DOI: https://doi.org/10.53350/pjmhs20221612457

ORIGINAL ARTICLE

The Assessment of Body Mass Index as a Risk Factor for Chronic Periodontitis

MAHAM KHALID[1], MEHMIL ASLAM[2], HUMA TAHIR[3], WAHEED GUL SHAIKH[4], MARIUM AZFAR[5], NOSHEEN KHAWAR[6]
[1]*General dentist, Karachi medical and dental college, Karachi*
[2]*Assistanat Professor, Hamdard University, Karachi*
[3]*Assistanat Professor, Community Dentistry Department, Margalla Dental College, Rawalpindi*
[4]*Associate Professor, Orthodontic Department, Shahida Islam Dental College, Lodhran*
[5]*Associate Professor, Department of Community Dentistry, Sindh Institute of Oral Health Sciences, Jinnah Sindh Medical University, Karachi*
[6]*Assistant Professor, HOD Dental Materials Science, Fatima Jinnah Dental College, Karachi*
Corresponding author: Maham Khalid, Email: Mahamfarazalam@gmail.com

ABSTRACT

Background: Obesity is one of the highly emerging chronic disease. It is a major health concern now a days. The BMI of more than 35% of the adults were in the overweight category in 2008 but now the values are reported to be exceeded. The study aimed to assess the relationship between body mass index and chronic periodontitis.
Study Design: It is a cross-sectional study with statistical approach, conducted at Karachi medical and dental college, Karachi
Material and Methods: The study was conducted on 200 patients visited the dentist department of the hospital. The study was conducted for six month duration from Jan 2022 to June 2022. The ethical and review board of the hospital approved the study.
Results: Among 200, 100 specimens belong to the normal weight category, 73 are overweight, and 27 are from the obese category. In each category, all the specimens are from similar age groups, but more males were present in the overweight and obese categories. Complete data analysis of these patients was performed. Then logistic regression analysis was performed, and it was predicted that periodontitis has a direct relation with the body mass index (BMI). About a 17% risk rate increases with an increase in each unit of BMI.
Conclusion: This study supports the hypotheses of the association of obesity with periodontal issues. The body mass index is a factor for the assessment of different health risk factors. The body mass index and smoking are linked with periodontal issues. Smokers and obese people specifically young obese have a more critical periodontal state.
Keywords: Body mass index and periodontitis.

INTRODUCTION

Health is the fundamental human right. It is common theme in most cultures. Obesity is one of the highly emerging chronic disease. It is a major health concern now a days. The BMI of more than 35% of the adults were in the overweight category in 2008 but now the values are reported to be exceed. The immune responses modulates in the obesity it eventually leads to the increase susceptibility of the infection[1-3]. The inflammatory mediators release by the adipocyte triggers the systematic pro-inflammatory state. The cytokine and adipose tissue derived hormone trigger inflammation. The adverse metabolic effects are associated with the obesity not only effect blood pressure but also increase the risk of coronary artery disease. The obese person are not only susceptible to the development of infection but also the chronic wounds complication are also observed to be associated with the obese persons.

The dental plaque biofilm initiate the inflammatory disease known as periodontitis. The dysregulated immune responses perpetuate the disease in the gingival tissues. It is a prevalent disease. The higher number of cases are reported around the globe. It was reported in the study that 47% of the US adult resident are suffering from the periodontitis. It is tooth supporting structure disorder. It was reported in the study that the obese people are 1.8 to 2.3 times more susceptible to this infection. The worst surgical outcomes are associated with the obesity. The obese person are observed to be suffer from the infectious complications. The excessive accumulation of the fat that leads to the body mass index greater than 30 kg/m^2 is termed as obesity. The energy imbalance between the consumption and expenditure of the energy basically leads to the obesity. Obesity is adding to the global burden[4-6]. It is one of the major concern for the surgeons and clinicians because of the worst complications associated with the obesity. The loss of gingival attachment ultimately leads to periodontal pocket formation. Chronic periodontitis is reported as sixth most prevalent disease around the globe it has affected the 11% of the population with it severe impacts. Both CP and obesity are characterized as chronic inflammatory disease. These two multifactorial diseases are positively associated with each other[7-9]. There is insufficient and limited knowledge present in the literature about the population based studies. There is need to explore the link between these two multifactorial diseases[10]. The study was conducted to determine the link between the chronic periodontitis and body mass index. The study aimed to assess the relationship between body mass index and chronic periodontitis.

