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Periodontal Diseases and Associated Risk Factors among Residents in Orlu, Nigeria

M. C. Ohamaeme[1*], J. N. Egwurugwu[2], I. G. Eberendu[3], U. F. Ogunnaya[4], C. N. Ekweogu[2] and S. D. Ejikunle[5]

[1]Department of Community Medicine, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria.
[2]Department of Human Physiology, College of Medicine, Imo State University, Owerri, Nigeria.
[3]Department of Paediatrics, Imo State University Teaching Hospital, Orlu, Nigeria.
[4]Department of Internal Medicine, Imo State University Teaching Hospital, Orlu.
[5]Department of Obstetrics and Gynaecology, Imo State University Teaching Hospital, Orlu, Nigeria.

Authors' contributions

This work was carried out in collaboration between all the authors. Author MCO designed the study, and supervised the research. Authors MCO, JNE, UFO, SDE and IGE wrote the manuscript. Authors MCO, JNE, UFO, CNE, SDE and IGE administered instruments. Authors MCO, JNE, IGE, SDE and CNE did statistical analysis and literature search. The final manuscript was edited by author MCO, JNE, CNE and IGE. All authors read and approved the final manuscript.

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ABSTRACT

The global burden of periodontal diseases is enormous with attendant health challenges especially in developing countries like Nigeria. This study assessed the risk factors associated with periodontal diseases in Orlu Local Government Area (LGA) of Imo State, Nigeria. This cross-sectional descriptive study evaluated 500 respondents randomly selected from the LGA. An interviewer administered questionnaire was used to collect the data which was analysed with descriptive statistics, and chi-square used to determine the level of significance set at $p \leq 0.05$. The results showed that the younger population, as well as males, were more likely to have periodontal diseases and this was statistically significant ($p<0.02$). It was also found that lower income earners were more at risk to developing periodontal diseases compared to higher income earners which was

**Corresponding author: E-mail: mcohams@yahoo.com;*

also significant (p<0.00). Those who used chewing stick or toothpaste with brush, and the respondents who brushed two or more times per day were less likely to have periodontal diseases compared to those who used water+ salt or alcohol and the respondents who brushed only once or less per day and these were also significant (p<0.05 and p<0.01 respectively). We recommend that regular dental check-ups, regular brushing of teeth, the creation of awareness, increased oral health education and inter-sectoral collaboration be embarked upon to achieve a better oral health.

Keywords: Periodontal diseases; risk factors; dental check-up; oral health education; Orlu.

1. INTRODUCTION

Periodontal diseases affect tissues around the gum and are usually seen as a chronic inflammatory disease [1]. An acute infection of the periodontal tissue is not usually reported to the dentist. The tissues that are involved in periodontal disease are the supporting structures around the teeth which include the gingiva, periodontal ligament, cementum, and alveolar bone [2]. Periodontal disease is considered to be an opportunistic infection as a result of interactions between the causative agent (dental plaque) and the host responses which may be modulated by genetic, environmental, and acquired risk factors [3].

Several distinct forms of periodontal diseases are known such as gingivitis, acute necrotising ulcerative gingivitis, adult periodontitis, and localised juvenile periodontitis amidst others. Although periodontal disease is thought to be widespread, serious cases of periodontitis are not common, however, Gingivitis, bleeding gum, dental plaque, and dental caries are frequent causes of periodontal diseases [4].

It has also been stated by several authors [1,5] that several risk factors play a role in the development of periodontal disease, the most important ones being age, oral hygiene including a pattern of brushing habit, hormonal factors, drugs, tooth decay, mal-occlusion of teeth, dietary habits and vitamin deficiencies. The number and type of bacteria present on the gingival tissue also play a role in the development of periodontal diseases. Furthermore, it was opined that, in considering other associated risk factors to periodontal diseases, it will be pertinent to state that the mechanisms by which the bacteria in the periodontal pocket cause tissue destruction in the surrounding regions are not fully understood [6]. Scurvy, a Vitamin C deficiency and pellagra, a Niacin deficiency, can also lead to bleeding gums and gingivitis [1,5,6]. Also, a higher prevalence of periodontal diseases can be attributed to socio-cultural differences in oral hygiene, poor access to dental treatment and availability of dental care centres [5,7]. Other risk factors to periodontal diseases according to Zadik et al. [7] could be attributed to genetic predisposition as well as socio-cultural and behavioural differences such as smoking, oral hygiene, and access to dental treatment among the populations. Another study [8] noted that the adoption of “westernised” diet by the Australian indigenous community has placed them as high risk population for dental caries and periodontal diseases. These indigenes were also said to show some of the highest rates in the world for Rheumatic fever which is a complication arising from periodontal disease.

