Periodontitis and Body Mass Index among Patients attending a Tertiary Hospital in Nigeria

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ABSTRACT

Objective: Studies have shown that an increased body mass index (BMI) may be a potential risk factor for periodontitis. The association has been linked to unhealthy dietary patterns containing insufficient micronutrients, and excessive sugars and fats. This study assessed the prevalence of patients who presented with signs and symptoms of chronic periodontitis that were also overweight or obese

Methods: A descriptive retrospective review was conducted on all patients who presented at the Periodontology Clinic of University of Port Harcourt Teaching Hospital with chronic periodontitis over five years (2015-2019). Data retrieved from patients' case notes were analyzed and presented as frequencies and percentages. Test for significance was done using Chi-square statistics, and the level of statistical significance was set at $P<0.05$.

Results: Of the one thousand, one hundred and eighty-nine (1,189) patients who attended the Periodontology outpatient clinic during the 5-year duration, five hundred and forty-nine (549) patients were diagnosed with chronic periodontitis. Age ranged between 18 and 75 years with a mean age of 41.6±13.9 years. There was a slight male predominance with male: female ratio of 1.14:1. More males were underweight and pre-obese than females. More patients who were overweight and pre-obese were in their third decade of life. A total of 27.1% pre-obese and 9.6% obese class 1 patients had chronic periodontitis involving three teeth while 27.6% pre-obese, 6.2% obese class 1 and 51.2% obese class 2 patients had chronic periodontitis of both anterior and posterior teeth.

Conclusion: One out of 3 patients that presented with chronic periodontitis were overweight and 1 out of 12 were obese

Key words: chronic periodontitis, overweight, obese, multiple teeth

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INTRODUCTION

Obesity was declared by World Health Organization (WHO) in 2002 as a global pandemic and is considered as a visible but neglected public health problem that overwhelms both the developed and less developed countries.[1] Excess body weight is said to be the sixth most important risk factor that

contributes to worldwide disease and potentiates a decline in life expectancy.[1,2]

Overweight and obesity are defined as abnormal or excessive fat accumulation that represents a risk to general health.[3] Obesity, a chronic disease with a multifactorial aetiology, is a risk factor for cardiovascular disease, certain types of cancers, type II diabetes as well as periodontitis.[1,2,4] Individuals who are obese have elevated serum levels of C-reactive proteins, interleukin-6, tumour necrosis factor-α and leptin which are known as markers of inflammation and are also closely associated with chronic inflammatory diseases.[5,6]

More so, there is increase in the knowledge of the active role, fat cells play in regulating inflammation and immunity.[7] Obesity can adversely affect the general health resulting in altered blood pressure, insulin resistance, dyslipidaemia and create a state of low-grade inflammation.[7-9] This explains the rationale upon which an association between obesity and periodontal disease is based. Overweight and obesity have been suggested to increase the susceptibility to periodontitis.[6] Periodontitis is a chronic inflammatory disease initiated by dental plaque biofilm and perpetuated by interactions between pathogenic microbes and host immune response.[1,7] It is considered one of the two most important global oral health burdens with a reported prevalence that ranges from 20% to 50% in the general population.[8-12] Various studies have been done to investigate this association, but the non-standardized and subjective approaches made them prone to bias.[13-20]

This study assessed the prevalence of chronic periodontitis in patients who were also overweight or obese

MATERIALS AND METHODS

A descriptive retrospective review was conducted on all patients who presented at the periodontology clinic of University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Rivers State with chronic periodontitis over five years (2015-2019). Ethical approval for the study was obtained from the Research and Ethics Committee of UPTH.

The data retrieved from the patients' case notes included; age, gender, height, weight, clinical diagnosis and periodontal treatment done. Of the 1189 one thousand one hundred and eighty-nine patients who attended the periodontology outpatient clinic within the study period, five hundred and forty-nine patients who met the inclusion criteria for the study were selected. All patients who presented at the Periodontology out-patient clinic with chronic periodontitis and had full complement of teeth were included while those with other periodontal diseases and chronic periodontitis with missing teeth were excluded.

