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Relationship Between Body Mass Index and Chronic Periodontitis

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ABSTRACT

Introduction: Obesity is regarded as unnecessary body fat in ratio to lean body mass. Besides being an established risk factor for cardiovascular and other systemic diseases, obesity has been suggested to be a potential threat for periodontitis as well.

Objective: The objective of the study was to learn relationship between body mass index (BMI) and periodontal disease.

Methods: This analytical cross-sectional study was conducted at People's Dental College from February 16 to April 15, 2021 after ethical approval. Seventy-two participants were selected conveniently who, on the basis of calculation of weight and height were allocated into two groups: Group A: participants with normal BMI, Group B: Obese/overweight individuals. Plaque index, gingival index, periodontal pocket, and clinical attachment loss were recorded in both the groups to assess the periodontal disease status. On basis of findings, the two groups were statistically compared.

Results: The result showed clinical attachment loss was significantly higher (P <0.001) in overweight/obese group than in normal BMI group (P = 0.001).

Conclusion: The findings of this study suggest that obesity and overweight can be a possible predisposing factor for periodontal disease.

Keywords: Body mass index; clinical attachment loss; obesity; periodontitis.

INTRODUCTION

Periodontitis is a long-standing inflammatory disease affecting supporting structures of teeth. It presents as progressive attachment and bone loss with partial or complete tooth loss eventually. It affects 10-15% of population and is regarded the most common factor for tooth loss among adults.[1] Studies have established association between periodontitis and systemic conditions like diabetes mellitus,[2] stroke,[3] cardiovascular disease,[4,5] preeclampsia and preterm low birth weight babies,[6] and other systemic diseases as well.

Obesity and overweight are defined as unnecessary body fat in ratio to lean body mass. Its backing factors include a complex interaction of extra caloric consumption, harmful food choices, inactive lifestyles, hereditary, medications, and some diseases. Obesity or overweight is today's most common disease with one billion people who are overweight, leading to at least 2.6 million death every year.[7,8] World Health Organisation (WHO) has considered obesity as one of today's most neglected public health problem that prevails in every region of the world.[9]

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Numerous studies suggest obesity as a factor that increases risk of periodontal disease.[10-15] Since there are only few studies showing the link between periodontitis and obesity in this part of the world, this study was conducted to assess possible link between periodontitis and obesity.

METHODS

This was an analytical cross-sectional study conducted at Department of Periodontics and Oral Implantology, People's Dental College and Hospital for two months from February 16, 2021 to April 15, 2021. Ethical approval was taken from Institutional Review Board of People's Dental College and Hospital (Ref. 1-18.2077/2078). Participants attending the Department were selected for the study on basis of convenience sampling technique.

Those patients with BMI ≥18.5, age group >35 years, absence of any systemic diseases and non-smokers were selected for the study. Individuals with systemic diseases, pregnant females, dependent on drugs having adverse effect on periodontium like calcium channel blockers and individuals who declined to consent were excluded.

After taking consent from the patients, Body Mass was recorded using Body Mass Index,[16] which is a method of assessing a person's body fat levels on basis of person's weight and height measurements. Body mass index was calculated by the following way: Body mass index = Weight (kg)/ Height (m^2). Participants were categorised into two

groups: Group A = Obese and overweight individuals (BMI >25 kg/m^2); and Group B - Healthy individuals (BMI <25kg/m^2).

The periodontal disease severity was recorded on the basis of clinical findings according to 1999 classification of periodontal disease and conditions which defines chronic periodontitis as an infectious disease resulting in inflammation within the supporting tissues of the teeth leading to progressive attachment and bone loss.[17] Clinically, severity was estimated on basis of the amount of clinical attachment loss (CAL) which is the distance from cementoenamel junction to the gingival margin as follows: i) Slight = 1 to 2 mm CAL; ii) Moderate = 3-4 mm CAL; iii) Severe = > 5 mm CAL. Following parameters were recorded as well to know the gingival and periodontal health: i) gingival index (GI); ii) plaque index (PI); iii) periodontal pocket depth (PPD); and iv) oral hygiene index-simplified (OHI-S). The statistical analysis was done using IBM SPSS Statistics for Windows, version 20 (IBM Corp., Armonk, N.Y., USA). The mean difference of various periodontal parameters with BMI was calculated using independent t-test. The association of BMI with clinical attachment loss was calculated using Chi-square test.

RESULTS

The mean age of obese group was 48.72±10.59 years and mean age of normal BMI group 46.28±9.67 years. The mean BMI of overweight and obese group was 28.93±3.46 kg/m^2 and the mean BMI of normal group was 22.35±2.28 kg/m^2.

No significant mean difference in oral hygiene (P = 0.652), severity of gingivitis (P = 0.586), and periodontal pocket depth (P = 0.403) was seen in between overweight/obese group and normal BMI group. However, clinical attachment loss was found to be significantly higher (P <0.001) in overweight/obese group (5.05±1.49 mm) than in normal BMI group (3.86±0.99 mm, Table 1). Significant association of severe clinical attachment loss was seen among those of overweight/obese group (25, 69.4%) than those with normal BMI group (11, 30.6%) (P = 0.001, Table 2). There was an almost equal distribution of male and female in both the groups (Figure 1).

