Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 22s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Evaluating The Link Between Body Mass Index, Oral Hygiene And Periodontal Disease

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Cite this paper as: Ramanarayana Boyapati, Jyesta Lakshmi Naga Sai Sanjana, Adapa Himaja, Asritha Kondapaneni, Potluri Naga Sirisha, Venna Anushka, (2025) Evaluating The Link Between Body Mass Index, Oral Hygiene And Periodontal Disease. *Journal of Neonatal Surgery*, 14 (22s), 892-896.

ABSTRACT

Background: This study was conducted to assess the relationship between obesity and periodontitis.

Material and methods: The study involved a population of 100 participants, all of whom were dentate individuals aged 20 years and older. It included obese patients, both with and without diabetes, hypertension, and osteoarthritis. However, individuals who had undergone periodontal treatment or taken antibiotics within the three months preceding the study were excluded. Additionally, patients with physical or mental disabilities, as well as pregnant or lactating women, were not considered for participation. All potential subjects were informed about the study's purpose and design, and only those who provided informed consent were included. Participants underwent screening to assess their periodontal health, with each individual examined by a single examiner in a dental chair under adequate lighting. Observations were documented on a standardized form. Demographic variables such as age and sex, which could influence periodontal disease, were recorded. A thorough intraoral examination was conducted, and oral hygiene was evaluated using the simplified oral hygiene index. The periodontal status of each participant was assessed by measuring the depth of periodontal pockets. Additionally, the height and weight of each participant were recorded to calculate the body mass index (BMI), and waist circumference (WC) measurements were also taken.

Results: There were 100 controls in group 1 and 100 subjects having periodontal disease in group 2. Good prognosis was seen in 56 subjects without the disease and fair prognosis was seen in 44 subjects without periodontal disease. Among subjects having the disease, good prognosis was seen in 25 cases, fair prognosis was seen in 31 cases and poor prognosis was seen in 44 cases. 15 healthy subjects were obese and 85 healthy subjects were non-obese. 58 subjects with periodontal disease were found to be obese and 42 subjects with periodontal disease were found to be non-obese.

Conclusion: From the findings of this study, it can be concluded that the subjects with periodontal disease were obese and had poor oral hygiene, while the subjects without the disease had good oral hygiene and they were not obese.

Keywords: *Menopause, Mental health, Hormonal fluctuations, Mood disorders, Anxiety, Depression.*

1. INTRODUCTION

Periodontitis is a chronic, multifactorial condition that impacts the supporting tissues of the teeth, marked by an excessive production of molecules that damage tissue and inflammatory mediators in response to periodontal pathogens. Individuals suffering from periodontitis frequently exhibit associations with systemic diseases such as diabetes, coronary heart disease (CHD), preterm birth, and obesity.[1,2] This relationship appears to stem from a shared low-grade inflammatory state, suggesting a common underlying pathophysiological mechanism that connects periodontal disease with systemic health issues.[3] Obesity, a systemic condition defined by an excessive buildup of adipose tissue, poses significant health risks.

Adipose tissue functions not only as a reservoir for fat but also as an active endocrine organ that secretes a variety of biologically active substances.[4] These substances include hormones and proinflammatory cytokines, collectively referred to as adipokines, such as resistin, visfatin, leptin, and adiponectin. These adipokines are integral to inflammatory responses and metabolic regulation.[5] Dysfunction of adipose tissue activates inflammatory pathways and promotes oxidative stress, thereby establishing a parallel pathophysiological link between obesity and periodontitis. Furthermore, dyslipidemia, which is characterized by abnormal levels of serum lipids, is frequently seen in individuals with obesity and is known to be affected by inflammatory processes.[6-8]

Obesity is recognized as one of the most overlooked public health challenges, impacting both affluent and less affluent nations. Over recent decades, the incidence of obesity has risen significantly. In 2014, the World Health Organization (WHO) reported that approximately 600 million adults globally were classified as obese, with projections indicating further increases in the future due to the rising consumption of high-calorie foods and a more sedentary lifestyle.[9,10]

Obesity is typically quantified using the body mass index (BMI), calculated as kg/m². Specifically, a BMI ranging from 25.0 to 29.9 kg/m² is categorized as overweight, while a BMI of 30.0 kg/m² or higher is classified as obesity. However, in Asian populations, the threshold for overweight is set at a BMI of 23 kg/m², as obesity-related health issues have been noted at lower BMI levels in these regions. Although BMI serves as a general measure of total body fat, it does not provide insights into the distribution of body mass.[11]

Therefore, additional metrics such as waist circumference (WC) and waist-to-hip ratio (WHR) are often employed. A WC of 102 cm or more in men and 88 cm or more in women, along with a WHR exceeding 0.90 in men and 0.85 in women, indicates abdominal obesity, which is linked to a heightened risk of health complications.[12] These anthropometric measurements are closely associated with the volume of visceral adipose tissue, which is known to be more metabolically active and to secrete higher levels of cytokines and hormones compared to subcutaneous fat.[13]

This study was conducted to assess the relationship between obesity and periodontitis.

