



Correlation between BMI and Chronic Periodontitis

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Introduction

Obesity is defined as abnormal or excessive fat accumulation that may impair health. WHO estimated that in 2016, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 650 million were obese.¹ Obesity has become a severe health threat worldwide. Being overweight and obese are important risk factors for various adult diseases, including type 2 diabetes, hyperlipidemia, hypertension, cholelithiasis, arteriosclerosis, and cardiovascular and cerebrovascular disease.

Recently, obesity has emerged as one of the risk indicators of periodontal disease. The first report on the relationship between obesity and periodontal disease appeared in 1977, when Perlstein *et al.* found that alveolar bone resorption was greater in obese animals compared to the non-obese rats. The underlying biological mechanisms for the association of obesity with periodontitis are not well known; However, adipose tissue-derived cytokines and hormones may play a key role.²

Compared to individuals with normal weight, individuals with obesity have higher levels of circulating tumor necrosis factor- α (TNF- α) and interleukin-6 (IL-6), which are also secreted from adipose tissues and are involved in the pathophysiology of both obesity and periodontitis.³

Leptin is the best-known substance secreted from adipose tissue. Leptin stimulates the immune system as it enhances cytokine production and phagocytosis by macrophages. A strong negative relationship between the plasma levels of leptin and interleukin-6 has been reported in sepsis. It has been reported that leptin is present within healthy and marginally inflamed gingiva and decreases in concentration as the adjacent probing depth increases. Thus, leptin may play an important role in the development of periodontitis.²

Thus the purpose of this study was to correlate the body mass index of the patients with the periodontal condition and to validate the relationship.

Material and Methods

A total of 200 subjects in the age group 25 to 65 years were examined. Name, age, gender of each patient was recorded on a proforma sheet. Oral hygiene Index – Simplified (OHI-S) was recorded according to Greene and Vermillion (1964). A score of 0-1.2 was regarded as good, 1.3 -3.0 as fair 3.1- 6.0 as poor oral hygiene score.

Periodontal status of the patient was recorded by examining all the teeth. Four surfaces on each tooth were examined that is mid buccal,

mesiobuccal, distobuccal and midlingual. Probing pocket depth was recorded as the distance from the free gingival margin to the bottom of the pocket/sulcus, was recorded in millimeters using UNC 15 periodontal probe. Similarly recession was recorded as the distance from the cement enamel junction to the most apical part of free gingival margin. Clinical attachment loss was recorded by adding probing pocket depth to the value to gingival recession. Disease severity was graded based on CAL (Clinical Attachment Loss) 1-2 mm as MILD, 3-4 mm MODERATE, > 5mm SEVERE.

General examination was done. Weight of the patient was recorded in kilograms on a mechanical weighing scale. Height of the patient was recorded in centimetres with a measuring scale. Body Mass

Index was calculated by dividing weight of the patient in kilograms with square of height. A value of <18.5 was recorded as underweight 18.5 – 24.9 as normal, 25-29.9 as overweight and >30 obese.

Results

In all the individuals examined 34% were in normal body mass index category. 40 % were overweight and 23% were obese.

When a correlation was made between body mass index (BMI) and clinical attachment loss (CAL) it was found that 66 % of the obese, 60 % of the overweight individuals and 26.5 % of the normal individuals had a CAL more than 5 mm. Thus CAL was significantly correlated with BMI (chi square 65.37, p value < 0.05), as seen in **table 1**

	Clinical Attachment Loss			
Body Mass Index	MILD	MODERATE	SEVERE	TOTAL
UNDERWEIGHT	3	4	3	10
NORMAL	21	40	22	83
OVERWEIGHT	4	24	43	71
OBESE	3	9	24	36
TOTAL	31	77	92	

Table 1 shows the correlation between body mass index and clinical attachment loss in the whole population.

23% of females were obese and 40% were overweight whereas 11% of males were obese and 34% were overweight. This distribution shows more number of females fell into the obese category as compared to males. Further a

comparison when made between CAL and BMI among genders it seen that CAL was significantly associated with BMI in both the gender groups. (Chi square 18.80 for the group including females and 19.20 for group including males)

Table 2 shows the distribution of Body mass index between genders

		BMI			
		Underweight	Normal	Overweight	Obese
GENDER	Females	13	28	35	23
	Males	6	50	34	11

Table 3 Correlation among CAL and BMI

	CAL			
BMI				
FEMALES	Mild	Moderate	Severe	
Underweight	5	2	6	13
Normal	7	15	6	28
Overweight	3	12	20	35
Obese	5	3	15	23
	20	32	47	
MALES				
Underweight	2	3	1	
Normal	5	29	16	
Overweight	1	12	21	
Obese	3	1	7	

Table 4 correlation of CAL and BMI in different age groups

AGE GROUP 25-45 YEARS		CAL		
	BMI	MILD	MODERATE	SEVERE
	UNDERWEIGHT	3	2	2
	NORMAL	15	34	13
	OVERWEIGHT	4	15	28
	OBESE	3	4	16
AGE GROUP 45-65 YEARS	UNDERWEIGHT	1	1	0
	NORMAL	1	10	9
	OVERWEIGHT	3	9	15
	OBESE	1	2	10

When a correlation was made according to the age groups it was seen that CAL was significantly associated with BMI in the younger age group (chi square 28.106) but not in the older age group (chi square 9.35) [Table 4]

Discussion

In this study, a direct correlation was found between clinical attachment loss and BMI. It was seen that as the BMI value increased, clinical attachment loss also increased. So we can suggest

that BMI is a risk factor for the periodontal disease.

