ORIGINAL ARTICLE

Gingivitis and Periodontitis among the Elderly in Port Harcourt Nigeria: A Population-based Study

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Abstract

Background: Data on the periodontal health status of elderly in Rivers State are uncommon, the objective of this study was to assess the prevalence and describe the determinants of periodontal disease among the elderly in Port Harcourt, Rivers State, Nigeria.

Subjects and methods: The study was an observational research design in which data on periodontal health status was collected by a clinical oral examination. Subjects were selected by systematic random sampling and data collected using a self-developed questionnaire. Data analysis was done using statistical package for social sciences (SPSS version 20 IBM, Armonk, New York). Relationship between variables was established using Chi-square and significance determined at 0.05 alpha level.

Results: The prevalence of gingivitis and periodontitis was 327 (60.2%) and 190 (35.0%), respectively. More than half 293 (53.9%) of the subjects had calculus on their teeth, and 137 (25.2%) had Shallow pocket. Gingivitis and periodontitis were significantly higher in males than females and the old elderly compared to the young elderly. Cigarette smokers had less gingivitis and more periodontitis than nonsmokers and those who engaged in once daily tooth cleaning had a higher prevalence of gingivitis and periodontitis compared to subjects who cleaned their teeth twice or more daily.

Conclusion: The burden of periodontal disease was high among the elderly and the periodontal health status was poor with a high prevalence of gingivitis and periodontitis. Therefore, oral health education, enlightenment, and motivation towards the seeking of oral care are recommended in this group.

Keywords: Elderly, Gingivitis, Oral health education, Periodontitis.

Journal of Oral Health and Community Dentistry (2019): 10.5005/jp-journals-10062-0038

Introduction

The periodontium consists of the supporting tissues of the teeth, this includes the gingival, cementum, periodontal ligament and the alveolar bone. Periodontal diseases are a group of diseases which affects one or more of these tissues, and it is broadly categorized into gingivitis and periodontitis. Gingivitis is a reversible form of periodontal disease, the inflammation is restricted to the gingiva without destruction of the other supporting tissues, on the other hand, periodontitis is the irreversible destruction of the deeper structures of the periodontium, caused by specific microorganisms or groups of specific microorganisms, characterized by destruction and loss of connective tissue attachment and alveolar bone, periodontal pocket formation, loosening of teeth and subsequent tooth loss.[1,2]

The burden of periodontal disease in the African population is quite high, and the occurrence is related to age, oral hygiene status, and socioeconomic status.[3-5] In fact, it constitutes a major public oral health problem and is considered a socio-economic disease in Africa.[3] Among Nigerians, the prevalence is also high and it is the second most common cause of tooth loss.[6-8] In a study among the adult male population in Benin City, Nigeria, the prevalence of periodontal diseases was 90.8%, of this 75.4% had gingivitis and 15.4% had periodontitis.[9] In another study conducted among prisoners in Benin city, the prevalence of periodontal disease was 95% with gingivitis and periodontitis accounting for 64.2% and 30.7% of the prevalence, respectively.[10] A cross-sectional survey among pensioners also in Benin city reported the prevalence of gingivitis and periodontitis as 52% and 45.6%, respectively.[11] Retrospective analysis of hospital records of patients attending the dental clinic in a university teaching hospital in Port Harcourt, Nigeria, the prevalence of periodontal disease was 19%.[12]

Although there are number of studies assessing the periodontal health status of Nigerians available in the literature,[11,13-15] such studies are uncommon in Port Harcourt, Rivers State. A search of the literature revealed that the only available data on the prevalence of the periodontal disease in Rivers State is a hospital-based retrospective analysis of hospital record of patients.[12] Results obtained from such study may not reflect the true situation at the community or population level.

Consequently, community-based study on the prevalence and determinants of the periodontal disease become imperative.

The present study determined the prevalence of gingivitis and periodontitis by recording gingival bleeding on probing, presence of calculus and periodontal pockets. It also investigated the possible influence of factors such as age, gender, educational status, tooth cleaning frequency and smoking on the occurrence of periodontal disease.

The study population was made of pensioners in Port Harcourt, Nigeria. Pensioners are considered as elderly made up of persons 60 years and older[16] with varied educational, socio-economic, cultural and psychological experiences.[17] Worldwide, the number

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How to cite this article: Braimoh OB, Alade GO. Gingivitis and Periodontitis among the Elderly in Port Harcourt Nigeria: A Population-based Study . J Oral Health Comm Dent 2019;13(1):5-9.

