

# Prevalence of Periodontal Disease and Characterization of its Extent and Severity in an Adult Population – An Observational Study

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## ABSTRACT

**Introduction:** Present study was undertaken to determine the prevalence of periodontal disease in an adult population and to further characterize the extent and severity of the disease.

**Materials and Methods:** The study population consisted of 700 randomly selected individuals reporting to out patient department of dental college and hospital. Demographic details and lifestyle characteristics of the all the subjects were recorded and a thorough oral examination was performed. In order to evaluate the periodontal status of subjects, five indices (CAL, PD, OHI, PI and GI) were assessed and subjects having at least one site with clinical attachment loss (CAL)  $\geq 3$ mm were diagnosed as having periodontitis. Further, to analyse the extent of disease, subjects having periodontitis were divided into two

groups as having at least one site with CAL  $\geq 5$ mm and having at least three sites with CAL  $\geq 5$ mm.

**Results:** Results showed that there was a high prevalence of periodontitis amongst population with almost 72% of the individuals having at least one site with CAL  $\geq 3$ mm. A trend was noted in which periodontal status worsened as the age increased. Analysing the extent and severity of disease amongst the population, results revealed that almost 41% of population had at least one site with CAL  $\geq 5$ mm whereas almost 21% of individuals had at least three sites with CAL  $\geq 5$ mm.

**Conclusion:** Present study provides with evidence of high prevalence of periodontal disease amongst the population. Importantly, this study also unveils the lack of awareness for dental health amidst the population.

**Keywords:** Characterization, Prevalence, Periodontal disease

## INTRODUCTION

Epidemiologic data are the foundation for much of our public health policy. In recent years, there has been a trend of increasing awareness of dental health in Indian population. This has led to increase in number of population zealous for retaining their dentition. Thus, dentists are now required to monitor dental health scrupulously in addition to performing dental treatment. There are various dental diseases that may affect the oral cavity. Amongst all the dental diseases periodontal disease is the most prevalent disease in adults. However, it is satirizing that periodontal diseases have always been neglected by both dental professionals and patients in India. A logical justification for this would be the silent and slowly progressive nature of the disease.

Periodontal diseases are a group of lesions affecting the tissues surrounding and supporting the teeth in their sockets. Amongst all periodontal diseases gingivitis and periodontitis are the most commonly occurring diseases. Gingivitis can be defined as inflammation of gingival [1] whereas periodontitis is inflammation of periodontium that extends beyond the gingiva and produces destruction of the connective tissue attachment of the tooth [2].

Several epidemiologic studies assessing the prevalence and distribution of periodontal disease have been carried out in various other countries, especially developed countries [3,4]. These studies altogether reported a high prevalence of both gingivitis and periodontitis ranging from 54% to 99%. Although, it seems credible that developing countries like India may have high prevalence of periodontal disease amidst the population but it is deplorable that few studies have been conducted in this regard. Moreover, very few studies in India have characterized the extent and severity of periodontal diseases in any given population. Understanding the epidemiology and the characteristics of periodontal diseases in a

population is important for the planning of strategies for prevention and control of the disease. However, there is scarce information about periodontal health status of population in India. Therefore, the aim of this study was to assess the prevalence of periodontal disease in individuals reporting to dental hospital and to further characterize the extent and severity of the disease along with various factors influencing the disease.

## MATERIALS AND METHODS

### Study population

A total of 700 individuals were enrolled in this observational study. The subjects were those reporting to out patient department of C.S.M.S.S dental college and research centre, Aurangabad from 1<sup>st</sup> January 2010 to 31<sup>st</sup> April 2010. A proforma was designed to record the patient's demographic details, lifestyle characteristics, medical history, oral hygiene measures and periodontal health status. Demographic data included age, gender, religion, address, educational status, income, diet and frequency of dental visits. Individuals were randomly selected from the out patient department and were then examined.

