

## PERIODONTAL LINK WITH OBESITY: DOES IT EXIST?

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### ABSTRACT:

Obesity is a major public health concern in both developed and developing countries. It is one of the several risk factors for various systemic conditions which can contribute to accentuation of periodontal diseases by affecting metabolic and immune parameters which are directly related to inflammatory conditions.

So, there exists a need to co-relate obesity with severity of periodontal disease. The mechanism co-relating includes adipose tissue derived cytokines and hormones called adipokines that modulate periodontitis.

The main objective of this study was to probe if any relationship exists between periodontal disease and obesity.

**Keywords:** Obesity, Periodontitis, Systemic disease, Adipokines.



### INTRODUCTION:

Obesity is an emerging chronic disease associated with relevant morbidity and mortality, not only in high-income but also in medium- and low-income countries. This condition has been associated with adverse effects on chronic health conditions, such as diabetes mellitus (DM), hypertension, depression, infectious diseases, and all-cause mortality. Systematic reviews by Chaffee et al (2010) [1] and Suvan et al (2011) [2] have supported evidence that an association between obesity status and periodontal disease exist. It is suggested that lipopolysaccharide of Gram-negative periodontal bacteria could lead to hepatic dyslipidemia [3]. In addition, white adipose tissue is responsible for secreting pro-inflammatory cytokines. Furthermore, expansion of adipose tissue during weight gain constrains blood vessels, causing

macrophage migration into this tissue [4]. The combination of these induce a generalised chronic low-grade inflammation which affects collagen metabolism and, consequently, bone loss progression at the site specific level. It also impacts the gingival arteriolar wall thickening [5,6] leading to a precarious local immune response [7].

To assess the link between obesity and periodontal conditions in patients reporting to the dental hospital.

### MATERIALS AND METHOD:

A total of 50 (n=50) were evaluated for this study. Only patients who willingly gave a written consent, after being explained the nature of the study were enrolled. [Figure 1]

### **Inclusion Criteria :**

1. Systemically healthy individuals aged between 25-54 years.
2. Patient willing to give informed consent were included in the study.
3. Patient included and grouped based on AAP classification, 1999 [7].
4. No usage of antibiotics in the preceding 6 months of the study.
5. No history of periodontal therapy 6 months prior to the study.

### **Exclusion criteria:**

1. Patients with conditions like Diabetes mellitus, hypertension, atherosclerosis and other systemic diseases known to affect periodontal status.
2. Pregnant and Lactating Women.
3. Patients with deleterious habits like alcohol consumption, tobacco habits and any other adverse habits.
4. Patients who have received any surgical or non surgical periodontal therapy in past 6 months.
5. Patients who have received any antimicrobial therapy in past 3 months.

To avoid inter-examiner variability all measurements were performed by a single examiner. Body mass index was calculated by measuring weight and height of patient. Pocket probing depth and clinical attachment level was calculated using UNC-15 probe. Calculate socioeconomic status based on questionnaire

### **Statistical tests used-**

- Mann Whitney U Test, Chi-square test, Paired t-test

### **RESULT:**

50 sample consisting of 34 males and 16 females were evaluated for oral hygiene indices, plaque indices and periodontal parameters. Sample was divided based on different body mass index (BMI). The statistical analysis shows significant results for Turskey-Gillmore plaque index i.e person with higher Body mass index show higher plaque index therefore risk factor for periodontal disease.[Table1] No statistical significant association was seen between periodontitis and oral hygiene index-simplified and periodontal parameters.

### **DISCUSSION:**

Obesity is recognised as chronic disease with multifactorial etiology<sup>[8]</sup>. NHANES III suggested obesity as risk factor for cardiovascular disease, diabetes and certain type of cancers and also for periodontal diseases. It is the sixth risk factor contributing to diseases and in future will result in decrease in life expectancy.

World Health Organisation (WHO) in 2002 described obesity as global epidemic, that is most blatantly visible but yet most neglected health problem that threatens to overwhelm both more or less developed countries<sup>[9]</sup>.

High level of pro inflammatory markers like C-reactive protein, interleukin-6, tumor necrosis factor- $\alpha$  is seen associated with obesity which are all found in chronic inflammatory diseases, thus association of obesity with periodontitis is seen which is also an inflammatory disease<sup>[10,11]</sup>

Cytokines like adipokines, hormones and pro inflammatory markers like TNF- $\alpha$  (tumor necrosis factor), and IL-6 (Interleukin) explain the role of obesity on periodontium<sup>[12,13]</sup>. All these factors are produced from visceral fat and enhance periodontal degradation. High level of TNF- $\alpha$  in GCF (Gingival crevicular fluid) has been strongly correlated with subjects having high BMI <sup>[14]</sup>. Host immune response is influenced by obesity resulting in increased susceptibility to infection <sup>[15]</sup>. High local inflammatory response and altered periodontal micro flora is seen in obese patients which is also evident clinically<sup>[16]</sup>.

Fat tissue produces a vast amount of cytokines and hormones, collectively called adipokines or adipo cytokines which in turn may modulate periodontitis (Kershaw & Flier 2004) <sup>[17]</sup>. Obesity increases the host's susceptibility by modulating the host's immune and inflammatory system, leaving the patient with greater risk of periodontitis.