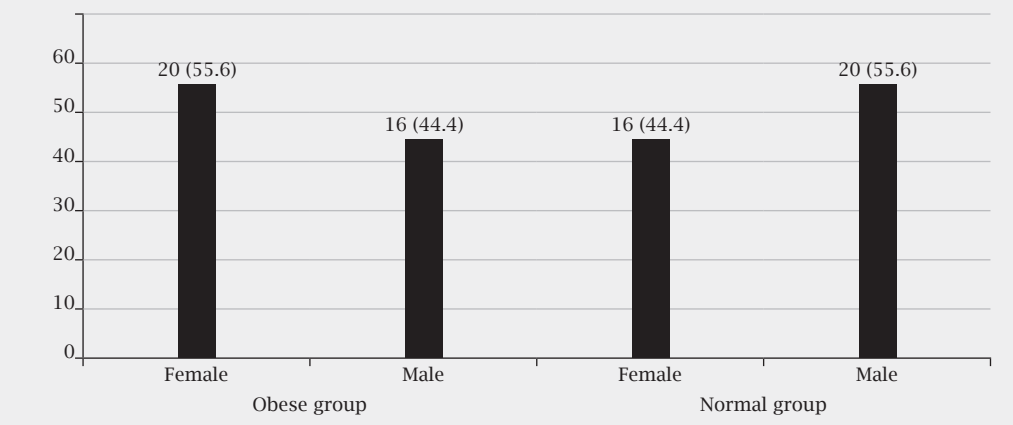

Figure 1: Sex distribution of study participants, n (%).

Table 1: Mean difference of various periodontal parameters with body mass index.

Periodontal parameters	No. of participants	Group (Mean±SD)		Mean difference	t value	P value
		Overweight and obese (Group A)	Normal (Group B)			
OHI-S	72	3.10±0.83	3.01±0.85	0.090	0.453	0.652
GI	72	1.51±0.47	1.45±0.49	0.063	0.548	0.586
PPD	72	4.85±1.63	4.61±0.54	0.24	0.841	0.403
CAL	72	5.05±1.49	3.86±0.99	1.19	3.997	<0.001

Independent t-test

Table 2: Association of body mass index with clinical attachment loss.

Group	Moderate CAL (mm)	Severe CAL	P value
(mm)	72	0.090	
Overweight and obese	11 (30.6%)	25 (69.4%)	0.001
Normal weight	25 (69.4%)	11 (30.6%)	

DISCUSSION

Link between periodontal disease and obesity has been illustrated in worldwide literature.[18,19] As obesity has been established as a risk factor for several chronic health conditions, it leads to immunoinflammatory modifications and has also been linked with periodontitis as well. Modifications in the host immune response due to the inflammatory markers, results in increased and exaggerated immune responses that has been seen in obesity. Adipose tissue (adipocytes) release several proinflammatory factors like chemokines and cytokines which affect the T cell function. Similar effect of proinflammatory factors is seen in periodontitis as well.[18-22]

In current study, subjects above 35 years of both genders were taken to evaluate the influence of obesity on periodontal health. There was no significant difference in OHI, GI, PPD seen in between overweight and obese group and normal BMI group. However, overweight and obese group had significantly higher clinical attachment loss ($P<0.01$). In 2014, a similar case-control study by Budunell et al. compared obese and non-obese patients for the evaluation of periodontal disease. The study showed significantly higher clinical attachment loss in obese group.[20] A prospective study by Gorman in 2012 demonstrated obesity is linked with periodontal disease progression irrespective of periodontal disease indicator.[21] Early evidence show obese individuals have two to three times more chances to suffer from periodontitis independently of classical risk factors (including sex, age, and tobacco use). Various clinical studies establishing the link between obesity and periodontitis have been published in the last 20 years. Similarly, a number of systematic reviews have been published in the last nine years as well.

Some studies[22] suggest that males have greater risk of developing periodontitis than females, while other articles[23] indicate females more likely to develop periodontitis, due to hormonal fluxes that increase gingival inflammation. However, Saxlin et al.[24] suggest that gender does not appear to impact the association between obesity and periodontitis. Also, on the basis of the results of present study, it is not possible to draw firm conclusion regarding the influence of gender on link between obesity and the progress of periodontal disease. Although many studies show evidence regarding link between obesity and periodontal disease, few studies suggest no significant association between obesity and periodontitis.[25,26]

There are few limitations of this study. First, it is a cross-sectional design which does not take into account the changes in the characteristics of the target population at both the group and individual levels. Second limitation of the study is that it does not take into consideration the serum inflammatory markers levels and the effects on treatment outcomes of periodontal therapy in both obese/overweight and normal individuals.

CONCLUSION

The findings in present study suggest that obesity and overweight can be a possible predisposing factor for periodontal disease. This finding can be helpful clinically in motivating people for the changes in their lifestyle and promoting healthy lifestyles that can benefit their general and oral health as well.

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Conflict of Interest: None.

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