Inclusion criteria of patients was as follows

1. Patients enrolled in this study were of age 30 y or more.
2. Patients having at least 20 natural teeth.
3. Patients with no history of periodontal treatment in last six months.

### Ethical Consideration

The protocol was approved by the institutional review boards for human subjects and was further analysed and approved by Maharashtra University of Health Sciences (MUHS). Written informed

Variable	Number	Percentage	Total
<b>Sex</b>			
Male	357	51	700
Female	343	49	
<b>Income</b>			
Lower	21	3	700
Middle	301	43	
Upper middle	294	42	
High	84	12	
<b>Religion</b>			
Hindu	455	65	700
Muslim	133	19	
Buddhist	56	8	
Christian	21	3	
Jain	14	2	
Sikh	21	3	
<b>Education</b>			
Illiterate	56	8	700
Secondary School	63	9	
Higher Secondary	357	51	
Graduate	224	32	
<b>Tobacco chewing</b>			
Yes	168	24.0	700
No	532	76.0	
<b>Smoking Status</b>			
Current Smoker	91	13	700
Former Smoker	133	19	
Never Smoker	476	68	
<b>Diet</b>			
Vegetarian	423	60.4	700
Non-Vegetarian	277	39.6	
<b>Frequency of Brushing</b>			
Once a day	528	75	700
Twice a day	148	21.1	
None	27	3.9	

[Table/Fig-1]: Overview of study population

consent was obtained from all individuals and were informed of the study objectives and the importance of the findings. Subjects were then referred to respective departments for further required treatment.

### Periodontal Examination

The subject's periodontal status was evaluated using the following measures:

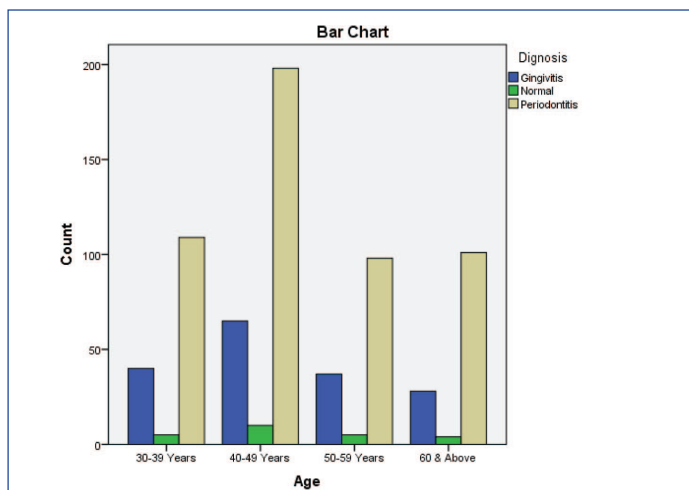
- 1) Oral Hygiene Index (Greene and Vermillion) [5].
- 2) Plaque Index (Turesky-Gilmore-Glickman modification of the Quigley Hein Plaque Index 1970) [6].
- 3) Gingival Index (Loe and Silness 1967) [7].
- 4) Probing Depth (PD)
- 5) Clinical Attachment Level (CAL)

Oral health examinations of all the individuals were conducted by a single periodontist. All the teeth in the oral cavity were examined except for third molars. Probing depth and clinical attachment level was measured using a standard William's graduated periodontal probe at six sites per tooth and thereafter a mean was calculated for the whole oral cavity. At each site PD, recession and CAL were calculated based on the probed distances in millimeters from gingival margin to cemento-enamel junction and the base of sulcus.

