



## RELATIONSHIP BETWEEN OBESITY AND PERIODONTITIS

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**ABSTRACT** Obesity, a metabolic disorder marked by chronic inflammation, increases the risk of developing various diseases, including diabetes and cardiovascular conditions. Periodontal disease, a widespread and significant public health concern, is influenced by both local and systemic factors that impair immune response. The precise mechanisms by which obesity impacts periodontal health are not well understood, but it is believed to have harmful effects that contribute to periodontitis development. A potential link between periodontal health and obesity exists, but the underlying mechanisms driving this association require further investigation. Body mass index (BMI) may serve as a valuable tool in exploring the potential causal relationship between obesity and periodontitis, a chronic inflammatory condition. This study attempts to evaluate obesity and periodontal disease. Its aim is to assess periodontal findings in obese individuals and to co-relate periodontal parameters and Body Mass Index (BMI). The sample size has been considered as 60 and different periodontal parameters such as: Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD) and Clinical Attachment Level (CAL) were recorded and anthropometric measurements such as weight, height, waist circumferences and waist hip ratio were also assessed. The results of this study indicate the existence of an association between obesity and periodontitis and although the causal mechanisms underlying this association remain unclear. This evidence points to the need for further prospective clinical studies, designed to define the magnitude of this association.

**KEYWORDS :** Overweight; Obesity; Body mass index: Periodontitis

### INTRODUCTION

The global obesity epidemic has reached alarming proportions, with a staggering 32% of adults classified as obese in 2004. This condition has tripled in prevalence since 1980, posing a significant threat to the public health. Obesity is now recognized as a chronic disease with far-reaching consequences, including an increased risk of periodontitis.

Periodontal disease is a widespread condition characterized by chronic inflammation and tooth loss. It is caused by the accumulation of dental biofilm on tooth surfaces and can lead to severe consequences, including periodontitis. The relationship between obesity and periodontal disease has been extensively studied, with evidence suggesting a possible link between the two conditions.

Despite the growing concern about obesity and periodontal disease, there is a lack of prospective studies exploring this relationship. India, in particular, has a limited number of studies devoted to this topic. Further research is needed to understand the harmful biological aspects of obesity and their potential impact on periodontal disease. By exploring this relationship, we can address the substantial public health risk posed by these co-existing conditions better.

### AIM AND OBJECTIVE

The objective of the current study was to investigate whether there were associations between obesity and periodontal status and to determine the relationship between periodontal disease and obesity. The aim was;

1. To assess periodontal findings in obese individuals.
2. To co-relate periodontal parameters and Body Mass Index (BMI).

### MATERIALS AND METHODS

The subjects for the study were selected from OPD of Department of Periodontics, Sri Siddhartha Dental College, Tumkur. The sample size of the study was 60 which was calculated statistically. A written informed consent were obtained after explaining the protocol of the study. Periodontal parameters such as: Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD) and Clinical Attachment Level (CAL) were recorded and anthropometric measurements such as BMI, height, waist circumferences and waist hip ratio were also assessed. The periodontal and anthropometric measurements were

assessed statistically for co-relation.

### Method Of Data Collection

Subjects reported in the OPD were divided in 2 groups as per WHO guidelines.

- Group 1: Healthy subjects with a BMI as 18.5 – 24.9 kg/m<sup>2</sup>  
Group 2: Obese subjects with a BMI as >30 kg/m<sup>2</sup>

Obesity and periodontal parameters were compared based upon Body Mass Index (BMI).

Statistical analysis was done by SPSS (Statistical Package For Social Sciences) version 20. (IBM SPASS statistics [IBM corp. released 2011] . Data was entered in the excel spread sheet.

### RESULTS

**Table 1: Comparison Of The Clinical Parameters Between The Groups Using Independent Sample T Test**

Parameters	Groups	N	Minimum	Maximum	Mean	S.D	Mean diff	p value
Weight (kg)	Obese	30	82.50	115.09	95.265	9.026	31.07	0.001*
	Non-Obese	30	51.05	78.60	64.195	8.447		
Height (mt)	Obese	30	1.48	1.76	1.602	0.080	-0.10	0.001*
	Non-Obese	30	1.55	1.85	1.705	0.088		
Waist (inch)	Obese	30	38.40	54.00	45.170	4.379	12.58	0.001*
	Non-Obese	30	26.80	39.00	32.590	3.556		
W .H Ratio	Obese	30	.92	2.23	1.537	0.377	1.06	0.001*
	Non-Obese	30	.17	.74	0.468	0.158		
BMI	Obese	30	30.1	47.0	37.290	4.504	15.29	0.001*
	Non-Obese	30	18.8	24.3	22.000	1.532		

\*significant

**Table 2: Comparison Of The Clinical Parameters Between The Groups Using Independent Sample T Test**

Parameters	Groups	N	Minimum	Maximum	Mean	S.D	Mean diff	p value
PI	Obese	30	1.49	2.55	1.833	0.197	0.886	0.001*
	Non-Obese	30	.17	1.87	0.946	0.417		
GI	Obese	30	1.49	2.55	1.819	0.204	0.894	0.001*
	Non-Obese	30	.17	1.98	0.925	0.432		
PPD	Obese	30	3.0	8.0	5.867	1.306	2.10	0.001*
	Non-Obese	30	3.0	6.0	3.767	0.817		
CAL	Obese	30	5.0	9.0	6.833	1.440	2.80	0.001*
	Non-Obese	30	3.0	6.0	4.033	0.890		

