



The Association Between Obesity And Periodontitis

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Introduction:

Obesity

- It is an excess amount of body fat in proportion to lean body mass.
- It is estimated that 312 million worldwide, **43.8 %** of the population in KSA are obese
- Obesity besides being a risk factor for several conditions including diabetes, cardiovascular disease, hypertension, stroke and osteoarthritis, it is suggested to be a risk factor for periodontitis. The first report was in animals in **1977** when Pearlstein observed histopathological changes in the periodontium in hereditary obese Zucker rats. Then in **1998**, Saito T reported an association between obesity and periodontal disease in humans.

The aim of this review:

To define the association between obesity and periodontitis. To determine the necessity to consider obesity as a risk factor for periodontitis. To initiate awareness among dental clinicians to implement dental hygiene care prevention measures for obese patients.

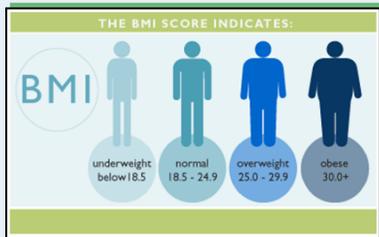
Measurement of body fat :

Most common measurement of body fat is the:

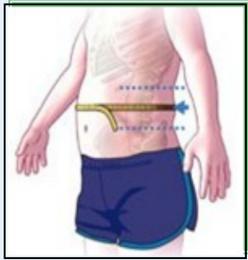
1) Body Mass Index (BMI)

Divided in 4 categories

$$BMI = \frac{\text{weight (kg)}}{\text{height}^2 \text{ (m}^2\text{)}}$$



2) Waist Circumference (WC)



Normal: Male 94 cm, Females 80 cm

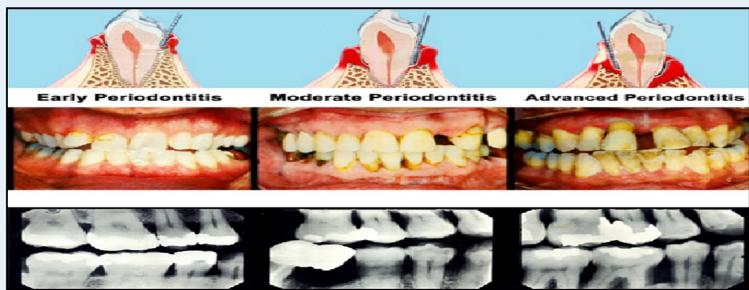
3) Waist-Hip Ratio (WHR)



Normal: Male < 0.85, Female < 0.75

Periodontal diseases:

- They are a group of inflammatory diseases that affect the supporting tissues of the dentition.
- It is **estimated** that 50% of the USA adult population is affected and higher prevalence in KSA.
- Several different approaches to **measure periodontal disease** (both pocket depth and attachment loss are important parameters).
- Classified** as plaque-induced gingivitis, chronic and aggressive periodontitis.
- Chronic periodontitis** is divided into early, moderate, and severe periodontitis.



The hypothesis of obesity as a risk factor for periodontal disease was supported by several epidemiological studies:

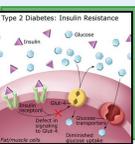
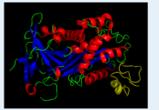
Author/ year/ country	sample	Indexes used	Result
Saito T (1998) Japan	241 healthy Japanese individual	Periodontal examination (CPITN) - Questionnaire (BMI)	First time an association between obesity and periodontal disease in humans. Risk periodontitis was 3.4 in persons with BMI of 25 to 29.9 kg/m ² , and 8.6 in BMI above 30 kg/m ² .
Saito T (2001) Japan	643 adult (19 to 79) years old	WHR, BMI and periodontal examination.	Individuals with high BMI and waist-to-hip ratio presented significantly greater risk of developing periodontitis.
Al-Zahrani (2003) USA	13,665 individuals divided in 3 groups: younger (18 to 34) years, middle-aged (35 to 59) years, (60 to 90) years	BMI, WC and periodontal examinations	Reported significant association between obesity and prevalence of periodontal disease, only among 18 to 34 years. The prevalence of periodontal disease was 76% higher among young obese (BMI >30 kg/m ²). Also young persons with high WC (>102 cm in men; >88 cm in women) have 2.27 times greater odds of having periodontal disease.
Saito T (2005) Japan	584 Japanese women (40 - 79) years	BMI, WHR, body fat, oral glucose tolerance test, periodontal examination	Obesity was associated with deep pockets in Japanese women, even after adjusting for oral glucose tolerance test.
Anne F Reeves (2006) USA	2452 nonsmoker aged 13-21 years	BMI and WC and periodontal examinations	Among adolescents aged 17 to 21 years, each 1-kg increase was associated with a 6% increase in risk of periodontitis. Similarly, each 1-cm increase in WC was associated with a 5% increase in risk of periodontitis.
D. Ekuni (2007) Japan	618 Students (18-24) years	BMI, body fat, periodontal examination CPITN	The BMI of all subjects was < 30 kg/m ² . Age and BMI were significantly associated with the community periodontal index. Logistic regression analysis revealed a 16% increased risk for periodontitis per 1-kg/m² increase in BMI.
Khader (2008) Jordan	340 persons (18-70) years	Questionnaire, periodontal examination	14% of normal weight subjects had periodontal disease whereas 29.6% of overweight and 51.9% of obese participants had periodontal disease. Periodontitis was more prevalent among subjects with high WC and among subjects with high WHR.