Kongstad et al. found that BMI is inversely related to clinical attachment loss among 1,504 subjects who took part in the Copenhagen City Heart Study in 2007.⁴ Kim et al 2011 reported that a high WC seems to be associated with periodontitis, whereas BMI does not. This finding showed that abdominal obesity was significantly correlated with periodontitis.⁵

The underlying biological mechanisms for the association of obesity with periodontitis are not well established. However, adipose-tissue derived cytokines and hormones may play a role. Fat tissue is not only passive triglyceride reservoir, but also produces high levels of cytokines and hormones, collectively called adipokines or adipocytokines which may in turn affect the periodontal tissues. Pro-inflammatory cytokines, such as tumor necrosis factor- α and interleukin-6, may form a multidirectional link among periodontitis, obesity and other chronic diseases⁽⁵⁾

In the present study it was seen that in the age group of 25 to 45 years BMI was significantly associated with CAL whereas no such association was found among the older age group of 45- 65 years. Suggesting that BMI is a risk factor for periodontitis in the younger age. Similar results have been shown in the study by Al-Zahrani, who showed a significant association between obesity and periodontal disease in the age group 18 to 34 years however, no significant association was found for the age group ≥ 35 years. A variety of potential mechanisms could explain an association between obesity and periodontitis in the younger age⁷. Overweight young subjects may have unhealthy dietary patterns with insufficient micronutrients and excess sugar and fat content, and such dietary patterns may increase the risk for periodontal disease.

In present study 35.3% females were overweight and 23.2% were obese whereas 33% males were overweight and 10.9% were obese. Further 47% females had severe periodontal disease whereas 44% males had severe disease. So females were more likely to be obese and had a higher percentage of severe periodontitis, but the association is statistically significant in both the genders. Susin (2005), in his study on 706 subjects aged 30 to 65 years from south Brazil, explained that the differences in the prevalence of periodontitis between body mass index groups were more pronounced in female subjects⁻⁸

In the present study it was seen that when oral hygiene was poor, mean CAL was more & when

oral hygiene was good, CAL was less. This difference was significant in all the groups of BMI. Thus we can conclude that for the same score of oral hygiene, CAL was greater in the obese group.

Limitations

Females in the age group of 25- 45 years are prone to inflammation of the periodontium due to the cyclic nature of female sex hormones. This could have been a confounding factor of this study. Diabetes mellitus is a known risk factor for periodontal diseases.

On the other hand, obesity is a risk factor for diabetes. Hence diabetes is likely a confounding factor for study to relate obesity and periodontitis in males. BMI recordings are affected by amount of muscle mass and weight of bones. Hence higher values of BMI in males may not necessarily be indicative of obesity.

Conclusion

In conclusion, a higher body mass index could be a potential risk factor for periodontitis among younger population. Obesity is a greater risk factor for periodontitis in females than in males. Poor oral hygiene is related with clinical attachment loss and this relationship is more pronounced in the overweight and obese group. Thus, evaluation of body mass index should be included on a regular basis during intra oral & extraoral examinations. Diet counselling and weight loss motivation of overweight and obese patients should be carried out in dental clinics to prevent the progress of periodontal disease in them.

References

1. <http://www.who.int/mediacentre/factsheets/fs311/en/>
2. Toshiyuki Saito & Yoshihiro Shimazaki; Metabolic disorders related to obesity and periodontal disease; Periodontology 2000, Vol. 43, 2007, 254–266

3. Umut Altay, Cem A. Gu'rgan ;Changes in Inflammatory and MetabolicParameters After Periodontal Treatment in Patients With and Without Obesity; J Periodontol 2013;84:13-23.
4. Johanne Kongstad, Ulla A. Hvidtfeldt ; The Relationship Between Body Mass Index and Periodontitis in the Copenhagen City Heart Study :
5. Eun-JinKim, Bo-HyoungJin ; Periodontitis and Obesity: A Study of the Fourth Korean National Health and Nutrition Examination Survey.; J Periodontol 2011;82:533-542.
6. Sunitha , Dinesh ; Obesity and periodontal disease; J Indian Soc Periodontol. 2010 AprJun; 14(2): 96–100
7. Mohammad , Bissada ; Obesity and periodontal disease in young , middle age and older adults , J Periodontal 2003 ; 74: 610- 615
8. Caroline Formolo Dalla Vecchia,* Cristiano Susin : Overweight and Obesity as Risk Indicators for Periodontitis in Adults ; J Periodontol 2005;76:1721-1728.