MATERIAL AND METHODS

It is a cross-sectional study with statistical approach. The study was conducted on 200 patients visited the dentist department of Karachi medical and dental college, Karachi. The study was conducted for six month duration from Jan 2022 to June 2022. The ethical and review board of the hospital approved the study. The patients were aware of the objective of the study and willingly signed the consent. The sample size was calculated. The patients who were following any diet plan and taking the steroid medicine were excluded from the study.

The non-surgical periodontal therapy was given to every patient selected for the study. The demographic features of every patient was recorded. The selected patients were 18 years old and diagnosed with the chronic periodontitis. Complete data analysis of these patients was performed. Then logistic regression analysis was performed, and it was predicted that periodontitis has a direct relation with the body mass index (BMI). The data was presented in the form of tables after analysis and conclusion was made.

RESULTS

The given study consists of 200 sample specimens from ages 26 to 76 years. Among them, 100 specimens belong to the normal weight category, 73 are overweight, and 27 are from the obese category. In each category, all the specimens are from similar age groups, but more males were present in the overweight and obese categories. However, the standard weight category also has a lot of smokers. The patients were divided into two groups control and periodontitis group. Smokers have more plaque, bleeding, and pockets in their teeth. Complete data analysis of these patients was performed.

Then logistic regression analysis was performed, and it was predicted that periodontitis has a direct relation with the body mass index (BMI). About a 17% risk rate increases with an increase in each unit of BMI. The average age was 46.7 years in the control

group while the average age in the periodontits group was 47.2 years. The statistical values of fat obtained was 21.6 while for the periodontitis group it was 27.6.

Table 1: category-based based BMI and parameters of the sample

Parameters, Mean value (St. Deviation)	Standard (18.6-24.98 kg/m^2) N = 100	Over-weight (25.0-29.98 kg/m^2) N = 73	Obese ones (≥ 30.0 kg/m^2) N = 27	p-value
BMI (kg/m^2)	23.57 (1.85)	25.96 (1.33)	33.94 (2.47)	
Age, years	45.30 (8.08)	47.37 (8.95)	47.56 (6.87)	0.703
Sex: Masculine (%)	40 (40.0)	45 (61.1)	19 (70.3)	0.030
Ethnicity: Non-Asian (%)	31 (31.0)	20 (27.2)	12 (44.1)	0.038
Smoking status: Smoker (%)	40 (40.0)	21 (28.9)	15 (55.0)	0.047

Table 2 shows the association between BMI and clinical attachment loss (CAL). Categories of all BMI and their moderate and severe clinical attachment loss were studied by calculating the p-value.

Table 2: Clinical attachment loss and its relation to BMI

Category	CAL (Moderate) (mm)	CAL (Severe)	p-value
mm	200	0.080	0.001
overweight	49	24	
obese	20	07	
standard	85	15	

Table 3: Periodontitis status of specimens

Parameters	Control (n=175)	Periodontitis (n=25)	p
Age, years	46.7	47.2	0.001
teeth (n)	27.6 ± 0.8	27.6 ± 0.8	0.34
BMI(kg/m^2)	23.6 ± 2.6	29.6 ± 2.8	0.008
Sex: Masculine	65	18	0.43
Fat (%)	21.6 ± 5.8	27.6 ± 0.8	0.98

The younger people included in this study belonging to the obese category have more severe periodontal issues.

