 30% of sites	>30% of sites		
20-30 yrs	Male	3 (2.8%)	23 (22.8%)	0 (0%)	15 (13.9%)	60 (60.6%)	p<.01*(sig)
	Female	0 (0%)	27 (29.3%)	0 (0%)	11 (11.9%)	54 (58.7%)	
30-40 yrs	Male	0 (0%)	37 (36.3%)	0 (0%)	20 (19.6%)	45 (44.1B)	p<.01*(sig)
	Female	0 (0%)	16 (22.8%)	0 (0%)	23 (32.8%)	31 (44.3%)	
40-50 yrs	Male	0 (0%)	47 (44%)	0 (0%)	25 (26%)	32 (30.1%)	p<.01*(sig)
	Female	0 (0%)	18 (41.9%)	0 (0%)	9 (20.9%)	16 (37.2%)	
50 yrs and above urban	Male	0 (0%)	28 (34.5%)	0 (0%)	27 (33.3%)	26 (32%)	p<.01*(sig)
	Female	0 (0%)	21 (33%)	0 (0%)	13 (20.6%)	29 (46%)	

A significant association was observed between males and females in 1-3mm group but in >3mm group non –significant association was observed in E.S.I severity in rural population. In urban areas a non-significant association was observed in different groups (1-3mm & >3mm). While in 0mm group a significant association was seen in both areas in different age groups.

of males and 29.3% of females had attachment loss of 1-3mm from urban areas in the age same group.

In urban areas 19.6% of males and 32.8% of females had attachment loss of more than 3mm as compared to 11.8% of males and 18.8% of females, respectively in rural areas in the age group of 30-40 years.

In 40-50 years age group; 34.5% of males and 41.7% of females from rural areas and 44% of males and 41.9% of females from urban areas had attachment loss of 1-3mm, while 17.2% of males and 23.3% of females from rural areas and 26.3% of males and 20.9% of females from urban areas had attachment loss of more than 3mm. This shows that urban males had higher

attachment loss as compared to rural males.

In 50 years and above age group 33.3% of males from urban areas had attachment loss of more than 3mm as compared to 26% rural males; while 52% of rural females had attachment loss of more than 3mm as compared to 20.6% urban females. The above results show that urban males had a higher loss of attachment as compared to rural males and rural females had higher loss of attachment as compared to urban females. More number of healthy sites were noticed in young individuals from both the genders.

DISCUSSION

A cross-sectional survey was done by using multi-stage sampling procedure. Sampling method is a critical issue in descriptive type of epidemiological surveys to assess the true magnitude of the disease; sample population is expected to represent the whole population without any bias. Total of 1300 subjects were assessed to evaluate their periodontal status using disease identification indices i.e. - CPITN and ESI. Out of the total 1300 subjects evaluated, 658 were from urban population and 642 were from rural population. 341 males and 301 females were assessed from rural population while 390 males and 268 females were assessed from urban population.

Extent and Severity Index indicated that 51% males and 50% females from rural areas and 41.7% of urban males and 48.5% of urban females were free from chronic periodontitis. So, overall 57% of males and 51% of females had chronic periodontitis as estimated by E.S.I index. When following the code 3 and 4 of C.P.I.T.N index, 36% of rural males, 38% of rural females and 42.5% of urban males, 41.7% of urban females proved to be suffering from chronic periodontitis. The results of CPITN show that CPITN index has given an incorrect estimate of prevalence of periodontal disease. These results are in accordance with the reports of Lewis.^{10,11}

Further, percentage of population suffering from periodontitis increased with age. The females and males with CPITN Code 4 were 16.6% and 17.7% (20-30 yrs), 32.9%/25.2% (30-40 yrs), 40%/31% (40-50 yrs), 41%/46% (50yrs and above) respectively. Almost similar trend was observed in urban population. Highest percentage of subjects with CPITN Code 4 was

observed in 50 years and above. Maximum numbers of healthy subjects i.e. Code 0 were observed among 40-50 years of rural females and 30-40 years of urban female.

Distribution of study sample under different severities of loss of attachment observed was as under: percentage of healthy sites without any loss of attachment was maximum in youngest age group rural males and females with values 63.9% and 69.4%; respectively and the same was true for healthy sites in urban males and females with values 60.6% and 58.7%; respectively. The disease sites with moderate loss of attachment (>3 mm) were highest in 50 years and above rural males (26%) as well as rural females (52%) and urban males (33.3%). Unusual change was observed in urban females and rural females in which the maximum percentage with loss of attachment was observed in 40-50 years age group with values of 41.9% and 41.7%; respectively. The disease sites with mild loss of attachment (1-3mm) were highest in 40-50 yrs and 50 years and above age group in both the areas. These observations indicate consistent age related changes in loss of attachment in majority of the rural and urban males and females in different age groups which was not there in CPITN index. Jenny M. Lewis et al¹⁰ questioned the validity of Community Periodontal Index for Treatment Needs scoring and presentation method for measuring periodontal conditions. Thus; the results of the study clearly shows the underestimation of the disease when examined with C.P.I.T.N index but we need accurate data to demonstrate how cross- sectional surveys estimate the disease load in presence of risk factors when associated with the disease of interest.