The mechanism of the association between obesity and periodontitis

A variety of potential mechanisms could explain the association between obesity and periodontitis (Biological and Health risk behavior mechanism)

Biological mechanism:

- visceral fat enhanced the expression of **Plasminogen activator inhibitor-I (PAI-I)** that decrease blood flow in the Periodontium to promote the development of periodontitis
- Obesity triggers **immune response** generating a chronic subclinical systemic inflammation. Adipocytes actively produce cytokines including **tumor necrosis factor alpha (TNF-alpha)**, **IL-6**, and to some degree **IL-1** which increases in cytokines stimulate acute immune response, liver produce C-reactive protein and fibrinogen.
- increase the apoptosis of pancreatic β cells that is caused by fat generate an immune response that will interfere with glucose transporters, **inhibiting insulin signaling** causing the body to develop an inflammatory state
- significant association between periodontitis and **serum levels of AST, ALT, cholinesterase, and AST-to-ALT ratio**, suggesting that subjects with periodontitis also tend to have hepatic steatosis. Visceral fat which leads to hepatic steatosis, may also increase the risk of periodontitis.



Health Risk Behavior mechanism:

- Unhealthy dietary patterns** with insufficient micronutrient increasing the risk for periodontal disease. Poor dietary patterns may affect oral tissues and the immune response.
- Psychosocial stress** associated with overweight may affect periodontal health through physiological and behavioral pathways. (alter blood and salivary flow, decreasing the immune response, affect oral health behaviors)



The association between obesity and periodontitis among young age.

- In (2003) AL-Zahrani reported that there is an association between obesity and periodontitis in younger adults (18-34). **The prevalence of periodontitis disease was 76% higher in young obese.**
- In (2005) an epidemiological study by same author reported that a **three health-enhancing behaviors (maintain healthy weight, Eat healthy diet and exercise)** was associated with a lower prevalence of periodontitis by (**40%, 29%, 16%**). Each one of the three behaviors had a biological plausibility by which it could protect against periodontitis

Conclusion

Obesity has taken an epidemic proportion, both in Saudi Arabia and internationally. Several studies that investigated obesity and periodontitis agreed about the presence of an association. They also suggest that obesity is a potential marker for periodontitis especially among youth.

Several biological mechanisms have been proposed. The underlying mechanisms may involve an interaction of health risk behaviors, particularly, among adolescents and biological factors. Including unhealthy dietary habits, alterations in host immunity and increased psychosocial stress. Adipose tissue produces a vast amount of cytokines and hormones, collectively called adipokines which may modulate periodontitis.

Maintaining a normal body weight, eating a well-balanced diet and indulging in physical activity shown to reduce the severity of periodontitis, as well as other chronic health conditions.

Dental professionals should be trained to promote a healthy lifestyle as part of their dental education. Periodontal health, and oral health in general, has to be considered as part of an individual's overall health, and Preventive strategies that are suitable for most of the chronic diseases may also be suitable for preventing or reducing the rate of periodontitis progression. Therefore, it may be useful to include an evaluation of BMI and waist circumferences on a regular basis in university general and oral health examination.

Reference:

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