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Correlation between Obesity and Periodontitis in Middle-Aged Women

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Abstract

Aim:
To determine the correlation between obesity and periodontal disease in middle –aged women.

Materials and methods:
The study was based on female patients aged between 30 to 60years without any other systemic diseases and without habits. Socio-demographic characteristics like occupation, income, education level were collected. The periodontal status of the participants were analyzed and recorded which included Oral Hygiene Index-Simplified (OHI-S), gingival index, pocket depth, clinical attachment loss and Russell's periodontal index. To assess obesity, indicators such as body mass index, waist circumference and waist hip ratio were used. The collected data was statistically analysed with SPSS 16.0 version.

Results:
Of the total 75, 20 participants were of normal BMI range, 27 overweight and 28 obese. The mean CAL in obese patients was 0.63±.99mm, in overweight patients 1.06±2.1mm and in non-obese patients it was 0.85±1.8mm. There is no significant difference in the mean CAL between groups. The P-Value correlating WC and CAL was 0.029. For WHR and CAL P-Value=0.870. Pearson Chi-Square test shows significant correlation between age and CAL (P-Value=0.010).

Conclusion:
The results indicate no significant correlation between obesity and periodontitis as evaluated using BMI, WC and WHR

Keywords*:* body mass index(BMI), obesity, waist circumference(WC), waist hip ratio(WHR).

INTRODUCTION

Obesity is a multifactorial disease in which there is an excessive accumulation of fat in the body as a result of interaction between environmental and genetic factors. A person is obese if his/her body mass index is greater than or equal to 30. WHO Global infobase showed an increase in the number of obese persons globally[1]. Data from the National family health survey III showed that in Tamil Nadu there is marked increase in obese women aged between 19-49years from 11% in NFHS - II to 15% in NFHS - III[2].

This complex disease is non-communicable and exacerbates or plays a role in the pathophysiology of many other diseases like cardiovascular, hypertension,oral disorders, type 2 diabetes, osteoarthritis and cholelithiasis. In obesity, the levels of adipokines such as adiponectin, leptin, IL-6, TNF-alpha, plasminogen activator inhibitor-1, angiotensin oven, vascular endothelial growth factor, C-reactive peptide secreted by adipose cells are altered. This alteration of adipokines is considered to contribute to the pathophysiology of obesity and its sequelae.

Periodontitis is the chronic inflammation of the periodontium caused by pathogenic bacterial microflora and their products which results in loss of attachment, loss of alveolar bone and eventually loss of tooth. The bacterial LPS activates the host immune response. The effect of nutrition on the immune response of the host has been proved. Although nutrition is not an absolute risk factor for periodontitis, it may play a role in maintaining optimal immunity and prevent periodontal disease.

The correlation between obesity and periodontitis has been proved by many studies in different populations[3,4,5,6]. However, the biological mechanisms underlying the pathophysiology and the link between both these diseases is yet to be determined. Evidence suggests that the inflammatory cytokines such as tumor necrosis factor alpha and interleukin-6 which are released by the adipocytes may be involved in the pathophysiology of periodontitis.

This study is aimed to determine the correlation between obesity and periodontitis in middle aged women without any other systemic diseases. BMI, WC and WHR are used to assess obesity. WC and WHR are used because BMI alone may not indicate if the weight is due to increased body fat or increased lean body mass.

MATERIALS AND METHODS:

The participants in this study included a total of 75 female patients aged 30 to 60years who visited the dental hospital. They were selected with the exclusion criteria of absence of any systemic diseases and adverse habits . An informed consent was obtained from them.

Socio-demographic characteristics like occupation, income, education level were collected.

The periodontal status of the participants were analyzed and recorded which included Oral Hygiene Index-Simplified (OHI-S), gingival index, pocket depth, clinical attachment loss and Russell's periodontal index. The pocket depth and clinical attachment loss were measured using a William's probe. Oral hygiene habits were also recorded.

To assess obesity, indicators such as body mass index, waist circumference and waist hip ratio were used. Anthropometric measurements like height, weight, waist and hip circumferences of the participants were measured. Hip and waist circumference was measured using a measuring tape. BMI was calculated using height and weight. WHR was calculated using their waist and hip circumference.

The collected data was analysed with SPSS 16.0 version. To describe about the data descriptive statistics cross tabulation, frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in independent groups the Unpaired sample t-test was used. For the multivariate analysis the one way ANOVA with Tukey's Post-Hoc test was used. To fit the regression model Logistic regression model with forward stepwise wald was used. To find the significance in categorical data Chi-Square test was used. In all the above statistical tools the probability value .05 is considered as significant level.

