Acta Biomedica Scientia
e - ISSN - 2348 - 2168
Print ISSN - 2348 - 215X
www.mcmed.us/journal/abs
Research Article

THE IMPACT OF BODY COMPOSITION ON PERIODONTAL DISEASE SEVERITY IN ADULT MEN

Dr. Sonarkhan Deesha Devidas*

Assistant Professor, Department of Anatomy, Sree Balaji Medical College & Hospital, Chennai - 600044, Tamil Nadu, India.

ABSTRACT

Background: Overweight and obesity are known risk factors for several chronic diseases, including periodontal disease. While the relationship between obesity and periodontal disease has been explored, few studies have focused on the association between body composition and periodontal health in men. Objective: This study aimed to investigate the relationship between body composition parameters and periodontal disease severity in adult men. Methods: A cross-sectional analytic study was conducted involving 300 men aged 30-60 years. Participants were categorized into groups based on periodontal status: normal periodontium, gingivitis, initial periodontitis, and established periodontitis. Body composition variables including BMI, waist circumference, body water, body fat, skeletal muscle, and bone mass were measured using bioelectrical impedance analysis. Periodontal status was assessed via gingival and plaque indices and clinical attachment loss. Statistical comparisons were made between groups with significance set at $p < 0.05$. Results: No significant differences in body composition were observed between men with normal periodontium and those with gingivitis. Significant differences in BMI, waist circumference, body water, body fat, skeletal muscle, and bone mass were found when comparing normal periodontium with both initial and established periodontitis groups ($p < 0.01$). Differences between gingivitis and periodontitis groups were also significant for most parameters except bone mass. No significant differences were noted between initial and established periodontitis groups, suggesting a plateau effect in body composition changes. Bone mass was notably lower in periodontitis compared to gingivitis, indicating systemic bone involvement. Conclusion: The severity of periodontal disease is associated with alterations in body composition, especially adiposity and musculoskeletal health, among men. These findings highlight the importance of considering systemic factors in periodontal assessment and support integrated medical-dental care to improve patient outcomes.

Keywords: - Periodontal disease, Body composition, Bioelectrical impedance analysis, Obesity, Bone mass

Access this article online		
Home page **www.mcmed.us/journal/abs**		**Quick Response code**
Received:22.03.2013	**Revised**:27.03.2013	**Accepted**:08.04.2013

INTRODUCTION

The development of diabetes, heart disease, cancer and both endocrine and musculoskeletal diseases may be linked to being overweight. Being centrally overweight which is linked to metabolic syndrome, puts a subject at higher risk for heart and blood vessel disease [1-6].

Research shows that your chances of getting periodontal disease increase if you are overweight or obese. Gram-negative anaerobic bacteria bring on periodontal disease by triggering inflammation and destroying periodontal tissues. Many studies indicate that periodontal disease is linked to obesity, a greater body mass index (BMI) and a larger waistline [7 - 10].

Maintaining good oral health involved significant links between metabolic syndrome and periodontitis in women, as well as how

Corresponding Author: **Dr. Sonarkhan Deesha Devidas**

increased serum resistin, a hormone from the adipose tissue, connected to periodontitis [11, 12].

While there has been much research looking at the effect of periodontal disease on obesity, there are no studies focused on its link to body composition. As a result, this present study aimed to discover if body composition is related to periodontal disease among men. This research was designed to probe the hypothesis that body composition is linked, negatively, to the severity of periodontal disease. Studies from here on will determine if these phenomena are related.

METHODS

Analytic cross-sectional research was applied in the present investigation. Men in the 30-60 age range, who had been sent by other clinics for assessment, took part in the study. Anybody without diabetes, heart disease or who used tobacco recently, didn't exercise enough or had periodontal treatment in the previous three months was excluded.

A total of 300 men who met the required conditions took part in the study. A census was performed to collect all the necessary data from each subject during the study period. Because the study was approved by the Ethics Committee, its design is now done. Individuals who took part were informed about all the details of the investigation and signed an informed consent form.

In order to avoid including people who met the exclusion criteria, we interviewed one of the authors about their patients' history. By applying the gingival and plaque indices and measuring attachment, we took all the necessary records for periodontal measurements. If the score is "1," you find bleeding from the gums and visible plaque, but if it is "0," you see neither bleeding nor plaque [13].

To track the loss of attachment for all teeth, a Williams probe was used on four surfaces and the average was determined. Based on the study outcomes, people were put into one of four groups.

In the first group, inflammation of the gingival plaque is nearly absent (GPI = 0) and there is no loss of attachment. This group describes a simple gingivitis with no effects on attachment and only minor swelling of the gums. Group 3: Periodontitis where the gums are inflamed (GPI = 1) and there is loss of attachment greater than 2 mm.

