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RELATIONSHIP BETWEEN PERIODONTAL DISEASE AND OBESITY- A CLINICAL STUDY

Dental Science

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ABSTRACT

Background- Obesity and periodontal disease are common chronic disease. This study attempts to study relationship between obesity oral bacteria and periodontal disease.

Method- Study included 350 subjects with age ranging 18-60 years. They were divided into 4 groups. Clinical parameters included Plaque Index- Gingival Index, Probing Pocket Depth and Clinical Attachment Loss. Anthropometric measurements like weight, height, waist circumferences and waist-hip ratio were evaluated.

Results- Comparing obesity and clinical periodontal parameters: Group-I (healthy) and Group-II (obese-I) were not statistically significant, whereas relationship between Group-1 (healthy) and Group-III (obese-II) as well as Group-1(healthy) and Group-IV (obese-III) were statistically significant .

Conclusion- Adipose tissue may serve as a reservoir for inflammatory cytokines, increasing body fat has likelihood, of stimulating active host inflammatory response in periodontal disease.

KEYWORDS

Obesity, periodontal disease, plaque index, gingival index, probing pocket depth, clinical attachment level.

INTRODUCTION-

Obesity has been implicated as a significant risk factor for several conditions including diabetes, cardiovascular disease, hypertension, stroke and osteoarthritis. In addition, the incidence of obesity has steadily increased over the last two decades[1]. The definition of obesity is based on body mass index (BMI), which is the ratio of body weight (kg) to body height (m) squared[2].

Obesity would be a potential risk factor for periodontal disease. Adipose tissue is no longer believed to be an inert storage center for excess lipids[3]. Immunologic activity of adipose tissue may play an important role in the development of insulin resistance as well as periodontal disease[4].

Periodontitis is a disease involving a group of multifactorial bacterial diseases. It has been shown that bacteria are necessary but not sufficient for disease initiation and progression. Thus, increasing attention has been focused on identifying risk determinants influencing the onset and progression of adult periodontitis. Abnormal fat metabolism may thus be important factors in the pathogens of periodontal disease[5]. Elevations in levels of lipids and glucose can be associated with periodontal disease and may contribute to an exacerbated inflammatory host response, alterations on the neutrophil functions and inhibition of growth factors by macrophages, reducing healing capacity of the tissues[6]. Therefore aim of present study was to assess periodontal findings in obese individuals and to determine the relationship between periodontal disease and **o**besity.

MATERIALS AND METHODS

The subjects were selected from patients visiting the Department of Periodontics, Jaipur Dental College and Hospital, Jaipur. Study group consisted of 350 subjects with age ranging between 18-60 years.

Exclusion Criteria- underweight, pregnant women and patient with contagious disease. After obtaining necessary written consent the clinical parameters and anthropometric measurements were evaluated. According to BMI cases divided into 4 groups group I: 18.5–24.9 (healthy), group II: 30.0–34.9 (obese-I) group-III: 35.0–39.9 (obese-II) and group-IV : >40.0 (obese-III).

Anthropometric Measurements[7]:

The anthropometric measurements like weight, height, waist circumference (WC) and waist hip ratio (WHR) were assessed.

Height (cm) of each participant was measured using measuring tape and body weight (kg) was measured using mechanical flat scale. Body mass index (BMI) of each subject was calculated. WC and Hip Circumference (HC) were measured using measuring tape. WC was measured to the nearest centimeter at narrowest point between umbilicus and rib cage and HC was measured at the widest part of the body below the waist. WHR was calculated as the ratio of WC to HC. According to WHO guidelines, healthy was defined as BMI 18.5-24.9 kg/m2 and obesity was defined as BMI >30kg/m2. Obesity based on WC was defined as WC >102cm in men and >88cm in women. Obesity based on WHR, was defined as a WHR >0.90 for men and > 0.85 for women. Clinical parameters: Plaque Index[8], Gingival index[9], Probing pocket depth and Clinical attachment level were evaluated.

Statistical methods:-

Descriptive statistical analysis has been carried out in present study. Results on continuous measurements are presented on mean+ SD.

Analysis of variance (ANOVA) used to compare 4 groups and to determine differences if any, both within groups and between groups.

RESULT-

Comparison of Plaque Index (PI) (0.1664), Gingival Index (GI) (0.0512), Probing Pocket Depth (PPD) (0.0432) and Clinical Attachment Level (CAL) scores (0.0564) between Group-I and Group-II were statistically non significant, while comparison of PI (0.0006), GI (0.0011), PPD (0.0011) and CAL scores (0.0010) between Group-I and Group-III were statistically significant (P<0.001) and between Group-I and Group-IV also statistically significant PI,GI,PPD and CAL (P <0.0001). (Table 1)

Table 1: One way ANOVA test was used for comparison between Obesity and clinical periodontal parameters based on Body Mass Index (BMI) amongst various groups.