DISCUSSION

This study predicts the relationship between Body mass index and various clinical periodontal features. A linear relationship exists between body mass index (BMI) and periodontitis. This association is not affected by sex, age, plaque level, and smoking. Different previous researches also support this idea of an association between periodontitis and body mass index (BMI)[11]. About a unit mass change in BMI causes a huge change in the magnitude of periodontitis. As in the case of continuous analysis, the association is observed but in the case of categorical prediction, no observable effect was seen between weight and periodontitis status, which needs explanation by all the variable parameters. The given results of this study showed that the magnitude of different parameters of obesity is equal to the magnitude of the parameters of smokers. A number of associations were studied to find out the best possible reason for this association between periodontitis and obesity. Basically, obesity is involved in increasing inflammatory response, and it also involves the alteration of plaque composition and deposition on teeth, and sometimes both situations occur at the same time[12-13]. Among them, the involvement of obesity in inflammation is also involved in a number of other diseases. As in obese people, fat is deposited in the adipose tissues and it also changes the patterns of T-cells, macrophages, and B- cells. Due to such changes, the immune system behaves differently, against various infections and other body responses such as necrosis and apoptosis. All of these changes are also involved in the initiation of chronic periodontitis. Such malfunctioning immune responses also show variations in the body's reaction to insulin resistance. These abnormalities lead to diabetes mellitus and which is also resulted in defective healing responses and all of these are the attribution of fat deposition in adipocytes[14-16]. However, an altered immune system also play role in the compromised healing process. In this study, a survey of 200 people was done belonging to different categories. Overweight and obese people who have increased levels of pro-inflammatory adipokines and triglycerides in their serum are selected for this study. These individuals also have the worst periodontal state as compared to healthy patients. However, the clinical periodontal state is not as different, this lack is due to the small sample size and the individuals also undergoing some surgical therapy.

Using body mass index as a standard for calculating the health state of people is controversial because health risks cannot be relayed only on BMI. As body mass index only provides an assessment of body mass composition, not of risk factors. But this study also considers body fat parameters for the estimation of health risks to obese people which provides further insight into this disease incidence and progression. However, in the future, there is a need to consider visceral fat and proper methodology of estimation can further facilitate the health risk measurement[17-19]. The sample specimens used in this study were taken from people suffering from severe periodontitis and plaque so these findings cannot be used for the estimation of the milder periodontal state of the population. The samples used for different secondary analyses were not properly diagnosed for diabetes mellitus but age and sex were properly balanced.

When a statistical comparison with the US population was done, it was observed that 21.25 % of the population is obese and suffering from various comorbidities including periodontal issues, while about 24 % of English people are obese[20-21] and suffering from the periodontal state. In some studies, it is estimated that periodontal diseases are more common in young obese having aged between 19 to 35 years as compared to the older ones. A number of hypotheses support this idea because the eating patterns of young people are quite unhealthy and rich in sugars. So due to malnutrition and excess sugary content, there are chances of them being obese and suffering from various morbidities including diabetes mellitus and periodontal disease. The major limitation of this study is linked to the secondary analysis of patients which can be further stabilized by some clinical facilities. However, this hypothesis can be further used for the designing of periodontal studies in detail. To control periodontal issues there is a need to change dietary patterns, as an unbalanced diet causes an increase in Body mass index which ultimately leads to fat deposition in adipose tissues and affects the sensitivity of the immune system for healing purposes.

CONCLUSION

This study supports the hypotheses of the association of obesity with periodontal issues. The body mass index is a factor for the assessment of different health risk factors. The body mass index and smoking are linked with periodontal issues. Smokers and obese people specifically young obese have a more critical periodontal state.

REFERENCES

1. Ekuni D, Yamamoto T, Koyama R, Tsuneishi M, Naito K, Tobe K. Relationship between body mass index and periodontitis in young Japanese adults. Journal of periodontal research. 2008 Aug;43(4):417-21.
2. Al Habashneh R, Azar W, Shaweesh A, Khader Y. The relationship between body mass index and periodontitis among postmenopausal women. Obesity research & clinical practice. 2016 Jan 1;10(1):15-23.

