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Research Article

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The effect of obesity on the periodontal health status

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Abstract

Background: Obesity increases the host's susceptibility by modulating the immune and inflammatory systems in a manner that predisposes to inflammatory tissue destruction and leaves an individual at greater risk of periodontitis.
Aim of the study: this study was designed to compare periodontal health status of patients with normal weight and obese patients.
Materials and methods: The studied sample consisted of (60 females subjects) aged 25-35 years who attended to the teaching hospital of the college of dentistry/Baghdad University. The age was recorded according to the last birthday **(WHO, 1997)**[1]. They should be non-smoker, systemically healthy; shouldn't wear any fixed or removable dental prostheses or orthodontic appliance.The sample was divided into 3 groups according to their body mass index (BMI), each group included 20 subjects. The first group was the normal weight group (Group N), and their BMI was (18.50 - 24.99)the second group was the pre-obese group (Group P) (BMI was 25.00 - 29.99)andthe third group was the obese group (Group O) (BMI was ≥30.00). Plaque index PLI, gingival index GI and bleeding on probing BOP were measured for all groups.
Results: PLI was highly significant in group (O) and (P) than in the normal group (N)**.** GI was higher in groups (O) and (P) than in the normal group (N) with high significant difference and by using the chi- square to compare the BOP score 1 among the three groups, we found that score 1 was higher in the obese and the pre-obese group than the normal weight with high significant difference
Conclusion: Plaque index, gingival index and bleeding on probing scores were significantly higher in the group of subjects with obesity.

Keywords: obesity, normal weight and periodontal disease.

Introduction

Bacillary Periodontitis it can be defined as "an inflammatory disease of the supporting tissues of the teeth caused by specific microorganism or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession, or both" **(Carranza, 2009)**[2]. Periodontitis is characterized by deepened periodontal pockets, bleeding after pocket probing, suppuration and loss of alveolar bone **(Williams et al., 1996)**[3]**.**

Gingivitis is a non-destructive periodontal disease (**AAP, 2000)**[4], and an inflammatory lesion confined to the tissues of the marginal gingiva in the absence of clinical attachment loss **(Page, 1986)**[5]**and (Albandar and Kingman, 1999)** [6]. Gingivitis is mainly of two

types **(Armitage, 1999)**[7]plaque induced and non-plaque induced gingival lesions. Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health **(WHO, 2006)**[8]**.**Obesity is an unhealthy accumulation of body fat with an excessively high amount of adipose tissue in relation to lean body mass **(Donatelle, 2002)**[9]**.**

Obesity increases the host's susceptibility by modulating the immune and inflammatory systems in a manner that predisposes to inflammatory tissue destruction and leaves an individual at greater risk of periodontitis **(Iacopino and Cutler, 2000)**[10]. Obesity has been postulated to reduce blood flow to the periodontal tissues, promoting the development of periodontal disease **(Shuldiner et al., 2001)**[11]**.** Periodontal blood vessels in obese persons show a thickening in their innermost membrane, which indicates diminished blood flow in the periodontium **(Saito et al 2001)**[12]. One of the reasons for the association between obesity and periodontal disease include the social stigma associated with obesity in younger adults. Obesity for this age group may be a greater source of chronic stress than in older adults where increased body weight is considered more acceptable. Stress and how an individual copes with stress have been shown to increase a person's risk for periodontal disease **(Al-Zahrani et al., 2003)**[13]**.** Recent studies have indicated that maintaining a normal weight by regular physical activity is associated with lower periodontitis prevalence **(Merchant et al., 2003)**[14]**; (Al-Zahrani et al., 2005)**[15]. **(Al-Zahrani et al. in 2003)**[13] have assessed the association of BMI and periodontal disease among adults aged 18-34 years and observed that the prevalence of periodontitis was 76% higher among obese individuals. Using the classification and regression tree (CART) method, it has been suggested that obesity is second only to smoking as the strongest risk factor for inflammatory periodontal tissue destruction **(Nishida et al., 2005)**[16]**.** In a cohort of 241 otherwise healthy Japanese subjects, reported that obesity has a significant association with periodontitis in terms of BMI, body fat, and maximum oxygen consumption (**Saito et al., 1998)**[17]**.** In Copenhagen City, a study found that BMI was inversely associated with CAL but positively related to BOP **(Kongstad et al., 2009)**[18]. Study of the Fourth Korean National Health and Nutrition Examination Survey found that abdominal obesity is significantly correlated with periodontitis **(Kim et al., 2010)**[19]**.**

Materials and Methods

The studied sample consisted of (60 females subjects) aged 25-35 years who attended to the teaching hospital of the college of dentistry/Baghdad University. The age was recorded according to the last birthday **(WHO, 1997)**[1]. They should be non-smoker, systemically healthy; shouldn't wear any fixed or removable dental prostheses or orthodontic appliance.

