



ORIGINAL ARTICLE

## Correlation between BMI and climateric symptoms in menopausal women

I. Y. González-Carrillo\*, J. Vázquez-Méndez, G. Guerrero-González, O. Vidal-Gutiérrez, M. Cervantes-Flores

Department of Gynecology and Obstetrics, "Dr. José Eleuterio González" University Hospital, Universidad Autónoma de Nuevo León, Monterrey, N. L., Mexico

Received: February 2013; Accepted: November 2013

### KEYWORDS

Climateric symptoms;  
Body mass index;  
Blatt-Kupperman  
index; Obesity;  
Mexico.

### Abstract

**Objectives:** To determine the association between climateric symptoms and body mass index (BMI). In addition, to define the age of onset of climateric symptoms and to associate a patient's occupation and marital status with climateric symptom severity.

**Materials and methods:** Observational, retrospective and cross-cohort study including 403 patients attending the Menopause Clinic of the University Hospital of the *Universidad Autónoma de Nuevo León* from November 2008 to December 2011. Clinical history, physical examination, weight and height, and BMI were evaluated. Climateric symptoms were assessed through the Blatt-Kupperman modified index. Marital status and occupation were also analyzed.

**Results:** No relation was found between BMI and climateric severity, nor was there any relation between climateric symptoms and marital status or occupation.

**Conclusions:** Additional research is needed to assess the influence of climateric risk factors.

1665-5796 © 2014 Revista Medicina Universitaria. Facultad de Medicina UANL. Publicado por Elsevier México. Todos los derechos reservados.

### Introduction

Menopause is the natural biological process in which a woman's menstrual period stops permanently. During climaterium, the progressive disappearance of the ovarian function occurs leading to a gradual decline in estrogen secretions and several associated hormonal alterations giving rise to a series

of organic and psychological changes. In healthy women, menopause occurs between the fifth and the sixth decades of life (from ages 47 to 52).<sup>1</sup> Climateric symptoms worsen in relation to social determinants linked to race, social and cultural entitlements which fall upon their gender.<sup>2</sup>

The manifestations produced as a consequence of the ovarian function ceasing and the subsequent hormonal deficit,

\* Corresponding author: Laguna de Catemaco 1359, Las Quintas, Z.P. 80060, Culiacán, Sin., Mexico. Telephone: (667) 715 8045. E-mail address: isabelyunuen@hotmail.com (I. Y. González-Carrillo).

are expressed with very unique symptoms known as climateric.<sup>1-3</sup> In order to evaluate climateric symptoms, different scales have been developed, for instance the Kupperman index,<sup>4</sup> the Utian Quality of Life (UQOL) Scale,<sup>5</sup> the Greene scale,<sup>6</sup> and the SUMEVA scale.<sup>7</sup> Some assess the impact of climateric symptoms in the quality of life, especially the influence on perimenopausal patients, this information being useful in the follow-up of patients who receive hormone replacement treatment (HRT).<sup>8</sup>

Hypoestrogenism has been related to physiological changes which are, in part, responsible for the weight gain during that period.<sup>9</sup> In Mexico, an overweight prevalence of 72% in adult women has been reported.<sup>10</sup>

Obesity in connection with vasomotor symptoms is controversial. Previous studies suggest that body fat protects women from vasomotor symptoms due to the aromatization of androgens to estrogens in the adipose tissue; however, other evidence suggests that a greater body mass index (BMI), and increased body fat in particular, are associated with reports of greater climateric manifestations.<sup>11,12</sup> In this study we assess the hypothesis that there is a correlation between BMI and the severity of climateric symptoms, studying overweight (according to BMI) connection with climaterium, through the Blatt-Kupperman index,<sup>4</sup> with the purpose of determining whether or not obese or overweight patients suffer from more severe climateric symptoms.

## Materials and methods

An observational, retrospective, descriptive, cross-cohort study was described. We included 431 patients who attended the Menopause Clinic of the "Dr. José Eleuterio González" University Hospital of the *Universidad Autónoma de Nuevo León*, in Monterrey, N. L., Mexico, from November 2008 to December 2011. Patients who had received HRT during the previous 3 months and those who did not comply with the required data were excluded.

We performed a full clinical history check in order to obtain personal data and background information, a physical examination including measurement of height and weight to obtain BMI and a questionnaire on climateric symptoms through the Blatt-Kupperman modified index.<sup>5</sup> The Blatt-Kupperman index is a scale used to determine the severity of climateric symptoms; it assesses 15 symptoms, which are rated by the patients as follows: 0 = none, 1 = mild, 2 = moderate, 3 = severe.

Subsequently, a score was obtained which was categorized as mild (0-20), moderate (21-35), or severe (> 35).<sup>13</sup> The variables included were: Age, marital status, occupation, BMI, number of years of menopause, and modified Blatt-Kupperman index.