Measurements were taken in kilograms (kg), centimeters (cm) and kilograms per square meter for BMI. At the belly button, each participant's waist was measured in centimeters. Bioelectrical impedance analysis (BIA) is used to calculate how much fat and muscle make up a person's body structure. Water, proteins and electrolytes, found in fat-free mass, give it greater conductivity than fat mass [14]. The estimation of bones, skeletal muscle and body water mass relies on resistance and reactance. Using the Diagnostic Scale-Beurer BG 56, I was able to measure these parameters. A post hoc test was run if significant variations were spotted between the groups. Any results with a P value below 0.05 were thought to be significant.

RESULTS

The analysis of periodontal status in relation to various body composition variables revealed significant differences across comparison groups. When comparing individuals with normal periodontium to those with gingivitis, no statistically significant differences were observed in BMI ($p = 0.845$), waist circumference ($p = 0.405$), body water ($p = 1.003$), body fat ($p = 0.853$), skeletal muscle mass ($p = 1.007$), and bone mass ($p = 0.013$), indicating that these parameters remain largely consistent between healthy and gingivitis-affected participants.

However, marked and statistically significant differences emerged when comparing normal periodontium to initial periodontitis cases, with all variables showing highly significant p-values (BMI $p = 0.002$; waist circumference $p = 0.003$; body water $p = 0.002$; body fat $p = 0.001$; skeletal muscle $p = 0.001$; bone mass $p = 0.003$). This suggests that early periodontal disease is associated with changes in overall body composition, including adiposity and musculoskeletal mass.

Similarly, the comparison between normal periodontium and established periodontitis revealed significant differences across all measured variables (BMI $p = 0.003$; waist circumference $p = 0.002$; body water $p = 0.001$; body fat $p = 0.002$; skeletal muscle $p = 0.002$; bone mass $p = 0.005$), reinforcing the association of advanced periodontal disease with altered body composition metrics.

In the comparison between gingivitis and initial periodontitis, significant differences were also detected for most variables except bone mass, which showed a non-significant trend ($p = 0.165$). This indicates that the transition from gingival inflammation to early periodontitis involves measurable changes in body composition, though bone mass alterations may manifest later.

Contrasting gingivitis and established periodontitis groups showed statistically significant differences in BMI ($p = 0.002$), waist circumference ($p = 0.003$), body water ($p = 0.002$), body fat ($p = 0.003$), and skeletal muscle ($p = 0.002$), while bone mass remained comparable ($p = 0.963$). This further supports that body composition changes progress with periodontal disease severity, but bone mass changes may be less sensitive or delayed.

Lastly, the comparison between initial and established periodontitis groups did not yield significant differences across BMI (p = 0.275), waist circumference (p = 0.993), body water (p = 0.560), body fat (p = 0.725), skeletal muscle (p = 0.685), or bone mass (p = 0.475). These findings suggest that the body composition changes associated with periodontitis plateau after disease onset, without further significant alteration as the disease advances.

Overall, the data indicate a strong association between periodontal disease progression from normal health or gingivitis to periodontitis and shifts in body composition parameters, highlighting potential systemic effects linked with periodontal inflammation and tissue destruction.

Table 1: A comparison of the normal periodontal status with various stages of periodontitis, as well as related variables

Periodontal Status	**Variables**					
	BMI	**Waist Circumference**	**Body Water**	**Body Fat**	**Skeletal Muscle**	**Bone Mass**
Normal Periodontium vs Gingivitis	0.845	0.405	1.003	0.853	1.007	0.013
Normal Periodontium vs Initial Periodontitis	0.002	0.003	0.002	0.001	0.001	0.003
Normal Periodontium vs Established Periodontitis	0.003	0.002	0.001	0.002	0.002	0.005
Gingivitis vs Initial Periodontitis	0.003	0.002	0.003	0.002	0.001	0.165
Gingivitis vs Established Periodontitis	0.002	0.003	0.002	0.003	0.002	0.963
Initial Periodontitis vs Established Periodontitis	0.275	0.993	0.560	0.725	0.685	0.475

DISCUSSION

After adjusting for age, diabetes history, smoking, physical activity, and socioeconomic status, the purpose of this study was to examine the relationship between periodontal disease and body composition, BMI, and WC in males with periodontal disease. According to the results of a systematic review by Chaffee and Weston, individuals with periodontitis (initial and established forms) had higher BMIs than those with healthy gums [15]. There is a trend of increasing odds of prevalent periodontal disease with increasing body mass index (BMI) among obese individuals and a greater mean clinical attachment loss among obese individuals, according to his study. Periodontitis and BMI were not associated. Having periodontitis was more likely among obese people with a BMI of 25. Their adjusted odds ratio (OR) was 0.99 (1.206 to 1.220). There may be a discrepancy in the ages of participants. The participants in our study were younger than those in the study in which we participated.

