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*Research Paper*

# Characterization of the periodontal condition in university Student of the regional complex of BUAP with overweight or obesity

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**ABSTRACT**

Obesity is a chronic condition influenced by several factors, including nutritional changes in the diet and sedentary lifestyles, predisposing one to suffering of various systemic diseases. It has been implicated as a significant risk factor for several medical conditions such as cardiovascular diseases, diabetes mellitus type 2, hypertension, cerebrovascular events, dyslipidemias, osteoarthritis, some types of cancer, and in recent years, several cross-sectional epidemiological and longitudinal studies suggest that obesity is associated with periodontal disease. In this study, the characterization of the periodontal condition of 159 adult students of the Southern Regional Complex of the BUAP was reported. The students were evaluated clinically and stomatologically by anthropometry (Size, Weight, BMI, ICC) and IHOS index. It was found that in the group of adults with overweight or obesity but with an average age between 18 and 19 years, there was no significant difference that correlates overweight or obesity with periodontal disease.

**Key words:** Obesity, BMI, IHOS, periodontitis.

## INTRODUCTION

WHO data indicate that in the last 43 years, the incidence of obesity has tripled worldwide. It has been reported that in 2016 alone, 39% of adults, 18 years of age or older, were overweight and 13% were obese. Estimates in that same year showed that there were more than 340 million children and adolescents between the ages of 5 and 19 who were overweight or obese (World Health Organization, 2018). In Mexico, figures published in the 2012 national health and nutrition survey show an increase in overweight and obesity in urban and rural areas. From 1988 to 2012, overweight in women from 20 to 49 years of age increased from 25 to 35.3% and obesity from 9.5 to 35.2%. The foregoing reveals that the increase in the prevalence of obesity in Mexico is among the fastest documented in the world (National Health and Nutrition Survey, 2012). Obesity has been implicated as a significant risk factor for several medical conditions such as cardiovascular diseases, diabetes mellitus type 2 and resistance to insulin, hypertension, cerebrovascular events, dyslipidemias, osteoarthritis, some types of cancer (Burton et al., 1985), and in recent years, several longitudinal and cross-sectional epidemiological studies suggest that obesity is associated with periodontal disease (Morita et al., 2011; Romero et al., 2014). Periodontitis is a process pathologically caused by chronic inflammation of the supporting tissues due to the development of an infectious process, where the microorganisms present in bacterial plaque dento constitute the etiological agent, promoting the destruction of connective tissues of the periodontium and alveolar bone (Van Dyke and Sheilesh, 2005). The immune response mediated by cytosines can cause irreversible damage to the tissues of the tooth and lead to its loss (Graves, 2008). It has been reported that individuals with a body mass index (BMI)> 30 express increased levels of leptin, IL-1, IL-6 and TNF-type cytokines. α contribute to a pro-inflammatory state in obese patients (Blancas-Flores et al., 2010). There are also evidences that report the activation of the expression of genes that code for these cytokines, regulating positively many processes of the inflammatory mechanism in periodontitis, for which the immunological

response of the periodontal tissue of the obese seems to be related to its pro-inflammatory state (Graves, 2008; Okada and Murakami, 1998).

**Description of the Method**

A cross-sectional, descriptive, observational study was conducted among newly admitted university student population having periodontal condition with BMI <25, and ICC <80 in women and in men an ICC <90 to be considered normal weight. The students considered overweight or obese fulfilled the condition of a BMI> 25 and ICC> 80 in women and in men an ICC> 90. The study sample consisted of 159 new students of the school year August 2017-December 2017, of four degrees from the Southern Regional Complex of the Benemérita Autonomous University of Puebla, located in the city of Tehuacán, Puebla. The data collection was done in the clinic of the Faculty of Stomatology through the clinical history with periodontograma. The study variables included age, gender, weight, height, body mass index (BMI), hip-waist index (ICC),% control of plaque dentobacteriana (% CPD) and simplified oral hygiene index (IHOS).