RESULTS:

This study included 75 middle aged female participants with no habits and no other systemic diseases . Of the total 75, 20 participants were of normal BMI range, 27 overweight and 28 obese. The mean CAL in obese patients was 0.63±.99mm, in overweight patients 1.06±2.1mm and in non-obese patients it was 0.85±1.8mm. There is no significant difference in the mean CAL between groups, which means, there is no significant correlation between BMI and CAL in this study. The Independent samples t-test showed moderately significant correlation between WC and CAL (P-Value=0.029). There was no significant correlation between WHR and CAL (P-Value=0.870). Pearson Chi-Square test shows significant correlation between age and CAL (P-Value=0.010). The results of logistic regression analysis showed that there is significant correlation between age and CAL (P-Value=0.005) and no correlation between the anthropometric measurements and CAL. Overall, the results indicate no significant correlation between obesity and periodontitis as evaluated using BMI,WC and WHR.

Table 1

Variable	(N=75) Frequency	Percent	Cumulative percent
Frequency of brushing			
once	51	68.0	68.0
twice	24	32.0	100.0
Income			
high	1	1.3	1.3
low	24	32.0	33.3
medium	50	66.7	100.0
BMIrange			
normal	20	26.7	26.7
overweight	27	36.0	62.7
Obese	28	37.3	100.0
WCrange			
upto 35 inches(normal)	40	53.3	53.3
>35 inches(high)	35	46.7	100.0
WHRrange			
upto .85(normal)	26	34.7	34.7
>.85(high)	49	65.3	100.0
CALrange			
zero	36	48.0	48.0
>0	39	52.0	100.0
PPDrange			
<3	70	93.3	93.3
3-3.99	1	1.3	94.7
>=4	4	5.3	100.0
AGErange			
<35yrs	24	32.0	32.0
35-40yrs	23	30.7	62.7
41-60yrs	28	37.3	100.0

Table 2

VARIABLES		N	Mean	Std. Deviation	Std. Error
OHI-S	Normal	20	2.1650	0.40298	0.09011
	Overweight	27	2.2315	0.53406	0.10278
	Obese	28	2.1929	0.40086	0.07576
	Total	**75**	**2.1993**	**0.44861**	**0.05180**
GINGIVAL INDEX	Normal	20	1.2405	0.34979	0.07822
	Overweight	27	1.2204	0.49376	0.09503
	Obese	28	1.2182	0.42365	0.08006
	Total	**75**	**1.2249**	**0.42738**	**0.04935**
POCKET DEPTH	Normal	20	2.0065	1.40855	0.31496
	Overweight	27	1.8537	0.76275	0.14679
	Obese	28	2.0186	0.91798	0.17348
	Total	**75**	**1.9560**	**1.01355**	**0.11703**
CLINICAL ATTACHMENT LOSS	Normal	20	0.8525	1.84287	0.41208
	Overweight	27	1.0670	2.11853	0.40771
	Obese	28	0.6311	0.99155	0.18739
	Total	**75**	**0.8471**	**1.68611**	**0.19469**
RUSSELL'S PERIODONTAL INDEX	Normal	20	1.9210	1.59028	0.35560
	Overweight	27	2.1719	1.82284	0.35081
	Obese	28	1.8307	1.16913	0.22094
	Total	**75**	**1.9776**	**1.52915**	**0.17657**

Table 3 T-Test Group statistics

WCrange		N	Mean	Std. Deviation	P-Value
OHI-S	Upto 35 inchs (Normal)	40	2.2238	0.44057	0.880
	> 35 inchs (High)	35	2.1714	0.46246	
GINGIVAL INDEX	Upto 35 inchs (Normal)	40	1.2403	0.44849	0.982
	> 35 inchs (High)	35	1.2074	0.40770	
POCKET DEPTH	Upto 35 inchs (Normal)	40	2.0370	1.22352	0.810
	> 35 inchs (High)	35	1.8634	0.70862	
CLINICAL ATTACHMENT LOSS	Upto 35 inchs (Normal)	40	1.2265	2.17172	0.638
	> 35 inchs (High)	35	0.4134	0.64397	
RUSSELL'S PERIODONTAL INDEX	Upto 35 inchs (Normal)	40	2.2595	1.89770	0.703
	> 35 inchs (High)	35	1.6554	0.87066	

Table 4

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
CLINICAL ATTACHMENT LOSS	Equal variances assumed	16.075	0.000	2.133	73	0.036	0.81307	0.38122	0.05329	1.57285
	Equal variances not assumed			2.257	46.691	0.029	0.81307	0.36022	0.08828	1.53787