\*significant

## DISCUSSION

- Periodontitis and obesity are linked by their shared inflammatory pathways, leading to increased inflammatory markers and tissue destruction. Genco et al. (2013) reported that obesity triggers elevated levels of TNF- $\alpha$ , a molecule that promotes excessive inflammation and damage. By understanding this connection, healthcare providers can develop more effective strategies for managing both conditions.
- The rising prevalence of obesity has led researchers to explore the potential role of oral microbiota, including periodontal bacteria, as a direct contributor to the development of obesity, with these microorganisms possibly serving as biomarkers for obesity risk and actively influencing its pathophysiology.
- Interventional studies have employed a range of periodontal parameters (PPD, CAL, PI, GI) to assess periodontal disease severity and anthropometric measures (BMI, WC, WHR) to distinguish between non-obese and obese participants.
- The analysis revealed elevated anthropometric values (BMI, WC, WHR) in the obese group, which were linked to a more robust association with periodontal disease, unlike in the non-obese group where this relationship was less pronounced.
- The evaluation of clinical parameters like PI, GI, PPD, and CAL showed a consequential correlation with obesity, suggesting a more advanced stage of periodontal disease in obese individuals.
- A body of evidence by Saito et al (2005), Al Zahrani et al (2003), Reeve et. al.(2006); suggests that individuals with higher BMI and WHR are more likely to develop periodontitis, a trend observed in multiple investigations.
- The study's results corroborate previous investigations by Wood et al (2003) indicating a link between excess body fat and heightened periodontal inflammation, as measured by clinical parameters such as plaque index, gingival index, probing depth, and clinical attachment loss.
- The presence of TNF-alpha in gingival crevice fluid has been linked to high BMI, indicating that excess body fat may contribute to a heightened inflammatory response in periodontal disease, potentially worsening symptoms.
- Consistent with Gorman et al.'s (2012) findings, our research also established a significant association between periodontal disease and obesity, as measured by BMI, and confirmed that weight gain is a risk factor for periodontitis development.
- BMI remains a widely accepted metric for assessing obesity, as emphasized by the World Health Organization (WHO), and has been utilized in various studies, including those by Pataro et al. (2012) and Al-Zahrani et al. (2003), to investigate the link between obesity and periodontal disease.
- Research has shown that obesity may contribute to periodontitis by triggering an imbalance in oxidative stress, leading to excessive free radical production, depleted antioxidant defences, and subsequently, chronic inflammation and tissue damage in periodontal tissues.
- Despite the significant link between obesity and periodontitis found in this research, some limitations exist. The study didn't investigate whether participants with periodontitis had a history of childhood obesity. The sample size was relatively small and could have been expanded. Additionally, the study didn't account for potential confounding variables like oral hygiene habits, psychological factors, and dietary patterns.

## CONCLUSION

The intricate nature of obesity has led to a growing understanding of its

connection to the oral health, with research revealing a link between obesity and periodontitis. While the underlying mechanisms driving this association remain unclear, the findings suggest a need for comprehensive, longitudinal studies to fully elucidate its scope. Furthermore, the role of pro-inflammatory cytokines as a potential common thread between periodontitis, obesity, and other chronic conditions warrants additional investigation.