On the prevalence of gingival disease in 10-12 years old in India [9], it was found that out of 1045 children sampled, 90% brushed once a day and 10% brushed twice daily, hence Ohamaeme et al, [5] therefore buttressed that number of times an individual brushes per day may influence the development of periodontal disease.

This study therefore assessed the risk factors leading to periodontal diseases and suggests how to ameliorate the condition in the populace.

2. METHODOLOGY

2.1 Study Area

The study was conducted in Orlu Local Government Area (LGA) of Imo State, South-East Nigeria. It is the second largest city in the State after Owerri, with an estimated population of 142,792 according to 2006 census and a 2016 projected population of 196,600 [10]. The LGA has 16 district areas which include Umunna, Umutanze, Okporo, Owerre Ebeiri, Umuzike, and Amaifeke. Others are Eziachi, Umudioka, Umuowa, Amike, Mgbe, Ihioma, Orlu rural, Ogberuru, Obibi-Ochasi and Ihitte-Owerre. It also houses the local government headquarters, the Imo State University Teaching Hospital (IMSUTH), and the Orlu International Market.

There are also various pharmaceutical companies, schools of Nursing and health technologies, Timber market and slaughter houses situated around the LGA. The major religion is Christianity with a few Muslim and Traditional worshippers. Several public and private primary, secondary and tertiary facilities are also situated within this LGA. The LGA also has a rich cultural heritage.

2.2 Ethical Approval

Ethical approval was sought and obtained from the Imo State University Teaching Hospital Ethics Committee. Purpose and procedure of the study was explained to each respondent and also the opportunity to withdraw from the study at will, emphasised. Permission was also obtained from school heads for children in the institutions utilised for the study.

2.3 Study Design

This was a cross-sectional descriptive survey conducted among the population aged 6-55 years.

2.4 Study Population

The study population included 500 male and female individuals selected from primary and secondary schools, dental care institutions in the LGA and the general population.

2.5 Study Instrument

A semi-structured interviewer administered questionnaire was utilised for this study. It was adopted from a study [5] and consisted of sections bordering on socio-demographics of respondents, oral hygiene and associated risk factors, as well as dental health seeking behaviour. The participants in this study ticked appropriately in the spaces provided in the questionnaire.

2.6 Sample Size Determination

The sample size was calculated using the formula for finite population.

$$n = \frac{Z^2\,p.q}{d^2}$$

Where

n= minimum sample size
Z= 1.96 (constant at 95% confidence)
P= 0.5 (at 50% population prevalence from previous study)
q= 1-0.05 (1-p)
d= degree of accuracy (usually set at 0.05)

Substituting for the above;

$$\frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2} = 384.16$$

Using attrition rate of 10% from previous studies thus;

$$\frac{10 \times 384.16}{100} = 38.4$$

$$384.16 + 38.4 = 422$$

422 was then increased to 500.

In order to increase the power of the study, the sample size was raised to 500 for the purpose of this study. This is in keeping with the fact that the larger the sample size, the greater the true reflection of the result to the population.

Five hundred (500) questionnaires in consonance with the final sample size were administered.

2.6.1 Inclusion criteria

All males and females who were apparently well and had no oral lesion at the time of this study.

All males and females within the age range of 6-55 years.

2.6.2 Exclusion criteria

All consenting males and females who were mentally ill, or declined to participate in the study.

2.7 Data Management

Data was collected, cleaned, coded and entered into Statistical Package for Social Sciences (SPSS) version 20. The results of 500 participants were tallied and analysed using descriptive statistics. Frequency tables and percentages were drawn and Pearson chi-square utilised to test level of significance set at $p \leq 0.05$. The oral hygiene status was thereafter grouped into two to compare methods of cleaning the teeth and teeth cleaning habits of respondents as risk factors to periodontal diseases. Respondents' health seeking behaviour about dental care was also collated as frequency tables and percentages for further risk factors to periodontal diseases.

3. RESULTS

The results in Table 1 show that periodontal disease was commoner among the age groups 16-25 years (27.2%), followed by 36-45 years (26.2%), hence youths and young adults more affected. It was also commoner among the males (59.4%), and these were statistically significant ($p<0.05$). It further showed that low income earners 159 (33.8%) had more affectation of periodontal diseases compared to those who earned more 46(9.8%), and this was also significant ($p< 0.05$). Level of education had no significant effect on the occurrence of periodontal disease among the study population.

Figs. 1 and 2 shows that as per the method of cleaning the teeth, tooth paste and brush was the commonest method (65.1%) while the use of alcohol was the least (0.4%). On the cleaning habit, 241 (47.9%) brushed twice a day, 217 (45.5%) brushed once per day and 5(0.4%) brush after every meal.

Table 3 shows that there was statistically significant difference between those who used chewing stick and tooth brush compared to those with water +salt or alcohol. Furthermore, there was statistically significant difference between those who cleaned their teeth twice or more per day compared to those who cleaned only once per day ($p<0.05$).