The patients' age was grouped into young adults (17-40 years), middle-aged adults (41-64 years) and elderly (>65years).[1] BMI was calculated as the ratio of the subject's body weight (in kg) to the square of their height (in meters). BMI was used to categorize the patients as Underweight (<18.5), normal range (18.5–24.9), pre-obese (25.0–29.9), obese class I (30.0–34.9), obese class II (35.0–39.9), and obese class III (≥40) using the World Health Organization criteria.[20]

The data was subsequently analyzed using SPSS version 20 (IBM SPSS Armonk, New York) and presented as frequencies and percentages. Test for significance was done using Chi-square statistics, and the level of statistical significance was set at $P < 0.05$.

RESULTS

Table 1 shows the association between BMI class and some demographics of the patients. Five hundred and forty-nine patients had chronic periodontitis with a mean age of 41.6±13.9 years. There was a slight male predominance with M: F ratio of 1.14:1. More males were underweight {28(9.6%)} and pre-obese {93(31.8%)}, while more females were normal weight {151(58.8%)}, in obese I {22(8.6)} and obese II {3(1.2%)} categories. More patients who were overweight {16(12.3%)} and pre-obese {40(30.8%)} were in their third decade of life; while more patients with normal weight {71(53.8%)} and in obese I {12(9.1%)} category were in their fourth decade of life. Statistical analysis showed no statistical significance.

Table 2 shows the association between BMI class, number and type of teeth diagnosed with periodontitis treated 54(27.1%) pre-obese, 19(9.6%) obese class I patients had three teeth diagnosed with chronic periodontitis. 116(27.6%) pre-obese, 26(6.2%) obese class **I** and 5(1.2%) obese class 2 patients had chronic periodontitis diagnosed on both anterior and posterior teeth.

Table 1: Association between BMI class and demographic characteristics

Variable	Underweight n (%)	Normal Weight n (%)	Pre-obese n (%)	Obese I n (%)	Obese II n (%)	Total n (%)	χ2	P-value
Gender							6.14	0.189
Female	19(7.4)	151(58.8)	62(24.1)	22(8.6)	3(1.2)	257 (46.8)		
Male	28(9.6)	150(51.4)	93(31.8)	19(6.5)	2(0.7)	292 (53.2)		
Age (years)							16.18	0.881
17-19	2(15.4)	8(61.5)	2(15.4)	1(7.7)	0(0.0)	13(2.4)		
20-29	16(12.3)	61(46.9)	40(30.8)	11(8.5)	2(1.5)	130(23.6)		
30-39	10(7.6)	71(53.8)	38(28.8)	12(9.1)	1(0.8)	132(24.0)		
40-49	8(9.4)	45(52.9)	26(30.6)	6(7.1)	0(0.0)	85(15.5)		
50-59	7(6.1)	66(57.9)	32(28.1)	8(7.0)	1(0.9)	114(20.8)		
60-69	3(4.5)	46(68.7)	14(20.9)	3(4.5)	1(1.5)	67(12.2)		
≥70	1(12.5)	4(50.0)	3(37.5)	0(0.0)	0(0.0)	8(1.5)		
Clinical age group							4.71	0.788
Young Adult	28 (10.1)	142(51.3)	80(28.9)	24(8.7)	3(1.1)	277(50.5)		
Middle Age	17(6.9)	144(58.5)	67(27.2)	16(6.5)	2(0.8)	246(44.8)		
Elderly	2(7.7)	15(57.7)	8(30.8)	12(53.8)	0(0.0)	26(4.7)		
Total	47(8.6)	301(54.8)	155(28.2)	41(7.5)	5(0.9)	549(100.0)		

Table 2: Association between BMI class and number and type of teeth diagnosed with chronic periodontitis