2. MATERIAL AND METHODS

The study involved a population of 200 participants, all of whom were dentate individuals aged 20 years and older. It included obese patients, both with and without diabetes, hypertension, and osteoarthritis. However, individuals who had undergone periodontal treatment or taken antibiotics within the three months preceding the study were excluded. Additionally, patients with physical or mental disabilities, as well as pregnant or lactating women, were not considered for participation. All potential subjects were informed about the study's purpose and design, and only those who provided informed consent were included. Participants underwent screening to assess their periodontal health, with each individual examined by a single examiner in a dental chair under adequate lighting. Observations were documented on a standardized form. Demographic variables such as age and sex, which could influence periodontal disease, were recorded. A thorough intraoral examination was conducted, and oral hygiene was evaluated using the simplified oral hygiene index. The periodontal status of each participant was assessed by measuring the depth of periodontal pockets. Additionally, the height and weight of each participant were recorded to calculate the body mass index (BMI), and waist circumference (WC) measurements were also taken.

3. RESULTS

Table 1: Group-wise distribution of subjects

Groups	Number of cases	Percentage
Group 1 (Controls)	100	50
Group 2 (Periodontal disease)	100	50
Total	200	100

There were 100 controls in group 1 and 100 subjects having periodontal disease in group 2.

Table 2: Prevalence of periodontal disease according to OHI-S

OHI-S	Without Periodontal Disease	With Periodontal Disease
Good	56	25
Fair	44	31

Poor	00	44

Good prognosis was seen in 56 subjects without the disease and fair prognosis was seen in 44 subjects without periodontal disease. Among subjects having the disease, good prognosis was seen in 25 cases, fair prognosis was seen in 31 cases and poor prognosis was seen in 44 cases.

Table 3: Prevalence of periodontal disease according to body mass index

BMI	Without Periodontal Disease	With Periodontal Disease
Obese	15	58
Non-obese	85	42
Total	100	100

15 healthy subjects were obese and 85 healthy subjects were non-obese. 58 subjects with periodontal disease were found to be obese and 42 subjects with periodontal disease were found to be non-obese.

4. DISCUSSION

Periodontal issues are not merely confined to oral health; they also have significant implications for systemic health. Recent studies indicate that obesity, increasingly recognized as a health concern due to lifestyle changes, is associated with periodontitis when analyzed through the lens of the individual's body mass index (BMI).[14] This analysis employs various parameters, including the waist-to-hip ratio, body fat percentage, and oxygen consumption. The evidence suggests that certain conditions related to periodontitis may exacerbate obesity, as evidenced by the presence of metabolic syndrome, dyslipidemia, and insulin resistance. Among the obesity-related diseases, the risk of cardiovascular diseases (CVDs) has been shown to be influenced by periodontitis.[15]

Periodontal disease is characterized as an infectious and inflammatory condition affecting the structures that support teeth, arising from the interplay between harmful bacteria and the immune response of the host.[16] The activation of the immune system, which is primarily intended for protection, ultimately results in tissue destruction due to the production and release of cytokines, proinflammatory mediators, and metalloproteinases.[17]

Periodontitis ranks among the ten most common chronic diseases impacting the global population. Recent studies have increasingly examined the connections between periodontitis and various systemic conditions, including diabetes mellitus, rheumatoid arthritis, cardiovascular diseases, and obesity.

The link between obesity and periodontitis represents a relatively new area of investigation within periodontal medicine, and the potential biological mechanisms involved are not yet fully understood. Nevertheless, adipose tissue secretes proinflammatory cytokines and hormones collectively known as adipocytokines, which trigger inflammatory responses and oxidative stress, leading to a similar pathophysiological profile in both conditions.[18,19]

Obesity may also influence periodontal disease status by increasing lipid and glucose blood levels, which may, in turn, have deleterious consequences on the host response by altering T cells and monocyte/macrophage functions, as well as increasing cytokine production.[20,21] A variety of potential mechanisms can explain an association between obesity and periodontitis. The biological mechanisms for association of obesity with periodontitis are not well established. However, adipose tissue-derived cytokines and hormones may play a role.[22] Overweight in young individuals may have unhealthy dietary patterns such as insufficient micronutrients and excess sugar and fat content, which may increase the risk for periodontal disease and also changes in host immunity and/or increased stress levels, that are often associated with gain of excess fat in early part of life.

This study was conducted to assess the relationship between obesity and periodontitis.

There were 100 controls in group 1 and 100 subjects having periodontal disease in group 2. Good prognosis was seen in 56 subjects without the disease and fair prognosis was seen in 44 subjects without periodontal disease. Among subjects having the disease, good prognosis was seen in 25 cases, fair prognosis was seen in 31 cases and poor prognosis was seen in 44 cases. 15 healthy subjects were obese and 85 healthy subjects were non-obese. 58 subjects with periodontal disease were found to be obese and 42 subjects with periodontal disease were found to be non-obese.

Mathur LK et al.[23]The aim of the study was to evaluate the relationship between obesity and periodontitis.A total of 300 subjects aged 20 years and above suffering from generalized periodontitis were recruited from Department of Periodontics, Pacific Dental College and Hospital, Udaipur. Periodontal status of the subjects was recorded. Body mass index and waist circumference were used as measure to assess obesity. Other variables like age, gender, oral hygiene index were also recorded. When evaluation was done for prevalence of periodontal disease according to BMI in obese and non-obese, the

prevalence of periodontal disease was significantly (P=0.03) more in obese (88%) than in non-obese (74.4%) individuals. [OR=−20.4 and 95% confidence interval (CI) 1.3-1.3]. The prevalence of periodontal disease is higher among obese subjects. Obesity could be a potential risk factor for periodontal disease in all age groups.

5. CONCLUSION

From the findings of this study, it can be concluded that the subjects with periodontal disease were obese and had poor oral hygiene, while the subjects without the disease had good oral hygiene and they were not obese.

Declarations

Conflict of interest: The authors declares that there is no conflict of interest.

Funding: Not applicable

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