Source of support: Nil

Conflict of interest: None

of persons aged 60 years and above is expected to triple, This population group is expected to increase from 810 million in 2012 to 2.03 billion by 2050.18 According to Ogunbodede, of these, 10.6% (215 million) will live in Africa.[19] It is also estimated that by 2050, older persons will outnumber the population of children (0–14 years).[19] This growth in population is immense and would pose great challenges in caring for the aging population. The governments of African countries including Nigeria have not given the matter the serious attention it deserves and is not prepared adequately to meet the emerging challenges.[20] Based on this, the present study was focused on this group to bring attention to the group. The results of this study will provide information on the possible oral health challenges to be faced by this group and plan oral health services to meet these challenges. Furthermore, data on the prevalence and determinants of periodontal disease would provide the basis for the development of preventive and interventional programs necessary for the prevention of periodontal disease and reduce the burden in those suffering from the condition. Therefore, the objective of this study was to assess the prevalence and describe the determinants of periodontal disease among the elderly in Port Harcourt, Rivers State, Nigeria.

Subjects and methods

The study was an observational research design in which data on periodontal health status was collected by a clinical oral examination. The population of the study was pensioners in Port Harcourt, Rivers State. A minimum sample size of 128 was estimated to be adequate for the study. The assumptions made were: periodontal disease prevalence of 90.8%,[9] precision (d) 5% and a confidence interval of 95%. Although the calculated sample size was 128, a total of 543 elderly participants were involved in the study. This was so because the researcher recognized the fact that large sample size allows for appropriate statistical analysis such as cross-tabulation, provide the desired level of accuracy in the estimation of proportion and validity of the significant test.

The participants were selected by systematic random sampling. The register of the pensioners constituted the sampling frame and every second subject was selected from the register. Subjects selected who were not present in a particular visit were contacted through their phone numbers for a subsequent visit.

Data was collected through the use of a questionnaire. The questionnaire had sections A and B. Section A contained information on socio-demographic data (gender, age, educational status, tooth cleaning frequency, and smoking habits). The periodontal health was recorded in section B using the community periodontal index (CPI). The index is accepted globally as a tool for assessing periodontal status in epidemiological studies.[21] The reliability of the instrument was done using old people other than those recruited for the study. Twenty of them were selected; the selected participants completed the questionnaire and were examined by the researcher. The filling of the questionnaire and examination was repeated after an interval of one week. The reliability of the instrument was determined using the Cronbach alpha and alpha coefficient of 0.82 was obtained. The recording of periodontal health was done by the first author over a period of two years from April 2015 to March 2017. The intra-examiner reliability for the recording of periodontal health was determined by Intra-class correlation and reliability coefficient of 0.79 was obtained. The reliability testing also served as the pilot-test for this study, from the reaction of the participants to the questionnaire, it was evident that they quite understood the question items.

The study was approved by the Research Ethics Committee, the University of Port Harcourt and informed consent was obtained from each participant before data collection. Pensioners who retired from public service of Rivers State government voluntarily or retired as a result of years of service, who were below the age of 60 years were excluded from the study since they do not meet the age to be classified as elderly.

A total of 543 copies of the questionnaire were administered to the respondents, and all were retrieved. The participants who completed the questionnaire were examined. The indexed teeth in each sextant were examined by running the CPI probe around the whole circumference of the tooth and pocket depths were measured at six sites per tooth. These include the mesio-, mid-, and distobuccal surface of the index teeth on both jaws; mesio-, mid-, and the distolingual ligual surface of the index teeth on the lower jaw and mesio-, mid-, and disto-palatal surface of the index teeth on the upper jaw). According to the CPI scoring criteria, absence of bleeding on probing, calculus and periodontal pockets was scored 0, bleeding on probing was scored 1, presence of calculus (sub/supra) was recorded as 2, pocket depth 4 to 5 mm was recorded as 3 (shallow pocket) and pocket depth greater than or equal to 6 was scored 4 (deep pocket).[21]

The completed copies of the questionnaires were collated, coded and entered into the SPSS spreadsheet. The data were subsequently analyzed using SPSS version 20 (IBM SPSS Armonk, New York). Descriptive statistics of frequency and percentage were used to describe the periodontal health status of the sample. According to community periodontal index, the participants were categorized, thus, code 0 = healthy periodontium, codes 1 and 2 = gingivitis and codes 3 and 4 = periodontitis.[21] Inferential statistics of Chi-square was used to test the association of periodontal health of the respondents with gender, age, frequency of teeth cleaning and educational status. A significant association between the dependent variable (periodontal health) and independent variables (gender, age, frequency of teeth cleaning and educational status) was determined at *p* value less than 0.05.

Results

A total of 543 participants were examined giving a response rate of 100%. The age of the participants ranged from 60 to 82 years. Male participants constituted 295 (54.3%) of the study population. Most of the respondents 234 (43.1%) were 60 to 64 years old. Regarding educational status, 226 (41.6%) had tertiary education. Of the respondents, 121 (22.3%) smoked cigarette and 422 (77.7%) were nonsmokers. Majority of the respondents 352 (64.8%) cleaned their teeth once daily while 191 (35.2%) cleaned their teeth twice or more daily (Table 1).

