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# The relationship between body mass index and periodontitis among postmenopausal women

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## KEYWORDS

Periodontitis;  
Osteoporosis;  
Postmenopause;  
Obesity

## Summary

**Background:** Periodontitis and overweight/obesity prevalence are both increasing worldwide. Overweight/obesity has been suggested as a risk factor for developing periodontitis. The aim of this study was to determine the association between obesity and periodontitis among postmenopausal Jordanian women.

**Material and methods:** Cross-sectional associations between obesity and periodontitis were examined in 400 postmenopausal women aged 50–79 years. All women completed a questionnaire, had a clinical periodontal examination and had their weight and height recorded. Multivariable analysis was carried out using logistic regression with adjustment for possible confounders.

**Results:** Based on body mass index (BMI), 23.5% of the women were considered overweight and 70% were obese. Obese participants with BMI  $\geq 25$  had decreased odds (OR) for having periodontitis compared to participants with normal weight (OR: 0.54; 95% confidence interval [CI]: 0.27–0.87). The obese patients showed significantly higher loss of clinical attachment (CAL), calculus, as well as plaque and gingival index and as compared to normal and overweight ( $p < 0.01$ ). The extent

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of periodontal disease was also significantly higher in obese women as measured by average percent of sites with the deepest CAL  $\geq 5$  mm ( $p=0.025$ ). There was no significant difference in mean and percentage of sites with alveolar crestal bone loss (ACH) among different categories of obesity.

In conclusion, BMI may be inversely associated with prevalence of periodontitis but positively related to the severity of periodontitis assessed by several periodontal parameters such as CAL, recession, plaque, and calculus. Additional prospective studies to further quantify, or understand the mechanisms, of this association are merited.

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## Introduction

Overweight and obesity affect a large proportion of the population in all countries, and its prevalence has increased globally in the recent years [1]. There is a global pandemic with 500 million obese adults worldwide [2]. It seems to be increasing among people of all ages, in both developed and developing countries. The prevalence of obesity in north of Jordan was 28.1% for men and 53.1% for women [3]. The World Health Organization (WHO) has recognised obesity as a predisposing factor to major chronic diseases ranging from cardiovascular disease to cancer [4]. Periodontal disease is one of the most common chronic diseases affecting approximately half of US adults aged 30 and older [5]. In Jordan, among young adults with mean age 28 years old, 76% had gingivitis, 2.2% had aggressive periodontitis and 5.5% had chronic periodontitis [6].

A relationship between obesity and periodontal disease in humans was first demonstrated by Saito et al. [7]. Since then, several studies in adults have investigated a possible association between obesity and periodontitis [8–19]. A recent systematic review and meta-analysis included 28 independent studies done by Chaffee and Weston suggested positive association between periodontal disease and obesity across diverse populations with an OR of 1.35 (95% CI 1.23–1.47) whether BMI or waist circumference was used to define obesity [20]. A further systematic review by Suvan et al. reported a stronger association between periodontitis and obesity (OR 1.81, 1.42–2.30), overweight (OR 1.27, 1.06–1.51) and obese and overweight combined (OR 2.13, 1.40–3.26) from a meta-analysis of 19 studies [21]. BMI-defined obesity was significantly associated with increased odds of having periodontitis among adults in Jordan (OR 2.9, 95% CI 1.3–6.1) (13). The evaluation of the relationship between obesity and periodontitis is complicated by the fact that multiple systemic factors are risk factors of periodontal diseases, including age,

race, gender, smoking, genetic factors, exercise, and body weight, thus the associations were not uniform throughout the populations studied. Periodontal disease is more prevalent and severe in older population [5]. It is associated with impaired food intake and poor quality of life in older adults [22,23]. Identifying modifiable risk factors such as obesity is a priority to improve control of periodontal disease and its clinical complications in older women

The main objective of the present study was to examine the association of body mass index with prevalence and severity of periodontal disease among Jordanian postmenopausal women aged 50–70 years old. Based on the results of previous studies [9–21], we hypothesise that obese women are more likely to have periodontitis than normal weight women.

## Methods

### Study population

This study was approved by the Institutional Review Board of Jordan University of Science and Technology. A total of 400 women participated in this study. Women who enrolled in the study had fulfilled the following inclusion criteria: (1) experienced natural menopause; (2) no history of a systemic condition or medication intake that might influence the periodontal disease severity (i.e., women with a history of diabetes mellitus, or on corticosteroids); (3) aged between 50 and 70 years. Of the 900 potential participants contacted, some women declined and other women did not meet the inclusion criteria. Of the 500 women who completed a study visit, 50 women did not present for oral radiographs, 30 women did not complete the interview questionnaire, and 20 women did not complete the oral examination. After implementing all exclusions, a total of 400 women were included in the study.

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