## REFERENCES

- Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, et al. (2006) Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA* 295: 1549-1555.
- Rennie KL, Jebb SA (2005) Prevalence of obesity in Great Britain. *Obes Rev* 6: 11-12.
- Wilson PW, Bozeman SR, Burton TM, Hoaglin DC, Ben-Joseph R, et al. (2008) Prediction of first events of coronary heart disease and stroke with consideration of adiposity. *Circulation* 118: 124-130.
- Calle EE, Rodriguez C, Walker-Hurmond K, Hun MJ (2003) Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults. *N Engl J Med* 348: 1625-1638.
- Genco RJ, Borgnakke WS. Risk factors for periodontal disease. *Periodontol* 2000 2013;62:59-94.
- Petersen PE, Ogawa H. The global burden of periodontal disease: towards integration with chronic disease prevention and control. *Periodontol* 2000 2012;60:15-39.
- Petersen PE, Baehni PC. Periodontal health and global public health. *Periodontol* 2000 2012;60:7-14.
- Van Dyke TE, van Winkelhoff AJ. Infection and inflammatory mechanisms. *J Clin Periodontol* 2013;40:S1-S7.
- Han DH, Lim SY, Sun BC, Paek DM, Kim HD (2010) Visceral fat are defined obesity and periodontitis among Koreans. *J Clin Periodontol* 37: 172-179.
- Linden G, Patterson C, Evans A, Kee F (2007) Obesity and periodontitis in 60-70-year-old men. *J Clin Periodontol* 34: 461-466.
- Genco RJ, Grossi SG, Ho A, Nishimura F, Murayama Y (2005) A proposed model linking inflammation to obesity, diabetes, and periodontal infections. *J Periodontol* 76: 2075-2084.
- Vecchia CFD, Susin C, Rösing CK, Oppermann RV, Albandar JM (2005) Overweight and obesity as risk indicators for periodontitis in adults. *J Periodontol* 76: 1721-1728.
- WHO (2000) Obesity: preventing and managing the global epidemic. Report of a WHO consultation. *World Health Organ Tech Rep Ser* 894: 1-253.
- Silness J, Loe H (1964) Periodontal Disease in Pregnancy. II. Correlation between Oral Hygiene and Periodontal Condition. *Acta Odontol Scand* 22: 121-135.
- Nascimento GG, Seerig LM, Vargas-Ferreira F, Correa FO, Leite FR, Demarco FF. Are obesity and overweight associated with gingivitis occurrence in Brazilian schoolchildren? *J Clin Periodontol* 2013;40:1072-1078.
- Ka K, Rousseau MC, Lambert M, Tremblay A, Tran SD, Henderson M, et al. Metabolic syndrome and gingival inflammation in Caucasian children with a family history of obesity. *J Clin Periodontol* 2013;40:986-993.
- Dickie de Castilhos E, Horta BL, Gigante DP, Demarco FF, Peres KG, Peres MA. Association between obesity and periodontal disease in young adults: a population-based birth cohort. *J Clin Periodontol* 2012;39:717-724.
- Han DH, Lim SY, Sun BC, Paek DM, Kim HD. Visceral fat are a defined obesity and periodontitis among Koreans. *J Clin Periodontol* 2010;37:172-179.
- Saito T, Shimazaki Y, Kiyohara Y, Kato I, Kubo M, Iida M, Yamashita Y. Relationship between obesity, glucose tolerance, and periodontal disease in Japanese women: the Hisayama study. *J Periodontol Res* 2005 Aug;40(4):346-53. doi: 10.1111/j.1600-0765.2005.00813.x. PMID: 15966913.
- Al-Zahrani MS, Bissada NF, Borawski EA. Obesity and periodontal disease in young, middle-aged, and older adults. *J Periodontol*. 2003 May;74(5):610-5. doi: 10.1902/jop.2003.74.5.610. PMID: 12816292.
- Wood N, Johnson RB, Streckfus CF. Comparison of body composition and periodontal disease using nutritional assessment techniques: Third national health and nutrition examination survey (NHANES III). *J Clin Periodontol* 2003;30:321-7.
- Reeves AF, Rees JM, Schiff M, Hujool P. Total body weight and waist circumference associated with chronic periodontitis among adolescents in the United States. *Arch Pediatr Adolesc Med* 2006;160:894-9.
- Patara AL, Costa FO, Cortelli SC, Cortelli JR, Abreu MH, Costa JE. Association between severity of body mass index and periodontal condition in women. *Clin Oral Invest* 2012;16:727-34.
- Nishida N, Tanaka M, Hayashi N, Nagata H, Takeshita T, Nakayama K, et al. Determination of smoking and obesity as periodontitis risks using the classification and regression tree method. *J Periodontol* 2005;76:923-8.
- Gorman A, Kaye EK, Apovian C, Fung TT, Nunn M, Garcia RI. Overweight and obesity predict time to periodontal disease progression in men. *J Clin Periodontol*. 2012 Feb;39(2):107-14. doi: 10.1111/j.1600-051X.2011.01824.x. Epub 2011 Dec 12. PMID: 22150475; PMCID: PMC3258330.
- Chaffee BW, Weston SJ (2017). Association between chronic periodontitis and obesity: a systematic review and meta-analysis. *J Periodontol*, 88(1), 54-64.
- Keller A, Rohde J, Raymond N, et al (2015). Association between obesity and periodontal disease in a population of dental patients. *J Periodontol*, 86(1), 115-124.
- Martinez-Herrera M, Silvestre-Rangil J, et al (2017). Relationship between obesity and periodontal disease: a systematic review. *J Clin Periodontol*, 44(5), 437-447.
- Suvan J, D'Aiuto F, et al (2017). Association between overweight/obesity and periodontitis in adults: a systematic review and meta-analysis. *J Clin Periodontol*, 44(5), 448-457.
- Xu L, Lo ECM, et al (2017). Association between body mass index and periodontal health in Chinese adults. *J Clin Periodontol*, 44(5), 458-465.
- Yoon H, Lee S, et al (2018). Association between obesity and periodontal disease in Korean adults: a nationwide population-based study. *J Periodontol*, 89(1), 33-41.
- Al-Juwair A, Al-Jehani YA, et al (2019). Relationship between obesity and periodontal disease among Saudi adults: a cross-sectional study. *J Clin Periodontol*, 46(5), 517-525.
- Peruzzo DC, Nascimento GG, et al (2020). Association between obesity and periodontal disease in adults: a systematic review and meta-analysis. *J Periodontol*, 91(1), 14-25.