Several studies have shown association of obesity with periodontitis hence this study was undertaken to see association of obesity with periodontitis in groups with different body mass index (BMI)

The results of our study showed a significantly positive relation between plaque indices and Body mass index (BMI) but no significant association was seen between obesity and periodontal measurement. The data suggested that obesity is risk factor for periodontitis but not cause of the same. Our results are similar to those reported by Sheiham et

al.<sup>[18]</sup> and the cross sectional study by Al-Zahrani et al.<sup>[19]</sup>

Genco et al. in his study stated that obesity could affect periodontitis through inflammatory pathway <sup>[20]</sup>. Another Indian<sup>[21]</sup> study examining relation between periodontal pockets and obesity showed that individuals with increased BMI are at high risk of developing pockets in future which also supports results of our study.

A systematic literature review between overweight/obesity and periodontitis demonstrated that obese individuals are at 1.8 times greater risk of developing periodontitis than those having normal BMI. Thus these findings support results of our study that states that obesity is risk factor and not etiology of periodontal disease <sup>[22]</sup>.

A study done in Jordan represents strong association between BMI and periodontal disease <sup>[23]</sup> Saito et al <sup>[24]</sup> assured that deeper pockets were noticed in those with higher body fat. Wood et al. declared that adjusted mean PPD was correlated significantly with subcutaneous fat <sup>[10]</sup>. The association between periodontitis and obesity but not overweight was also confirmed by Dalla Vecchia et al.<sup>[25]</sup> which was similar to findings in study by Nishida et al.<sup>[26]</sup>.

Present study show a significant correlation between obesity and periodontal disease, but further longitudinal /prospective studies are needed to assess if obesity is true risk factor for periodontitis or not. The

relatively small sample size may be a possible cause for the lack of statistically significant result.

## CONCLUSION:

Results of the present study show obesity is only a risk factor and not a true indicator for periodontal disease, as association between the two is not always significant, which is also supported by other studies. Though further studies with larger sample size need to be done to assess if obesity is true risk factor/indicator for periodontitis. This association between obesity and periodontal disease also suggest need of staying fit and healthy and opting for better lifestyles for prevention of periodontal conditions.

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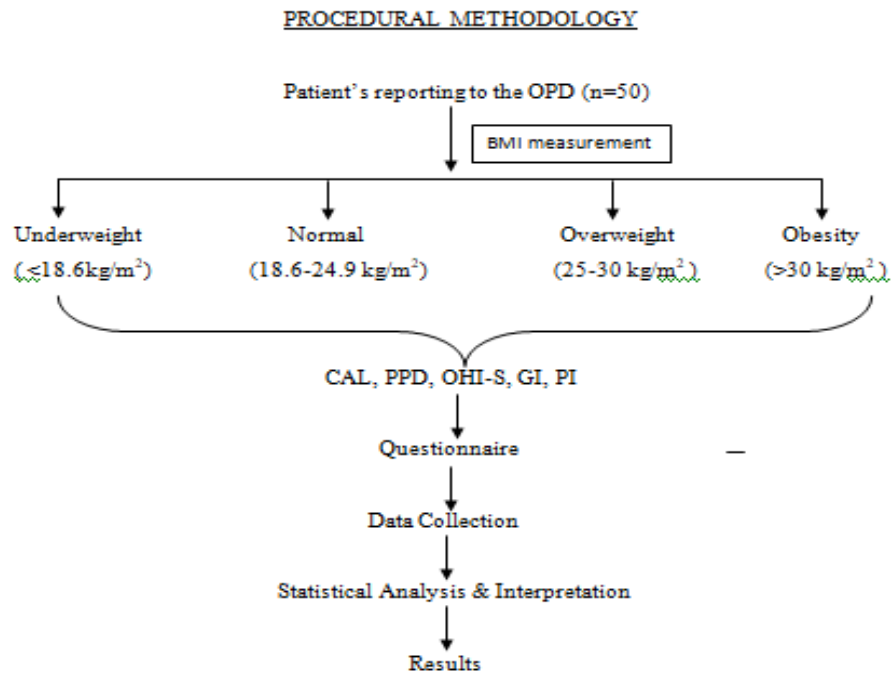
**TABLE:**

<b>BMI (KG/m<sup>2</sup>)</b>				
	NORMAL (≤25)	OVER (≥25)	OBESE (≥30)	P (>0.005*)
	28	17	5	
<b>GI</b>	1.51 ± 0.63	1.70±0.49	1.94±0.61	0.269
<b>PI</b>	1.54±0.75	.2.25±0.67	2.50±0.53	0.002*
<b>PPD</b>	2.50±0.49	2.48±0.52	2.38±0.47	0.891
<b>CAL</b>	2.63±0.64	2.70±0.66	2.92±0.58	0.635

**Table 1: Association Of Body Mass Index With Gingival Index (GI), Plaque Index (PI), Pocket Probing Depth (PPD) and Clinical Attachment Level (CAL)**

**FIGURE:**

**Figure 1: Brief Study Outline**



\*CAL – Clinical Attachment Level

\*\* PPD – Probing Pocket Depth