The study subjects were reviewed by the research team consisting of two assistants, who were instructed on the methodology for data collection. For the survey of the Simplified Oral Hygiene Index (IHOS) proposed by Green and Vermillion (Green and Vermillion, 1964; Van Dyke and Sheilesh, 2005), dental pieces were examined according to the methodology of this index: 1st molar right upper permanent (vestibular surface); right upper permanent central incisor (vestibular surface); 1st permanent upper left molar (vestibular surface), permanent lower left 1st molar (lingual surface); Left lower central incisor (vestibular surface) and permanent lower right 1 molar (lingual surface). Also, the IHOS index consisted of two components: the simplified waste index (DIS) and the calculation index (CI-S), each component was evaluated on a scale of 0 to 3.

The criteria to measure the component of waste (DI-S) of simplified oral hygiene (IHO-S) were as follows:

1- No waste or stains.
2- The waste or plate does not cover more than a third of the tooth surface.
3- The residues or plate cover more than a third of the surface but not more than two thirds of the exposed tooth surface.
4- Soft waste covers more than 2 thirds of the exposed tooth surface.

To obtain the individual index of IHOS per individual, it is necessary to add the score for each indicated tooth and divide it by the number of surfaces analyzed. Once established, the clinical degree of oral hygiene is determined:

Excellent: 0
Good: 0.1 - 1.2
Regular: 1.3 - 3
Bad: 3.1 - 6

**RESULTS**

After obtaining the clinical history and performing the exploratory examination in all of the students who participated in the study, the following data was obtained: the minimum age was 17 years and the maximum age was 24 years, and the average age was 18.8 years. Also, the female gender was the outstanding with 117 women and 44 men in the population studied, as shown in Figure 1.

The measurement of BMI, ICC and Simplified Oral Hygiene Index (IHOS) yielded the following data:

-Sample of students with normal weight (BMI <25 and ICC <80 in women and ICC <90 in men):

Students with good IHOS: 89
Students with regular IHOS: 22
Students with bad IHOS: 1

-Sample of students with overweight or obesity (BMI> 25 and ICC> 80 in women and ICC> 90 in men):

Students with good IHOS: 36
Students with regular IHOS: 10
Students with bad IHOS: 1

In Table 1 we show the descriptive statistical data (mean, standard deviation, minimum and maximum values) for the variables BMI, hip-waist ratio (CC),% control of plaque dentobacteriana (% CPD) and IHOS of the study group. The first group presented a BMI corresponding to normal weight, a % control value of dentobacterial plaque with normal characteristics and the IHOS showed a degree of regular oral hygiene.

Table 2 shows a BMI that, according to the WHO criteria, corresponds to overweight and values of% control of plaque dentobacteriana (% CPD) suitable. In addition, the IHOS indicated a degree of regular oral hygiene.

Table 3 shows the descriptive statistics and the results of the Student's t-test for the BMI, CHF, and periodontal condition variables (% CPD and IHOS) among the groups evaluated. It was observed that there were significant differences for the variables BMI and ICC considered ($p < 0.05$), but not so for the variables% CPD and IHOS, which showed the periodontal condition. These findings allow us to conclude that in the group of overweight or obese adults, there is no significant difference that correlates overweight or obesity with periodontal disease.

**DISCUSSION OF THE RESULTS**

In the data obtained and analyzed in the present study, we

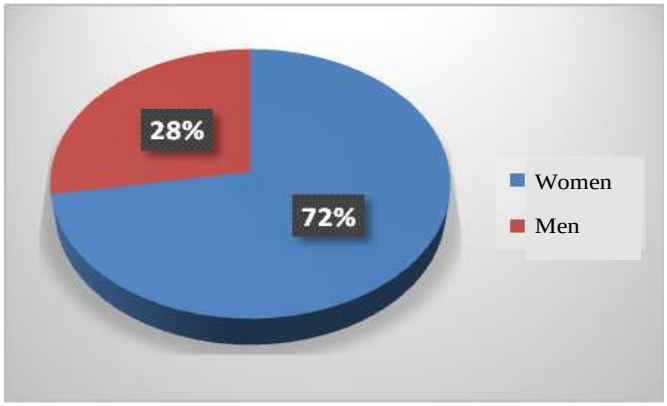


**Figure 1:** Percentage of women and men participating in the study.

**Table 1:** Descriptive statistics of the group of students in normal weight condition in the South Regional Complex of the BUAP.

| Variable | IMC | ICC | % CPD | IHOS |
|---|---|---|---|---|
| N | 112 | 112 | 112 | 112 |
| X | 22.1 | 75.9 | 17.4 | 0.7 |
| S | 1.9 | 6.0 | 15.8 | 0.6 |
| Min | 16.5 | 64 | 1.5 | 0.3 |
| Máx | 24.9 | 93 | 62.5 | 3.5 |

Source: Characterization of the periodontal condition in students in normal weight condition.