The table shows that 33.4% of the respondents allowed their dental problems to resolve by itself, 13.0% resorted to herbal medication, while 33.6% had never visited the dentist. It further showed that 42.0% did not know any dental care unit in the area while 8.6% did not see it necessary to visit a dentist.

Table 1. Sociodemographics of respondents

Variables	Number examined (n=500)	Number infected(n=500)	% Infected	Chi-square	p-value
Age range (years)					
6-15	45	40	8.5	16.867	*0.02
16-25	143	128	27.2		
26-35	65	65	13.8		
36-45	132	123	26.2		
46-55	115	114	24.3		
Total	*500*	*470*	-		
Sex					
Male	288	279	59.4	9.955	*0.02
Female	212	191	40.6		
Total	*500*	*470*	-		
Religion					
None	5	5	1.1	0.785	0.85
Christian	488	458	97.4		
Muslim	3	3	0.6		
Traditional Belief	4	4	0.9		
Total	*500*	*470*	-		
Level of education					
Non-formal	2	2	0.4	4.610	0.33
Primary	70	67	14.3		
Secondary	314	290	61.7		
College of education/ Polytechnic	49	47	10.0		
University	65	64	13.6		
Total	*500*	*470*	-		
Income level (#)/ month					
10,000-20,000	177	159	33.8	11.642	*0.00
21,000-30,000	127	119	25.3		
31,000-40,000	131	127	27.0		
41,000-50,000	19	19	4.0		
≥51,000	46	46	9.8		
Total	500	470	-		