All participants were carefully informed about the aims of the investigation and they were free to withdraw at any time during the study. The sample was divided into 3 groups according to their BMI, each group included 20 subjects. The first group was the normal weight group (Group N), their BMI was (18.50 - 24.99) .The second group was the pre-obese group (Group P) (BMI was 25.00 - 29.99) **(WHO, 2004)**[20] .The third group was the obese group (Group O) (BMI was ≥30.00).The weights of the participants were measured to the nearest 0.1 kg on an electronic digital scale which was placed on flat floor. Shoes and head covering were removed and minimum clothes kept on. 500 grams were subtracted from the total weight which represents the weight of the cloths **(Trowbridge, 1988)**[21] while the height of the individuals were measured using height measuring tape placed on flat wall, measures recorded to the nearest of 0.1 cm. Each individual height was measured with bare foot, feet are parallel to each other and pointed forward, heels shoulders and occipital touching up right wall, the eyes looking straight and the arms were hanging at the side in the natural manner. A head-pressing piece was gently lowered making contact with of top of the head; the exact reading can be read easily from the marker **(Trowbridge, 1988)**[21].The participants were examined intra orally to determine the plaque index (PLI) **(Silness and Loe 1964)**[22], Bleeding on probing (BOP) **(Newbrun, 1996)**[23] and Gingival index (GI) **Loe and Sillness (1963)**[24].

Results

In this study the mean of BMI for group (N) was 21.2675, the mean of the BMI for group (P) was 27.342 while the BMI for group (O) was 34.06 as showed in table (1).The mean of PLI for group (N) was 1.07; the mean of the PLI for group (P) was 1.39 while the PLI for group (O) was 2.02 as showed in table (2). PLI was highly significant in group (O) and (P) than in the normal group (N) as showed in table 3.The mean of GI for group (N) was 0.98, the mean of

the GI for Group (P) was 1.57 and the GI for Group (O) was 1.95 as showed in table 2. GI was higher in groups (O) and (P) than in the normal group (N) with high significant difference. The GI was higher in group (O) than group (P) with significant difference as showed in table 3. The descriptive statistics of the BOP for group (N) score 0 was 806 while score 1 was 1198, in group (P) score 0 for BOP was 694 while score 1 was 1314 and finally in group (O) BOP score 0 was 356 and score 1 was 1808 as showed in table 4. Using the chi- square to compare the BOP score 1 among the three groups, we found that score 1 was higher in the obese and the pre-obese group than the normal weight with high significant difference as showed in table 5.

Table (1) descriptive statistics of the BMI

Groups	Number	Minimum	Maximum	Mean	SD
Group(N)	20	18.02	24.4	21.2675	1.75
Group(P)	20	25.3	29.8	27.34	1.42
Group(O)	20	30.1	44.4	34.06	3.73

Table (2) descriptive statistics of the PLI and GI

Groups	Number	index	Minimum	Maximum	Mean	SD
Group (N)	20	PLI	0.6	1.6	1.07	0.24
	20	GI	1	2.1	0.98	0.25
Group (p)	20	PLI	0.88	2	1.39	0.26
	20	GI	1	2.1	1.57	0.33
Group (O)	20	PLI	1.09	2.6	2.02	0.34
	20	GI	1.4	2.6	1.95	0.35

Table (3) t -test for the PLI and GI

Groups	Index	T test	P value	Sig
Group N & Group O	**PLI**	**-10.118**	**<0.001**	**HS**
	GI	-10.580	<0.001	**HS**
Group N & Group P	**PLI**	**-3.929**	**<0.001**	**HS**
	GI	-6.142	<0.001	**HS**
Group P & group O	**PLI**	**-6.555**	**<0.001**	**HS**
	GI	-3.523	0.001	**S**

P<0.05 NS P>0.05 S P>0.001 HS

Table (4) BOP

	0	**1**	total
BOP (Group N)	806	1198	2004
BOP (Group P)	694	1314	2008
BOP (Group O)	356	1808	2164

Table (5) Chi square for the BOP

Chi square	Df	P value	sig
308.421	2	<0.001	HS

Discussion

Obesity was the fastest growing health-related problem in the world **(Hirotomi T et al, 2006)**[25]. The link between periodontitis and obesity is still controversial. Our study is trying to study that link in Iraqi young females aged 25-35 years old**.** There were numbers of epidemiological studies have examined the association between obesity and periodontitis in many countries such as Japan, United States, Brazil, United Kingdom, Jordan, Iran and korea **(Saito et al, 2001**[12]**; Al-Zahrani et al, 2003**[13]**; DallaVecchia et al, 2005**[26]**; Reeves et al, 2006**[27]**; Khader et al, 2008**[28]**).**
In this study, the PLI was highly significant in the obese group (O) and the pre obese group (P) than in the normal group (N), this elevation could be due to the social stigma associated with obesity **(Haslam et al., 2005)**[29]**.** Another explanation may be due to psychological factors that associated with obesity as stress and depression **(Alexandrina, 2010)**[30]**.**The mean value of the GI was found to be higher in the obese group than the normal weight group, this indicated more disease severity in the obese group and it is a result of more plaque accumulation in the obese group as the plaque is the causative factor of gingival inflammation. This was in agreement with **Winston et al. in 2002**[31]in his two- year longitudinal study; which found that subjects with higher BMI scores had significantly more gingival inflammation and bleeding. A high significant difference in the percentage of BOP was found in the obese group whether they have gingivitis only or periodontitis than the normal weight group and the pre obese. This is inconformity with the work of **Winston et al in 2002**[31]who found that obese persons had more bleeding sites than those with normal weight.

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