BMI Class	**Number of teeth diagnosed with chronic periodontitis** 1 n (%)	2 n (%)	3 n (%)	Total n (%)	χ2	P-value
Underweight	6(12.8)	29(9.6)	12(6.0)	47(8.6)	23.0	0.003*
Normal	22(46.8)	165(54.4)	114(57.3)	301(54.8)		
Pre-obese	13(27.6)	88(29.0)	54(27.1)	155(28.2)		
Obese I	3(6.4)	19(6.3)	19(9.6)	41(7.5)		
Obese II	3(6.4)	2(0.7)	0(0.0)	5(0.9)		
Total	47(100.0)	303(100.0)	199(100.0)	549(100.0)		
BMI Class	**Type of teeth diagnosed with chronic periodontitis**					
	Anterior (A) n (%)	Posterior (P) n (%)	Anterior & Posterior (AP) n (%)	Total n (%)		
Underweight	3(11.1)	10(9.8)	34(8.1)	47(8.6)	7.60	0.470
Normal	13(48.1)	49(48.0)	239(56.9)	301(54.8)		
Pre-obese	8(29.7)	31(30.4)	116(27.6)	155(28.2)		
Obese I	3(11.1)	12(11.8)	26(6.2)	41(7.5)		
Obese II	0(0.0)	0(0.0)	5(1.2)	5(0.9)		
Total	27(100.0)	102(100.0)	420(100.0)	549(100.0)		

DISCUSSION

In this study, majority of the patients who were overweight 80(49.7%) and obese 27(58.7%) were young adults. This is similar to studies done in Saudi Arabia that reported a significant association between the measures of body fat and periodontal disease among the younger adults and not middle or older adults in their study. [21.] They reported that obese and extremely obese patients showed a statistically significant difference in the age group of 21-30 years and obesity was significantly associated with the prevalence of periodontal disease in all the three age groups (young, middle-age and old).[21] Though association between obesity and periodontitis has been consistent with a compelling pattern of increased risk of periodontitis in

overweight or obese individuals, the underlying pathophysiological mechanism remains unclear. It has been pointed out that the development of insulin resistance as a consequence of a chronic inflammatory state and oxidative stress could be implicated in the association between obesity and periodontitis. [7]

Obesity may be considered a low-grade systemic inflammatory disease as obese persons have elevated serum levels of C-reactive proteins, interleukin-6, tumour necrosis factor-α and leptin which are markers of inflammation that are closely associated with chronic inflammatory diseases.[9] Thus, association between obesity and periodontal disease; an inflammatory disease that results from complex interaction between pathogenic microbes and host immune response is highly probable. [5]

In this study, 47(8.6%) participants were underweight, 301(54.8%) had normal weight, 155(28.2%), 41(7.5%) and 5(0.9%) were pre-obese, obese class I and obese class II respectively. A study done in Benin-city, Nigeria reported that few participants (3.8%) were underweight, 52.6% had normal weight, 28.2%,12.2% and 3.2% were pre-obese, obese class I and obese class II respectively. [22] In both studies about half of the participants had normal weight, and 28.2% were pre-obese. This could be because both studies used participants drawn from a hospital.

In the present study, the prevalence of participants who presented at the clinic with periodontal disease was higher in males 292(53.2%) than females 257(46.8%), this finding is consistent with previously reported gender differences.[23] This may be because of the gender differences in fat metabolism. It has been reported that women generally have a higher amount of body fat than men since they are more effective in storing fat subcutaneously; men store fat intra-abdominally.[24] The mechanisms for different fat distribution in both sexes and interaction with respect to metabolic risk are unknown.[24] Obesity may increase the host's susceptibility to chronic periodontitis by modulating the host immune and inflammatory systems.[10, 22] Obesity also affects the host immunity by impairing the cell-mediated immune response and decrease lymphocyte immune function.[10, 22]

In this study, 54(27.1%) pre-obese, 19(9.6%) obese class I patients had three teeth diagnosed with chronic periodontitis and 116(27.6%) pre-obese, 26(6.2%) obese class **I** and 5(1.2%) obese class 2 patients had chronic periodontitis on both anterior and posterior teeth. There are no comparative studies reporting number and type of teeth associated with chronic periodontitis in obese population. However, other studies have reported increase in severity of chronic periodontitis with increasing fat deposits in obese individuals.[25-30]

This study was limited by the fact the patients' waist circumference measurement was not used to express obesity, did not assess the severity of periodontitis and the association between obesity and periodontitis. However, this study confirmed that people who are overweight and obese have a high tendency of having chronic periodontitis.

CONCLUSION

This study confirmed that individuals that are overweight or obese people have a high tendency to have chronic periodontitis and there is the need to educate them on the need to maintain good oral hygiene at all time.

Source of Support
Nil.

Conflict of Interest
None declared

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