**p≤0.05, Statistically significant*

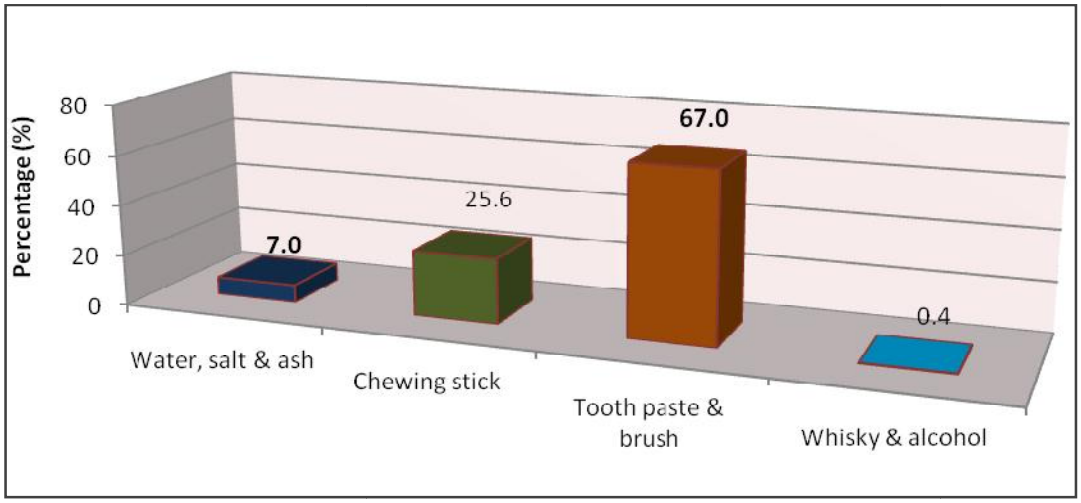

Fig. 1. Respondents methods of cleaning teeth

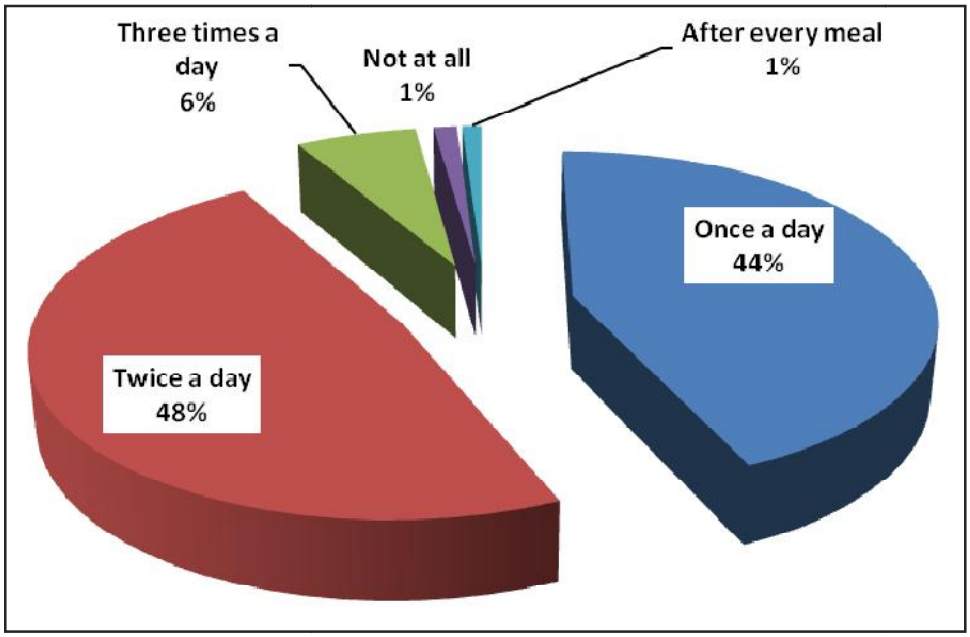

Fig. 2. Number of times of cleaning teeth by the respondents

Table 2. Test of significance on risk factors

Variable	n=500	Chi-square	p-value
Method of cleaning the teeth			
Chewing stick & brush	463		
Water+ salt/Alcohol	37	12.735	*0.05
Teeth cleaning habit			
Once per day	223	56.174	*0.01
≥Twice per day	277		

$p \leq 0.05$

Table 3. Respondents health seeking behaviour about dental care (Risk Factors)

Variable	Frequency	Percentage (%)
Type of treatment		
Problem resolved itself	157	33.4
Resorted to herbal medication	61	13.0
Went to hospital	169	36.0
Chemist /Drug-store	32	6.8
Self-medication	51	10.9
Total	470	100
Dental visits		
Never before	168	33.6
only once	92	18.4
Once every year	55	11.0
Twice a year	77	15.4
Only when the need arises	108	21.6
Total	500	100
Knowledge of dental units		
Do not know	211	42.0
Not enough	289	57.8
Total	500	100
Encouraging relatives and friends		
I will do so	355	71.2
If they like	101	20.2
Not necessary	43	8.6
Total	500	100

4. DISCUSSION

This study assessed the risk factors associated with periodontal diseases among inhabitants of Orlu Local Government Area of Imo State, Nigeria. The socio-demographic characteristics of the respondents showed that the age groups commonly affected with the disease were 16-25 years (27.2%), and 36-45 years (26.2%) with a male preponderance of 59.4%. These findings are in tandem with earlier studies [1,11,5], that periodontal diseases were commoner in the younger population. The above findings in this study might be due to dietary habits [1,8], as well as poor dental hygiene among the younger population groups. It has been observed that adoption of "westernised diet" and unhealthy diets places one at greater risk of periodontal diseases [8,13]. However, it contrasted with other studies [12,14] that periodontal diseases were commonest among the elderly population and that the disease increases with advancing age.

This study also showed that those who earned less were more predisposed compared to those with higher earnings and this was also statistically significant, $p<0.02$. This finding was also supported by another study [3] which noted that those with higher financial earnings were most likely to take care of their health and go for regular dental checks, hence prevention of risk factors leading to periodontal diseases.

On the oral hygiene status of the respondents, which is a known risk factor to the development of periodontal diseases, those who use chewing stick or toothpaste and brush had less likelihood to developing periodontal diseases compared to those who used water and salt or alcohol, this was also statistically significant ($p< 0.05$). Also this study showed that those who cleaned their teeth two times or more per day also had fewer tendencies to develop periodontal diseases compared to those who brushed less than once per day. These findings support other earlier works [7,9,15,16] which reported that frequent cleaning of the teeth more than once per day reduces the risk to getting periodontal diseases. This poor cleaning habit of one or none per day, may be as a result of belief, socio-cultural, and environmental factors where it was thought that periodontal diseases may be caused by black magic, worms, and non-regular dental check-up [17,18,19].

On the health-seeking behaviour of the respondents, a large number of them (36.0%) went to the hospital to access care, 33.4%

allowed the problem to resolve by itself while another 13.0% resorted to herbal medication. Furthermore, 33.6% had never visited a dentist while 42.0% did not know of any dental unit in the LGA. Based on the foregoing, the health seeking behaviour for dental care among the respondents was low. The above poor oral health seeking behaviour may be due to lack of knowledge and awareness of oral hygiene and non-regular dental care visits which are risk factors to periodontal diseases [7,16]. The prevailing economic challenges in the country may also play a role.

Our study further showed that those who had formal education were more affected though not statistically significant ($p>0.05$). Those who had formal education in this study may likely embrace non-traditional diets. Adoption of "westernised diet" places one at high risk of periodontal diseases [8]. On the Contrary, other authors have reported direct relationship between oral health and level of education [20,21,22,23].

5. CONCLUSION

In conclusion, method of cleaning the teeth, number of times of cleaning the teeth, socio-demographic characteristics and oral hygiene care cum poor dental checks are risk factors to periodontal diseases. We, therefore, recommend regular dental checkups, more dental clinics, increased oral health education and good dietary habits.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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