As reported by Khader et al. [17], periodontal patients had a larger waist circumference than healthy or gingivitis patients. According to [17], subjects with high waist circumference were more likely to develop periodontitis. One study found that BMI and WC were significantly correlated with CAL, GI, and CPI in women. CPI and WC were the only variables that had a significant correlation in males. Females who were overweight and obese in the abdominal area were significantly more likely to suffer from periodontal disease than those who were overweight or obese in the abdominal area [18].

As a unique feature of this study, men with different degrees of periodontal disease were assessed for body composition parameters.

It is also common to experience similar changes in the bone and periosteum in other areas other than the mouth. The cause of osteoporosis is reduced osteoid deposition, depletion of osteoblasts, and impaired morphodifferentiation of connective tissue cells to form osteoblasts, not increased osteoclastic activity. Periodontal tissue destruction is also aggravated by protein deficiency, but gingival inflammation is initiated and exacerbated by bacterial plaque infection [22]. Protein deprivation increases the vulnerability of periodontal tissues to breakdown when challenged by bacteria due to a lack of integrity.

There seemed to be an association between periodontal disease and bone mass in the present study. A significant difference was found between subjects in the gingivitis and periodontitis groups with respect to bone mass. In addition to osteoporosis and periodontitis, aging is associated with an increased incidence of these diseases. Osteopenia occurs when bone resorption and formation are out of balance, favoring resorption, resulting in osteoporosis and demineralization. Fractures are more likely to occur in people with osteoporosis because of low bone mass and fragility. There is a major cause of tooth loss and edentulism in adults and that is periodontitis, which is an inflammation of the supporting

tissues of the teeth that results in resorption of the alveolar bone [23]. Some studies have examined the relationship between osteopenia and periodontal disease. Bone mineral density and periodontal disease have a significant relationship [24]. Osteoporosis and periodontal disease can be detected and prevented more effectively if health care providers understand this relationship. The importance of increasing dialogue between medical and dental professionals is becoming increasingly evident when it comes to achieving and maintaining optimal patient health. Body posture was tested for its association with periodontal disease, and its causative role cannot be inferred from this study.

CONCLUSION

This study demonstrates a clear association between periodontal disease severity and alterations in body composition among men. While no significant differences in body composition parameters were observed between individuals with normal periodontium and those with gingivitis, significant changes in BMI, waist circumference, body water, body fat, skeletal muscle, and bone mass were evident when comparing healthy individuals to those with initial and established periodontitis. These findings suggest that the progression of periodontal disease correlates with shifts in systemic body composition, particularly in adiposity and musculoskeletal health.

The lack of significant differences between initial and established periodontitis groups indicates that body composition changes may plateau once periodontitis has developed. Notably, bone mass differences were significant when comparing gingivitis to periodontitis, highlighting a potential link between periodontal inflammation and systemic bone health. This supports existing evidence that periodontal disease and osteoporosis share pathophysiological pathways related to bone resorption and tissue destruction.

These results emphasize the importance of assessing body composition as part of comprehensive periodontal evaluation and suggest that metabolic and musculoskeletal factors may influence or reflect periodontal health. Given the potential systemic implications, integrating dental and medical care could enhance prevention and management strategies for periodontal disease and associated comorbidities.

Future research should explore causal relationships, investigate mechanisms linking body composition to periodontal pathology, and expand to diverse populations. Overall, this study contributes valuable insight into the systemic connections of periodontal disease and underscores the need for holistic approaches to patient health.