**Table 2:** Descriptive statistics of the group of overweight and obese students in the South Regional Complex of the BUAP.

| Variable | IMC | ICC | %CPD | IHOS |
|---|---|---|---|---|
| N | 47 | 47 | 47 | 47 |
| X | 29.4 | 90.8 | 16.7 | 0.7 |
| S | 3.1 | 7.5 | 11.6 | 0.7 |
| Min | 25.3 | 78 | 1.8 | 0.1 |
| Máx | 39.5 | 115 | 54.8 | 3.1 |

Source: Characterization of the periodontal condition in students who are overweight or obese.

**Table 3:** Descriptive statistics and analysis among the groups of students in conditions of overweight, obesity and normal weight in the South Regional Complex of the BUAP.

| Variable | Obesity | N | x | s | Min | Max | p* value |
|---|---|---|---|---|---|---|---|
| IMC | No | 112 | 22.1 | 1.9 | 16.5 | 24.9 | 0.00 |
| | Si | 47 | 29.4 | 3.1 | 25.3 | 39.3 | |
| ICC | No | 112 | 75.9 | 6.0 | 64 | 93 | 0.04 |
| | Si | 47 | 90.8 | 7.5 | 78 | 115 | |
| %CPD | No | 112 | 17.4 | 15.8 | 1.5 | 62.5 | 0.78 |
| | Si | 47 | 16.7 | 11.6 | 1.8 | 54.8 | |
| IHOS | No | 112 | 0.7 | 0.6 | 0.3 | 3.5 | 0.99 |
| | Si | 47 | 0.7 | 0.7 | 0.1 | 3.1 | |

* Test statistic: Student's T test for the difference of means between the groups. We consider a statistically significant value less than or equal to 0.05.

did not find a statistically significant positive association between overweight or obesity with periodontal disease. Although there are several longitudinal and cross-sectional studies that correlate overweight, obesity and chronic inflammation with periodontal disease (Morita et al., 2011) (Romero et al., 2014), this relationship does not usually appear in study groups with adults under 19, even if they are overweight or obese. This suggests that age is a determining factor for the appearance of periodontal disease, which coincides with the results obtained by Al-Zahrani et al. (2003), who in a cross-sectional study, reported data from an investigation conducted in the United States and found that the prevalence of periodontal disease in adults whose age was in the range of 18 to 34 years was 7.8%, in adults in the range of 35 to 59 years was 17.3% and in adults in the range of 60 to 90 years of age was 20.2%. This hypothesis is also supported by the results obtained by Reeves et al. (2006), who suggested that body weight and waist circumference is associated with periodontitis, but the association varies according to age. In their report, they concluded that adolescents aged 13 to 16 years were not at increased risk of chronic periodontitis, while adolescents aged 17 to 21 had a higher risk for each kilogram of increase in body weight. Similarly, adolescents aged 13 to 16 years did not have an increased risk of periodontal disease, while adolescents aged 17 to 21 years had a higher risk of periodontal disease due to a 1 cm increase in waist circumference. They concluded that periodontitis can follow patterns similar to other chronic conditions that originate early in life and are related to central adiposity.

## CONCLUSIONS

Our results suggest that at the beginning of adulthood, which comprises the period between 17 and 19 years of age, overweight and obesity are not factors for the onset of periodontal disease, since in the study conducted on a sample of 159 students, where we included adult students with normal weight, overweight or obese, with a mean age of 18.8 years, no significant difference was found to correlate overweight or obesity with periodontal disease. Other aspects such as diet, stress and habits such as smoking that could constitute risk factors that cause periodontal disease in early adulthood should be considered.

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