Table 5 T-Test Group statistics

WHRrange		N	Mean	Std. Deviation	Std. Error Mean
OHI-S	Upto .85 (Normal)	26	2.0654	0.41947	0.08226
	> .85 (High)	49	2.2704	0.45138	0.06448
GINGIVAL INDEX	Upto .85 (Normal)	26	1.2223	0.46632	0.09145
	> .85 (High)	49	1.2263	0.41028	0.05861
POCKET DEPTH	Upto .85 (Normal)	26	1.9227	1.41196	0.27691
	> .85 (High)	49	1.9737	0.73787	0.10541
CLINICAL ATTACHMENT LOSS	Upto .85 (Normal)	26	0.8912	1.63327	0.32031
	> .85 (High)	49	0.8237	1.72972	0.24710
RUSSELL'S PERIODONTAL INDEX	Upto .85 (Normal)	26	1.8992	1.35487	0.26571
	> .85 (High)	49	2.0192	1.62595	0.23228

Table 6 AGE range*CAL range

			CALrange		Total
			Zero	*Above Zero*	
AGE range	Less than 35 yrs	Count	17	7	24
		% within CALrange	47.2%	17.9%	32.0%
	35 - 40 yrs	Count	11	12	23
		% within CALrange	30.6%	30.8%	30.7%
	41 - 60 yrs	Count	8	20	28
		% within CALrange	22.2%	51.3%	37.3%
Total		Count	36	39	75
		% within CALrange	100.0%	100.0%	100.0%

Table 7

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	9.248[a]	2	0.010
Likelihood Ratio	9.533	2	0.009
Linear-by-Linear Association	9.102	1	0.003
N of Valid Cases	75		

Table 8 Logistic regression

Variables	Sig.
Age	0.005
BMI	0.991
Waist circumference	0.199
WHR	0.597

DISCUSSION:

Obesity is a chronic multifactorial disease with increasing prevalence worldwide. It has several complications such as cardiovascular disease, type 2 diabetes mellitus, hyperlipemia, hypertension, atherosclerosis and cerebrovascular disease and affects the systemic health(8). Many studies have shown a link between obesity and periodontitis in different age groups among different populations[3,4,5,6,7]. The aim of this study was to evaluate the correlation between obesity and periodontitis in middle-aged women without any other systemic diseases and without any habits using BMI, WC and WHR. In obesity there is increased accumulation of fat in the adipose tissue. The adipose tissue plays several functions in the body. In obesity they are enlarged and produce pro inflammatory proteins such as TNF-alpha,IL-6, plasminogen activator inhibitor type 1 and many others.

Thus, studies indicate that inflammation may contribute to the sequelae of obesity [9,10,11,12,13].

An investigation by perlstein et al., in 1997 on the effect of obesity and hypertension on the severity of periodontitis in rats showed that obesity significantly contributed to the severity of periodontal disease (14).

In 2005, Dalla Vecchia CF et al., evaluated the link between overweight,obesity and periodontitis in adults. BMI was used to assess overweight and obesity.The study indicated, obese females who were non-smokers were seen to have increased risk for periodontitis than the non- obese group[15]. In the study by Saito et al., 2005[16] it was indicated that obesity had significant relationship with deep pockets in Japanese women even after adjusting for oral glucose tolerance test. The women of the were aged between 40 and 79 years old. Shimazaki et al[17] showed that metabolic syndrome increased the risk of periodontitis in women. The components of the metabolic syndrome included were abdominal obesity, triglycerides, HDL cholesterol level, blood pressure and fasting blood sugar level. The present study showed no association between obesity and periodontitis in women evaluated using BMI,WC and WHR which is in contrast to the above studies. Moreover this study evaluated women aged between 30 and 60 years old with no systemic disease other than obesity and no habits.

In the study by Kongstad et al.,2009[18], which evaluated adults to assess the relationship between BMI and periodontitis it was found that BMI may be inversely associated with periodontitis. Machado et al.,2005[19] showed no statistically significant relationship between periodontitis and hyperlipedemia. The study included sixty adults in the age range of 27years to 64years of which three were smokers.

Among the studies which evaluated the association between body weight and periodontal disease in young adults, some cross-sectional studies have suggested an association between the two, however no association was detected in the study of Ludin et al[20].

The limitations of this study was that the sample size was very small and it is not representative of the population. Further studies with larger sample size are required to establish the relationship between obesity and periodonttis in middle aged women.

CONCLUSION

The results of the present study showed no significant correlation between obesity and periodontitis in middle aged women. But studies in the literature have shown positive link between obesity and periodontitis in adults. Further studies are required to establish this association in middle aged women.

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