The CPI scores and categorization of the scores into gingivitis and periodontitis is shown in Table 2. Approximately, only 26 (5%) of the old people had healthy gingival, that is a score of 0. A total of 34 (6.3%) of the participants had bleeding on probing (score 1) and more than half 293 (53.9%) of the subjects had calculus on their teeth (score 2). Shallow (score 3) and deep pockets (score 4) was recorded in 137 (25.2%) and 53 (9.8%) of the subjects respectively. Furthermore, of the 517 participants with periodontal disease, 327 (60.2%) and 190 (35.0%) had gingivitis and periodontitis, respectively.

Regarding gender and periodontal health, gingivitis and periodontitis were significantly higher in male than female participants, and the females had significant healthy gingival than the males. On the relationship between age and periodontal health,

Table 1: Sociodemographic characteristics of the participants

Variables	*Frequency*	*Percentage (%)*
Age		
60–64 years	234	43.1
65–69 years	206	37.9
≥70 years	103	19.0
Gender		
Female	248	45.7
Male	295	54.3
Educational status		
Primary	119	21.9
Secondary	198	36.5
Tertiary	226	41.6
Frequency of teeth cleaning		
Once daily	352	64.8
Twice or more daily	191	35.2
Smoking habit		
Smokers	218	40.1
Non-smokers	325	59.9

younger subjects had significant healthy gingiva than their older counterparts. Contrarily, the older age group had more gingivitis and periodontitis compared to the younger age groups. The level of education was also related to the periodontal health of the participants. Elderly, with a lower level of education had a higher level of gingivitis and periodontitis (Table 3).

Whereas subjects who smoked cigarette had less gingivitis and more periodontitis than non-smokers, those who engaged in once daily tooth cleaning had a higher prevalence of gingivitis and periodontitis compared to subjects who cleaned their teeth twice or more daily (Table 4).

Discussion

Periodontal disease is a major oral disease affecting a man and an important determinant of the oral health status of a population.

Table 2: Periodontal health status of the participants

Periodontal health status	*Frequency*	*Percent (%)*
Healthy gingiva		
CPI code 0	26	4.8
Gingivitis		
CPI code 1	34	6.3
CPI code 2	293	53.9
Total	327	60.2
Periodontitis		
CPI code 3	137	25.2
CPI code 4	53	9.8
Total	190	35

The present study shows that the periodontal health status of the elderly pensioners was poor. Approximately, only 5% of the participants had normal gingiva, 6.3% bled on probing, about 54% had an accumulation of calculus, 25.2% had shallow pockets and 9.8% had deep pockets. These findings indicate that the most prevalent score in this study was score 2. This is consistent with the findings of other studies. Okeigbemen et al., in a similar study conducted among pensioners in Benin City, Nigeria, reported score 2 as the most prevalent.[11] In a community study of elderly subjects in Ibadan, Nigeria, a similar finding was also documented.[22] Similar results were also reported among the elderly in Japan and Canada.[23,24] Accumulation of calculus is oral hygiene dependent; therefore this finding suggests that the participants in the present study had poor oral hygiene.

The prevalence of the periodontal disease in the present study was 95.2%, with gingivitis and periodontitis accounting for 60.2% and 35% respectively. This prevalence is comparable to 97.6% reported among the similar population in Benin City, Nigeria.[11] However, in a study among adult male population between the ages of 25 to 64 years in Benin City, Nigeria, the prevalence of periodontal disease was 90.8%.[9] While gingivitis contributed 75.4% of this, periodontitis accounted for 15.4%.[9] Although the prevalence of periodontal disease from this study appears comparable to that obtained in the present study, there was a difference in the prevalence of gingivitis and periodontitis obtained from both studies. The prevalence of gingivitis was less and that of

Table 3: Relationship between gender, age, educational status and periodontal health among the participants

	Periodontal health				
	Healthy gingiva	*Gingivitis*	*Periodontitis*	*Total*	
Variables	*N (%)*	*N (%)*	*N (%)*	*N (%)*	*p value*
Gender					
Female	19 (7.7)	146 (58.8)	83 (33.5)	248 (45.7)	
Male	7 (2.4)	181 (61.3)	107 (36.3)	295 (54.3)	0.01
Total	26 (4.8)	327 (60.2)	190 (35.0)	543 (100)	
Age					
60–64 years	16 (6.8)	139 (59.4)	79 (33.8)	234 (43.1)	
65–69 years	8 (3.9)	125 (60.7)	73 (35.4)	206 (37.9)	0.01
≥ 70 years	2 (1.9)	63 (61.2)	38 (36.9)	103 (19.0)	
Total	26 (4.8)	327 (60.2)	190 (35.0)	543 (100)	
Educational status					
Primary	3 (2.5)	74 (62.2)	42 (35.3)	119 (21.9)	
Secondary	6 (3.0)	119 (60.1)	73 (36.9)	198 (36.5)	0.34
Tertiary	17 (7.5)	134 (59.3)	75 (33.2)	226 (41.6)	
Total	26 (4.8)	327 (60.2)	190 (35.0)	543 (100)	