With the data obtained we created a database in Microsoft Excel®, for subsequent analysis using SPSS® v. 14. All the variables were analyzed with traditional descriptive statistics such as statistical average and dispersion measures (standard deviation). Pearson's correlation test was used to assess the correlation between BMI and Blatt-Kupperman, as well as a dispersion graph. Using Pearson's correlation, a value of -1 to 1 was obtained (a value closer to 1 indicates a positive correlation while a value closer to -1 indicates a negative correlation; if the value is close to 0, it implies

that there is no lineal relation). We assessed the correlation between marital status and occupation with the Blatt-Kupperman index through Pearson's R test.

## Results

A total of 403 patients with an average age of 50.01 ( $\pm$  7.70) years, with an average of 5.69 ( $\pm$  5.97) years of menopause were included in the study. The average BMI was 28.98 ( $\pm$  5.71) kg/m<sup>2</sup>. The average value of the Blatt-Kupperman index was 25.78  $\pm$  13.48. Regarding marital status, 334 (83%) of the patients were married, 52 (13%) were single, and 17 (4%) were widows. Three hundred forty-nine patients (87%) were housewives, 42 (10%) were employed outside their homes and 12 patients (3%) were retired.

We found that the symptoms in 113 patients (28%) were rated as severe, in 140 (35%) as moderate, and in 150 (37%) as mild, according to the Blatt-Kupperman index.

Concerning BMI and degree of obesity, 0.3% of the patients were thin, only 20.1% had what is considered to be a normal BMI, 41.0% were overweight, and 37.7% were obese. We evaluated the correlation between BMI and the Blatt-Kupperman index through Pearson's R test, obtaining a value of 0.053; consequently, we did not find a relationship between these 2 variables.

In order to show a correlation between BMI and the Blatt-Kupperman index, a dispersion graph was created; no correlation was found since we were not able to see an increasing or decreasing tendency of the Blatt-Kupperman index regarding BMI (Fig. 1).

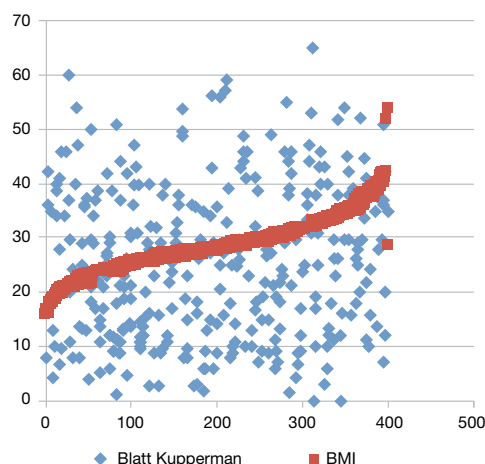
We evaluated the relationship between marital status and occupation with the Blatt-Kupperman index, through Pearson's R test, with a value of -0.074 and 0.017 respectively; therefore, no relationship was found between these variables.

## Discussion

The information regarding the association between BMI and climateric symptoms is controversial. In this study we assessed the correlation between the degree of obesity and the Blatt-Kupperman index, since some authors concur that estrogen production in adipose tissue in overweight and obese patients protects them from suffering climateric symptoms,<sup>9</sup> in contrast with other authors who conclude that a greater BMI and weight gain are associated with reports of greater climateric manifestations, mainly hot flashes, during transition to menopause. These findings concur with a thermoregulatory model of vasomotor symptoms in which body fat acts as an insulator, preventing heat dissipation.<sup>14</sup>

Riley et al. found that 30% of 468 perimenopausal and 287 postmenopausal females reported hot flashes. Perimenopausal patients with a BMI > 25 kg/m<sup>2</sup> reported more hot flashes with a relative risk (RR) of 2.00 (RI 95% = 1.28 - 3.12). We did not find an association with hot flashes in postmenopausal patients.<sup>15</sup>

Martínez Pérez et al. carried out a study with 10,514 women with an average age of 57.9 ( $\pm$  7.1) years, finding that smoking, use of alcohol, BMI > 25 kg/m<sup>2</sup>, marital status, educational level, and social level were associated with more severe menopausal symptoms for BMI (RR = 3.64; RI 95% = 2.96 - 4.32).<sup>16</sup>



**Figure 1** Dispersion chart between BMI and the Blatt-Kupperman index.

Thurston et al. assessed the connection of the adiposity with vasomotor symptoms in the study of Women's Health Across the Nation, which included 1,776 women aged 47 to 59 years with an intact uterus and at least 1 ovary, in whom vasomotor symptoms and hormonal serum levels were evaluated. They concluded that a greater percentage of body fat was associated with vasomotor symptoms ( $RR = 1.27$ ;  $RI\ 95\% = 1.14 - 1.42$ ).<sup>17</sup>

In this study, no connection between BMI and Blatt-Kupperman index was found; a probable reason for this is the fact that estrogens of peripheral origin do not have the biological action that ovarian estrogen has.