3. Kumar S, Dagli RJ, Dhanni C, Duraiswamy P. Relationship of body mass index with periodontal health status of green marble mine laborers in Kesariyaji, India. Brazilian oral research. 2009;23:365-9.
4. Haffajee AD, Socransky SS. Relation of body mass index, periodontitis and Tannerella forsythia. Journal of clinical periodontology. 2009 Feb;36(2):89-99.
5. Kongstad J, Hvidtfeldt UA, Grønbæk M, Stoltze K, Holmstrup P. The relationship between body mass index and periodontitis in the Copenhagen City Heart Study. Journal of periodontology. 2009 Aug;80(8):1246-53.
6. Pataro AL, Costa FO, Cortelli SC, Cortelli JR, Abreu MH, Costa JE. Association between severity of body mass index and periodontal condition in women. Clinical oral investigations. 2012 Jun;16(3):727-34.
7. Bhardwaj VK, Sharma D, Jhingta P, Fotedar S, Sahore M, Manchanda K. Assessment of relationship between body mass index and periodontal status among state government employees in Shimla, Himachal Pradesh. Journal of International Society of Preventive and Community Dentistry. 2013 Jul 1;3(2):77.
8. Dhaifullah E, Al-Maweri SA, Koppolu P, Elkhtat E, Mostafa D, Mahgoub M. Body mass index and periodontal health status among young Saudi adults: a cross-sectional study. Annals of Saudi medicine. 2019 Dec;39(6):433-40.
9. Vaziri F, Bahrololoomi Z, Savabieh Z, Sezavar K. The relationship between children's body mass index and periodontal status. Journal of Indian Society of Periodontology. 2022 Jan;26(1):64.
10. Buhlin K, Gustafsson A, Pockley AG, Frostegård J, Klinge B. Risk factors for cardiovascular disease in patients with periodontitis. European heart journal. 2003 Dec 1;24(23):2099-107.
11. Mathur LK, Manohar B, Shankarapillai R, Pandya D. Obesity and periodontitis: A clinical study. Journal of Indian Society of Periodontology. 2011 Jul 1;15(3):240-4.
12. Buhlin K, Hultin M, Norderyd O, Persson L, Pockley AG, Rabe P, Klinge B, Gustafsson A. Risk factors for atherosclerosis in cases with severe periodontitis. Journal of clinical periodontology. 2009 Jul;36(7):541-9.
13. Palle AR, Reddy CS, Shankar BS, Gelli V, Sudhakar J, Reddy KK. Association between obesity and chronic periodontitis: a cross-sectional study. The journal of contemporary dental practice. 2013 Mar 1;14(2):168.
14. Moura-Grec PG, Marsicano JA, Carvalho CA, Sales-Peres SH. Obesity and periodontitis: systematic review and meta-analysis. Ciencia & saude coletiva. 2014;19:1763-72.
15. Gupta S, Pradhan S, Sushil KC, Shakya S, Giri M. C-reactive Protein in Periodontitis and its Comparison with Body Mass Index and Smoking Behaviour. Journal of the Nepal Medical Association. 2017 Apr 1;56(206).
16. 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. Journal of periodontal research. 2005 Aug;40(4):346-53.
17. Kim YS, Kim JH. Body mass index and oral health status in Korean adults: the Fifth Korea National Health and Nutrition Examination Survey. International journal of dental hygiene. 2017 Aug;15(3):172-8.
18. Saito T, Shimazaki Y, Koga T, Tsuzuki M, Ohshima A. Relationship between upper body obesity and periodontitis. Journal of dental research. 2001 Jul;80(7):1631-6.
19. Benguigui C, Bongard V, Ruidavets JB, Sixou M, Chamontin B, Ferrières J, Amar J. Evaluation of oral health related to body mass index. Oral diseases. 2012 Nov;18(8):748-55.
20. Matsushita K, Hamaguchi M, Hashimoto M, Yamazaki M, Yamazaki T, Asai K, Yamori M, Bessho K, Toda H, Hasegawa G, Nakamura N. The novel association between red complex of oral microbe and body mass index in healthy Japanese: a population based cross-sectional study. Journal of clinical biochemistry and nutrition. 2015;57(2):135-9.
21. Arboleda S, Vargas M, Losada S, Pinto A. Review of obesity and periodontitis: an epidemiological view. British dental journal. 2019 Aug;227(3):235-9.