CONCLUSION

Based on the results of this study, following conclusions can be drawn:

1. Periodontal disease was found to be highly prevalent in the study population and severity of disease increased with age. More number of subjects in younger age group were found to be healthy.
2. Severity of the disease can be more accurately examined by ESI index rather than CPITN index.

INFORMED CONSENT STATEMENT

INSTITUTE OF DENTAL STUDIES AND TECHNOLOGIES

DEPARTMENT OF PERIODONTICS

PERFORMA No.1

I undersigned; give my consent to carry out any examination, investigation as deemed necessary by doctor concerned.

(Patient's Signature)

NAME:

AGE/SEX:

EDUCATIONAL STATUS:

OCCUPATION/INCOME:

ADDRESS:

CHIEF COMPLAINT:

MEDICAL HISTORY:

ORAL HYGIENE: a) TOOTH BRUSH b) FINGER c) DATUN d) MOUTH RINSING e) OTHERS

FREQUENCY: a) ONCE b) TWICE c) OCCASSIONALLY

DENTIFRICES: a) TOOTH PASTE b) TOOTH POWDER c) OTHERS

HABITS: a) SMOKING b) CHEWING TOBACCO c) PAN d) OTHERS

ORAL HYGINE STATUS:

A) DEBRIS INDEX

16
46

11
31

26
36

Score

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Good (0.0-0.6) / Fair (0.7-1.8) / Poor (1.9-3.0)

0 – No debris or stains present

1 – Soft debris covering not more than one third of tooth surface being examined or the presence of extrinsic stains without debris regardless of surface area covered

2 – Soft debris covering more than one third but not more than two third of exposed tooth surface

3 – Soft debris covering more than two third of exposed tooth surface

B) CALCULUS INDEX

16
46

11
31

26
36

Score

--

Good (0.0-0.6) / Fair (0.7-1.8) / Poor (1.9-3.0)

0 – No calculus present

1 – supragingival calculus covering not more than one third of the exposed tooth surface being examined

2 – Supragingival calculus covering more than one third but not more than two third of exposed tooth surface or the presence of individual flecks of subgingival calculus around the cervical portion of tooth

3 – Supragingival calculus covering more than two third of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth

OHI-S = DI-S + CI-S

Score

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Good (0.0-1.2) / Fair (1.3-3.0) / Poor (3.1-6.0)

CPI/TN INDEX

CODE					
INDEXTEETH	17	16	11	26	27
INDEXTEETH	47	46	31	36	37
CODE					

CODE

Pathologic pockets 6mm or deeper (Code 4), Pathologic pockets 4 or 5mm deep (Code 3), Supra-or subgingival calculus (Code 2), Gingival bleeding after gentle probing (Code 1), No signs of disease (Code 0).

TREATMENT NEEDS:

0 = No treatment (Code-0), I = Improvement in personal oral hygiene (Code 1), II = I + scaling (Code 2 and 3), III = I + II + Complex treatment (Code-4)

EXTENT AND SEVERITY INDEX

TEETH	17	16	15	14	13	12	11	21	22	23	24	25	26	27
LOSS OF ATTACHMENT	B	B	B	B	B	B	B	MB	MB	MB	MB	MB	MB	MB
	MB	MB	MB	MB	MB	MB	MB	B	B	B	B	B	B	B
LOSS OF ATTACHMENT	MB	MB	MB	MB	MB	MB	MB	B	B	B	B	B	B	B
	B	B	B	B	B	B	B	MB	MB	MB	MB	MB	MB	MB
TEETH	47	46	45	44	43	42	41	31	32	33	34	35	36	37

$$\text{EXTENT} = \frac{\text{NO. OF SITES WITH LPA} > 1\text{mm} \times 100}{\text{NO. OF SITES EXAMINED}}$$

NO. OF SITES EXAMINED

SEVERITY = MEAN OF SITE EXAMINED WITH LPA > 1mm

GINGIVAL MARGIN TO BASE OF POCKET (MIDBUCCALY AND MESIOBUCCALY)

TEETH	17	16	15	14	13	12	11	21	22	23	24	25	26	27
GM-BOP	B	B	B	B	B	B	B	MB	MB	MB	MB	MB	MB	MB
	MB	MB	MB	MB	MB	MB	MB	B	B	B	B	B	B	B
GM-BOP	MB	MB	MB	MB	MB	MB	MB	B	B	B	B	B	B	B
	B	B	B	B	B	B	B	MB	MB	MB	MB	MB	MB	MB
TEETH	47	46	45	44	43	42	41	31	32	33	34	35	36	37

GINGIVAL MARGIN TO CEMENTOENAMEL JUNCTION (MIDBUCCALY AND MESIOBUCCALY)

TEETH	17	16	15	14	13	12	11	21	22	23	24	25	26	27
GM-CEJ	B	B	B	B	B	B	B	MB	MB	MB	MB	MB	MB	MB
	MB	MB	MB	MB	MB	MB	MB	B	B	B	B	B	B	B
GM-CEJ	MB	MB	MB	MB	MB	MB	MB	B	B	B	B	B	B	B
	B	B	B	B	B	B	B	MB	MB	MB	MB	MB	MB	MB
TEETH	47	46	45	44	43	42	41	31	32	33	34	35	36	37

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Source of Support: Nil, Conflict of Interest: None Declared