Table 4: Relationship between smoking, frequency of cleaning and periodontal health among the participants

	Periodontal health				
Variables	*Healthy gingiva N (%)*	*Gingivitis N (%)*	*Periodontitis N (%)*	*Total N (%)*	*p value*
Frequency of teeth cleaning					
Once daily	9 (2.6)	216 (61.4)	127 (36.0)	352 (64.8)	
Twice or more daily	17 (8.9)	111 (58.1)	63 (33.0)	191 (35.2)	0.01
Total	26 (4.8)	327 (60.2)	190 (35.0)	543 (100)	
Smoking habit					
Smokers	9 (4.1)	126 (57.8)	83 (35.8)	218 (40.1)	0.44
Nonsmoker	17 (5.2)	201 (61.8)	107 (32.9)	325 (59.9)	
Total	26 (4.8)	327 (60.2)	190 (35.0)	543 (100)	

periodontitis was more in the present study compared to the other study among adults. The observation may be due to the difference in age of the study population. While the previous study was done among adults (25–64 years), the present research was done among the elderly between the ages of 60 to 82 years. Periodontal disease is considered as a disease of lifetime accumulation, therefore gingivitis though reversible with adequate care, in the absence of adequate care and continuous accumulation of plaque and calculus it progresses to the periodontitis. The increase in the prevalence of periodontitis and a drop in the prevalence of gingivitis in the present study may be due to this progression from gingivitis to periodontitis.

In this study, the prevalence of gingivitis and periodontitis increases with increasing age. This result is in agreement with the findings of other studies.[10,11,25] The increasing prevalence of the periodontal disease among older subjects is due to a decline in the immune and host healing potential which impairs the host response to the disease. Furthermore, while the women had more normal gingiva than the men, the men had a higher prevalence of gingivitis and periodontitis compared to the women. This is in tandem with findings reported among prisoners and pensioners in Benin City.[10,11] A number of studies have reported better oral hygiene status in females than in males. Sogi and Bhaskar reported that the better oral hygiene status observed among females was attributable to better oral health care seeking behavior exhibited by females as compared to males.[26] Individuals who have a good attitude and behavior by brushing the teeth daily have better oral hygiene compared to those who do not brush the teeth daily.[7,10,23] This was also found to be true for those who brush their teeth twice daily compared to those who brush once daily.[27] Researchers have shown that women brush their teeth twice daily than men and hence have better oral hygiene than men.[27]

In the present study, participants who smoked were more likely to have periodontitis compared to nonsmokers. The adverse effect of nicotine on gingival blood flow, neutrophil, cytokine production, and other immune cell function, and connective tissue turnover are some of the mechanisms responsible for overall effects of tobacco on periodontal tissues.[28] The higher prevalence of periodontitis among smokers may also be due to lower concern about health reported among smokers.[29] Conversely, smokers were less likely to have gingivitis compared to nonsmokers. The suppressed gingival bleeding response to plaque explains the lesser tendencies to gingival bleeding of gingivitis among smokers than nonsmokers in the presence of a similar plaque index.[30] This may also be attributed to vasoconstriction of gingival vessels as suggested, and increased number of keratinized cells with heavier keratinization of the gingivae of smokers.[31] Educational status is documented as a determinant of periodontal disease in a number of studies; subjects with a lower level of education have a higher prevalence of the periodontal disease.[9,32] The result of the study is in agreement with the findings of these studies. The possible explanation for this is that individuals with lower educational status show less concern about their health and have poor health care seeking behavior.

Conclusion

The burden of periodontal disease was high among the elderly in Port Harcourt Nigeria, and the periodontal health status was poor with a high prevalence of gingivitis and periodontitis. Periodontal disease increases with age and females have significant better periodontal health status than males. While subjects with a lower level of education and those who smoked had a higher prevalence of periodontal disease, those who cleaned their teeth twice daily had a lower prevalence of the periodontal disease. Almost all the subjects needed one form of periodontal treatment or the other, suggesting that intervention is required to halt the progression of the gingivitis and restore periodontal health in this group. Therefore, oral health education, enlightenment, and motivation towards the seeking of oral care are recommended in this group.

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