Clinical Parameters	Group-I v/s Group-II p-value	Group-I v/s Group-III p-value	Group-I v/s Group-IV p-value
Plaque Index	0.1664	0.0006*	0.0001*
Gingival Index	0.0512	0.0011*	0.0009*
Probing Pocket Depth	0.0432	0.0011*	0.0003*
Clinical Attachment Level	0.0564	0.0010*	0.0006*

Significance: *   S – Significant (P<0.05)

Obesity and clinical periodontal parameters were compared based on waist circumferences (WC) among various groups. Comparison of PI (0.1884), GI (0.0601), PPD (0.0663) and CAL scores (0.0666) between Group-I and Group-II were statistically non significant. Comparison of PI (0.0012), GI (0.0010) PPD (0.0011) and CAL scores (0.0013) between Group-I and Group-III were statistically significant (P<0.001) and between Group-I and Group-IV statistically significant.

(P<0.0001). (Table 2)

Table 2: One way ANOVA test was used for comparison between Obesity and clinical periodontal parameters based on Waist Circumference (WC) amongst various groups.

Clinical Parameters	Group-I v/s Group-II p-value	Group-I v/s Group-III p-value	Group-I v/s Group-IV p-value
Plaque Index	0.1884	0.0012*	0.0001*
Gingival Index	0.0601	0.0010*	0.0001*
Probing Pocket Depth	0.0663	0.0011*	0.0003*
Clinical Attachment Level	0.0666	0.0013*	0.0004*

Significance: * S – Significant (P<0.05)

Obesity and clinical periodontal parameters were compared based on waist hip ratio (WHR) among various groups. Comparison of PI (0.1384), GI (0.0301), PPD (0.0663) and CAL scores (0.0566) between Group-I and Group-II statistically non significant. Comparison of PI (0.0010), GI (0.0010), PPD (0.0009) and CAL scores (0.0008) between Group-I and Group-III statistically significant (P<0.001) and between Group-I and Group-IV statistically significant PI, GI, PPD and CAL P<0.0001. (Table 3)

Table 3: One way ANOVA test was used for comparison between Obesity and clinical periodontal parameters based on Waist Hip ratio (WHR) amongst various groups.

Clinical Parameters	Group-I v/s Group-II p-value	Group-I v/s Group-III p-value	Group-I v/s Group-IV p-value
Plaque Index	0.1384	0.0010*	0.0001*
Gingival Index	0.0301	0.0010*	0.0001*
Probing Pocket Depth	0.0663	0.0009*	0.0003*
Clinical Attachment Level	0.0566	0.0008*	0.0003*

Significance:
* S – Significant (P<0.05)

DISCUSSION-
Recent studies have showed that obesity could be a risk factor for periodontal disease[10].

Anthropometric measurements namely BMI, WC, WHR were compared between Group-I (Healthy), Group-II (Obese 1), Group-III (Obese 2) and Group-IV (Obese 3). All the anthropometric measurements had higher values in the obese groups when compared with healthy subjects. The relationship between Group-I (Healthy), and Group-II (Obese1) was not statistically significant whereas the relationship between Group-I (Healthy) and Group-III (Obese 2), as well as Group-I (Healthy) and Group-IV (Obese 3) were statistically significant suggesting that the duration of obesity plays an important role in the severity of periodontal inflammation.

This can be supported by Saito et al[11] they reported increased BMI and WHR were associated with increasing risk of periodontitis. Berg A.H et al[12] found significant correlation between BMI and plasmatic concentrations of TNF-α, which may suggest that obesity may lead to an exacerbation of periodontal disease because of the higher load of circulating cytokines.

Recent evidences have shown that insulin resistance is a link between obesity & periodontal disease as TNF-α is produced in both the conditions. TNF-α produced by adipose tissue causes exacerbation of periodontal disease and the one produced by periodontal disease help perpetuate insulin resistance seen in obesity[13;14].

Amongst varies anthropometric measurements like BMI, WC, WHR, WHR as an obesity indicator has been found to have a stronger positive relationship with periodontal disease[15].

The clinical parameters like PI, GI, PPD, CAL were compared between Group-I (Healthy), Group-II (Obese1), Group-III (Obese 2), Group-IV (Obese 3). There was statistically no significant relationship between Group-I (Healthy) and Group-II (Obese1). However, there was significant relationship between Group-I (Healthy) and Group-III (Obese 2) as well as Group-1 with Group-IV (Obese 3).

This evidence suggests that adipose tissue may serve as a reservoir for inflammatory cytokines, the increasing body fat has likely hood, of stimulating an active host inflammatory response in periodontal disease. This is an accordance with the study by Wood et al[6] who noted a correlation between BMI, WHR and various clinical periodontal measures including PI, GI, PPD, CAL.

CONCLUSION
Molecular biology studies are necessary for better understanding of mechanism and biological foundation of the association between obesity, periodontal disease and insulin resistance. Before any progress in the understanding of this relationship, periodontists should counsel obese patients in relation to possible oral complications of obesity, to diminish morbidity for these individuals. This counselling should include the measurement of BMI and WHR for periodontal risk evaluation on a regular basis.

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