Age Group	N	Mean PD	Mean CAL	Mean OHI	Mean PI	Mean GI
30-39 Years	154	2.285±0.258	2.738±0.319	1.764±0.276	1.852±0.183	1.881±0.202
40-49 Years	273	2.604±0.285	3.106±0.320	1.856±0.329	1.972±0.262	2.089±0.366
50-59 Years	140	2.856±0.324	3.403±0.295	1.888±0.194	2.138±0.304	2.335±0.414
≥60 Years	133	3.141±0.306	3.833±0.544	2.083±0.238	2.341±0.349	2.505±0.436
Total	700	2.6864	3.222486	1.885057	2.049057	2.1718
p-value		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

[Table/Fig-2]: Mean Periodontal Indices in individuals stratified according to their age, One way ANOVA of variance, Statistical analysis showing highly significant ( $p<0.0001$ ) variation of all the periodontal indices between groups stratified according to their age

Number of teeth involved with AL ≥5mm	Number	Percentage
None	259	37.0
1 teeth	289	41.28
3 teeth	152	21.71

[Table/Fig-3]: Number and percentage of individuals with attachment loss (AL) ≥5mm stratified according to number of teeth involved, Z-value=13.685, p-value<0.0001 Statistical analysis showing highly significant ( $p<0.0001$ ) difference between two groups

[Table/Fig-4]: Distribution of periodontal disease amongst the population

Since, age is a strong confounder in this study we evaluated the results after stratification of individuals enrolled into five age groups: - 30-39, 40-49, 50-59 and further 60 y and above. A threshold of 3mm was decided for the study sample and subjects having at least one site with clinical attachment loss (CAL) of ≥3mm were diagnosed as having periodontitis. Further, to analyse the extent of disease, subjects having periodontitis were divided into two groups as having at least one site with AL ≥5mm and having at least three sites with CAL ≥5mm.

### STATISTICAL ANALYSIS

The data collected were entered in Excel Sheet Format. Data was then put to statistical analysis using SPSS (Version 17) (Statistical Package for Social Sciences). Mean values of all the periodontal indices were calculated. One-way-ANOVA analysis of variance was used to determine the difference of periodontal indices between specified groups. Chi-square test was applied to determine the distribution of periodontal disease throughout the different age groups. Z-test of proportion was used to determine the variance between quantitative samples. Unpaired t-test was applied to determine the variance between independent samples.

### RESULTS

Present study was undertaken to evaluate the prevalence of periodontal diseases and to characterize the disease along with

Sex	Mean PD	Mean CAL	Mean OHI	Mean PI	Mean GI
Male	2.72±0.42	3.32±0.55	1.96±0.31	2.11±0.33	2.2382±0.41
Female	2.64±0.39	3.12±0.47	1.80±0.26	1.99±0.30	2.1027±0.42
p-value	0.006	0.000	0.000	0.000	0.000

**[Table/Fig-5]:** Mean Periodontal Indices in individuals stratified according to sex, Unpaired t-test, Statistical analysis showing highly significant difference ( $p<0.0001$ ) of periodontal indices (CAL, OHI, PI and GI) and significant difference ( $p<0.05$ ) of PD between males and females

demographic detailing of the enrolled population. [Table/Fig-1] shows the demographic details of the population. Mean age of the subjects in this study was  $47.36\pm 9.37$  y. [Table/Fig-2] shows the periodontal status of subjects enrolled in this study. Results reveal the poor periodontal status of population as displayed by their mean periodontal indices. Furthermore, subjects were stratified according to their age and results show that mean periodontal indices increased as the age increased. Statistical analysis showed that there was a highly significant difference of mean periodontal indices throughout all age groups ( $p<0.0001$ ). In order to analyze the extent and severity of disease amongst the population, individuals were stratified according to site involved with clinical attachment loss (CAL)  $\geq 5$ mm [Table/Fig-3]. Results revealed that almost 41% of population had at least one site with CAL  $\geq 5$ mm whereas almost 21% of individuals had at least three sites with CAL  $\geq 5$ mm. [Table/Fig-4] incurs that there was a high prevalence of periodontitis amongst population characterized by periodontal destruction with at least one site having CAL  $\geq 3$ mm throughout the age groups. It was observed that almost 72% of the individuals throughout the population had periodontitis. In addition, when periodontal indices between males and females were compared a highly significant difference ( $p<0.0001$ ) was observed with males showing poorer periodontal status [Table/Fig-5].