The reason for the inconsistent findings regarding a connection between BMI and climateric symptoms is unknown. Some studies suggest that the inconsistencies may be related to the different endogenous estrogen and other hormones levels in women with different body sizes. Hormonal changes are customary during the transition into menopause. Furthermore, for the formation of estrogens from circulating androgen precursors, the adipose tissue produces hormones such as leptin and tumor necrosis factor, which suppress ovarian production of steroids and have an influence on thermoregulation.<sup>18</sup>

Pérez-Pérez found that women who work in public spaces adapt more easily to hormonal changes in climaterium and menopause, in contrast to those who are housewives who feel misunderstood, rejected, and have a low self-esteem.<sup>19</sup> However, no connection was established between the Blatt-Kupperman index and occupation or marital status in our study. Further studies assessing all risk factors, like health problems, use of alcohol, smoking, role at work, family dynamics, presence of depression, as well as their connection with weight gain or loss in the female in transition to menopause are required.

While the results of this study report that the degree of obesity does not have an impact on climateric symptoms severity, most patients showed some degree of overweight or obesity; hence obese patients should undergo more complete tests, including sociological, physical, and personal history, in order to identify those with a higher risk of

presenting symptoms and to develop appropriate preventive strategies, including lifestyle modifications and the establishment of better treatment.

## Conflicts of interest

The authors have no conflicts of interest to declare.

## Funding

No financial support was provided.

## References

1. Accessed in January 2014. <http://www.consultorsalud.com/biblioteca/Guias/Menopausia.pdf>
2. Accessed in January 2014. <http://www.scog.sld.cu/Articulos/consenso2006seccclimymenop.pdf>
3. Accessed in January 2014. <http://www.docstoc.com/docs/74212096/The-Menopause-Handbook>
4. Kupperman HS, Wetchler BB, Blatt M. Contemporary therapy of the menopausal syndrome. *JAMA* 1959;171:103-113.
5. Utian WH, Janata JW, Kingsberg SA, et al. The Utian Quality of Life (UQOL) scale: development and validation of an instrument to quantify quality of life through and beyond menopause. *Menopause* 2002;9:402-410.
6. Greene JG. Construcción de una escala climaterica estándar. *Rev Climaterio* 1998;1:292-301.
7. Carranza LS, Reyes RP, Chan VR. SUMEVA, a new system of climateric symptom evaluation, and its correlation with FSH and estradiol levels. *Int J Fertil Womens Med* 2006;51:140-144.
8. Carranza LS, Cruz Sánchez K. Relación entre síntomas del climaterio y la calidad de vida. *Ginecol Obstet Méx* 2008;76:703-705.
9. Pavón de Paz I. Obesidad y menopausia. *Nutrición Hospitalaria España* 2006;21:633-637.
10. Díaz Villaseñor A. La obesidad en México. *Salud Pública. México: Fundación Este País*; 2011. p. 61-64.
11. Lambrinoudaki I, Brincat M, Erel CT, et al. EMAS position statement: Managing obese postmenopausal women. *Maturitas Grecia* 2010;66:323-326.
12. Thurston RC, Sowers MR, Sternfeld B, et al. Gains in body fat and vasomotor symptom reporting over the menopausal transition. *Am J Epidemiol* 2009;170:766-774.
13. Casado Méndez PR, Arró Martínez Y, Arias Hernández D. Repercusión del tabaquismo pasivo en el síndrome climaterico. *Rev Cubana Hig Epidemiol* 2012;50:1-10.
14. Schwingl PJ, Hulka BS, Harlow SD. Risk factors of menopausal hot flashes. *Obstet Gynecol* 1994;84:29-34.
15. Hyde Riley E, Inui TS, Kleinman K, et al. Differential association of modifiable health behaviors with hot flashes in perimenopausal and postmenopausal women. *J Gen Intern Med* 2004;19:740-746.
16. Martínez JA, García FC, Palacios S, et al. Epidemiology of risk factors and symptoms associated with menopause in Spanish women. *Maturitas* 2009;62:30-36.
17. Thurston RC, Sowers MR, Chang Y, et al. Adiposity and reporting of vasomotor symptoms among midlife women. *Am J Epidemiol* 2008;167:78-85.
18. Whiteman MK, Staropoli CA, Benedict JC, et al. Risk factors for hot flashes in midlife women. *J Womens Health* 2003;12:459-472.
19. Pérez-Pérez R, Medina Barragán RA, Espiricueta-Medina M. Respuestas adaptativas de mujeres en climaterio y menopausia. *Rev Enferm Inst Mex Seguro Soc* 2011;19:123-126.