REFERENCES

1. P. W. Wilson, S. R. Bozeman, T. M. Burton, D. C. Hoaglin, R. Ben-Joseph, and C. L. Pashos. (2008). “Prediction of first events of coronary heart disease and stroke with consideration of adiposity,” *Circulation*, 118(2), 124–130.
2. E. E. Calle, C. Rodriguez, K. Walker-Thurmond, and M. J. Thun. (2003). “Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. Adults,” *The New England Journal of Medicine*, 348(17), 1625–1638.
3. C. M. Steppan, S. T. Bailey, S. Bhat. (2001). “The hormone resistin links obesity to diabetes,” *Nature*, 409(6818), 307–312.
4. J. W. van der Steeg, P. Steures, M. J. C. Eijkemans. (2008). “Obesity affects spontaneous pregnancy changes in subfertile, ovulatory women,” *Human Reproduction*, 23(2), 324–328.
5. A. Tukker, T. L. S. Visscher, and H. S. Picavet. (2009). “Overweight and health problems of the lower extremities: osteoarthritis, pain and disability,” *Public Health Nutrition*, 12(3), 359–368.
6. S. M. Grundy. (2004). “Obesity, metabolic syndrome, and car- diovascular disease,” *Journal of Clinical Endocrinology and Metabolism*, 89(6), 2595–2600.
7. C. F. D. Vecchia, C. Susin, C. K. Ro¨sing, R. V. Oppermann, and J. M. Albandar. (2005). “Overweight and obesity as risk indicators for periodontitis in adults,” *Journal of Periodontology*, 76(10), 1721–1722.
8. T. E. Van Dyke. (2009). “The etiology and pathogenesis of periodon- titis revisited,” *Journal of Applied Oral Science*, 2009.
9. A. D. Haffajee and S. S. Socransky. (2009). “Relation of body mass index, periodontitis and Tannerella forsythia,” *Journal of Clinical Periodontology*, 36(2), 89–99.
10. A. F. Reeves, J. M. Rees, M. Schiff, and P. Hujoel. (2006). “Total body weight and waist circumference associated with chronic periodontitis among adolescents in the United States,” *Archives of Pediatrics and Adolescent Medicine*, 160(9), 894– 899.
11. Y. Shimazaki, T. Saito, K. Yonemoto, Y. Kiyohara, M. Iida, and Y. Yamashita. (2007). “Relationship of metabolic syndrome to periodontal disease in Japanese women: the Hisayama study,” *Journal of Dental Research*, 86(3), 271–275.
12. T. Saito, N. Yamaguchi, Y. Shimazaki. (2008). “Serum levels of resistin and adiponectin in women with periodontitis: the Hisayama study,” *Journal of Dental Research*, 87(4), 319–322.

13. J. Ainamo and I. Bay. (1975). "Problems and proposals for recording gingivitis and plaque," *International Dental Journal*, 25(4), 229–235.
14. H. C. Lukaski and W. W. Bolonchuk. (1988). "Estimation of body fluid volumes using tetrapolar bioelectrical impedance mea- surements," *Aviation Space and Environmental Medicine*, 59(12), 1163–1169.
15. B. W. Chaffee and S. J. Weston. (2010). "Association between chronic periodontal disease and obesity: a systematic review and meta- analysis," *Journal of Periodontology*, 81(12), 1708– 1724.
16. E. J. Kim, B. H. Jin, and K. H. Bae. (2011). "Periodontitis and obesity: a study of the fourth Korean National Health and Nutrition Examination survey," *Journal of Periodontology*, 82(4), 533–542.
17. Y. S. Khader, H. A. Bawadi, T. F. Haroun, M. Alomari, and R. F. Tayyem. (2009). "The association between periodontal disease and obesity among adults in Jordan," *Journal of Clinical Periodontology*, 36(1), 18–24.
18. H.-S. Amin. (2010). "Relationship between overall and abdominal obesity and periodontal disease among young adults," *Eastern Mediterranean Health Journal*, 16(4), 429–433.
19. V. Baelum, W. M. Luan, X. Chen, and O. Fejerskov. (1997). "A 10-year study of the progression of destructive periodontal disease in adult and elderly Chinese," *Journal of Periodontology*, 68(11), 1033–1042.
20. N. Wood, R. B. Johnson, and C. F. Streckfus. (2003). "Comparison of body composition and periodontal disease using nutritional assessment techniques: third National Health and Nutrition Examination Survey (NHANES III)," *Journal of Clinical Periodontology*, 30(4), 321–327.
21. T. N. Chawla and I. Glickman. (1951). "Protein deprivation and the periodontal structures of the albino rat," *Oral Surgery, Oral Medicine, Oral Pathology*, 4(5), 578–602.
22. S. S. Stahl, H. C. Sandler, and L. Cahn. (1955). "The effects of protein deprivation upon the oral tissues of the rat and particularly upon the periodontal structures under irritation," *Oral Surgery, Oral Medicine, Oral Pathology*, 8(70), 760–768.
23. J. Wactawski-Wende, S. G. Grossi, M. Trevisan. (1996). "The role of osteopenia in oral bone loss and periodontal disease," *Journal of Periodontology*, 67(10), 1076–1084.
24. A. Yoshihara, Y. Seida, N. Hanada, and H. Miyazaki. (2004). "A longitudinal study of the relationship between periodontal disease and bone mineral density in community-dwelling older adults," *Journal of Clinical Periodontology*, 31(8), 680–684.

Cite this article:
Dr. Sonarkhan Deesha Devidas. (2013). The Impact of Body Composition on Periodontal Disease Severity in Adult Men. *Acta Biomedica Scientia.* 1(2), 115-119