## DISCUSSION

Epidemiology is the science concerned with the factors that influence the distribution and occurrence of health, disease and mortality among groups of individuals. The periodontal status of an individual or a group is difficult to describe concisely and itself is an arduous task. To thoroughly characterize periodontal status, epidemiological studies assess numerous sites throughout both arches for several clinical conditions for each individual. Epidemiological assessment of a group of individuals requires a summary of the periodontal status over individual sites in the mouth. Thus, present study was performed to determine the prevalence of periodontal disease in a population and to characterize periodontal disease present amongst the population. To evaluate the periodontal disease present in the population five indices were taken in order to have a comprehensive view of periodontal status of the study population. Thus, the methodology adapted for this study has to great extent decreased the possibility of underestimating the true extent of disease. Results of the present study reveal that there was a high prevalence of periodontitis of almost 72% amongst the population [Table/Fig-4]. Results show that periodontal status of population was poor as demonstrated by their mean periodontal indices [Table/Fig-2]. Periodontitis is a multifactorial disease that is related to age and it was observed that periodontal indices worsened as the age of subjects increased and this trend was highly significant ( $p<0.0001$ ) for all the periodontal indices [Table/Fig-2]. These results were in accordance with previous studies [8,9] which suggest an increase in prevalence of periodontal disease as the age increases. Demographic details of the population showed that majority of the population were ignorant towards their oral health status. Almost 75% of the individuals brushed their teeth only once a day whereas only 21% individuals brushed twice a day [Table/Fig-1]. Moreover, only 11% of individuals visited dental clinics at an interval of three years. In addition the study population comprised of individuals from all sections of society therein individuals were from different income

group, different educational qualification and religion. Thus, it can be inferred from these results that the study population had a high prevalence of periodontitis throughout various segments of society. Results of present study firmly interpolate that the study population required a motivation for maintenance of oral hygiene as majority of the population were ignorant towards their oral health status.

Several studies [10,11] in the past have determined the prevalence of periodontal disease amongst Indian population but the distribution of periodontal disease and its severity have not been determined. Therefore, this study also aimed to ascertain the distribution and severity of periodontal disease throughout the population. Results of the study reveal that periodontal status of the study population was poor [Table/Fig-2]. In addition, to determine the distribution and severity of periodontal disease amongst the population individuals were categorized according to the involvement of sites [Table/Fig-3]. Results show that almost 41% of population had at least one site with CAL  $\geq 5$ mm whereas almost 21% of individuals had at least three sites with CAL  $\geq 5$ mm [Table/Fig-3]. These findings elucidate that almost 63% of population was suffering from severe periodontitis with an involvement of at least one site out of which almost 21% of individuals showed an involvement of three sites. Present study also shows that females had a better periodontal health status as compared to males. [Table/Fig-5] shows that all the periodontal indices (CAL, PD, OHI, PI, and GI) were significantly higher in males as compared to females. These results are in commemoration with previous studies [12,13] which suggest that females have a better periodontal health status compared to males. Possible reason for this suggested is that men are ignorant towards their oral hygiene maintenance as compared to females.

It is of great significance to consider the several aspects that have been adapted in the methodology of this study which strengthen the reliability of the study. Importantly, full mouth examination was done and patients having less than 20 teeth were excluded from the study. This criterion eliminated the probability of underestimating the true extent of periodontal disease. Furthermore, a single periodontist performed the oral examination of all the individuals enrolled in this particular study thus nullifying the possibility of inter examiner variability. As comprehensive community studies are few in Indian setup, this study was undertaken to assess the magnitude of periodontal disease amongst the population.

## CONCLUSION

Present study provides substantial evidence suggesting a high prevalence of periodontal disease amongst the population. The present study also promulgates the need of increasing awareness towards maintenance of oral health amongst the population as majority of the study population was ignorant towards their oral health status. Since periodontal disease is known to influence several fatal and debilitating systemic diseases, it is an incumbent responsibility of dental professionals to educate and motivate the general population to maintain their oral health status.

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