Overweight and obesity and factors associated with menopause

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Abstract *This study aims to check the association between overweight and obesity and sociodemographic, behavioral and clinical factors in menopausal women. A cross-sectional study of a sample of 253 menopausal women who answered questions about socioeconomic and demographic factors, health in general, eating habits and behaviors. Body-mass index (BMI) was used to assess participant nutritional status. The Menopause Rating Scale (MRS) was used to assess quality of life. To assess sexual performance we used SQ-F (Sexual Quotient, Female Version). We used bivariate analysis and hierarchical multiple regression to identify the factors associated with being overweight during menopause. Using BMI we found that 30.8% of the sample was overweight and 35.2% obese, totaling 66% overweight women in the sample. In the multiple analysis, not owning a home, the severity of symptoms using MRS, use of continuous use medication and having been on any type of diet were associated with being overweight or obese. Nutritional intervention for weight control and changing behaviors could produce considerable benefits in terms of the health and quality of life of menopausal women.*
Key words *Obesity, Menopause, Women's health*

Introduction

Obesity is recognized as a multi-factor metabolic change of epidemic proportions. Its prevalence has been increasing at alarming rates in almost all countries, becoming a serious public health problem. 64.9% of the women in Brazil are overweight or obese. The problem is even greater in women between the ages of 55 and 64[1], and in women with fewer years of schooling[2].

Multiple factors are mentioned as the main causes of obesity in women, including changes inherent to the aging process itself, as well as changes in lifestyle such as a less active lifestyle and increased consumption of energy dense food[3]. Researchers have found that the obesity epidemic is caused by changes in the economic, social and physical environments[4].

Brazil is seeing a rapid ageing of its population, and life expectancy among women is longer than it is for men. Because of this, more women will experience the changes associated with menopause[5], which is why this period deserves greater attention from the public health system.

The World Health Organization defines menopause as a natural phase in a woman's life that corresponds to the transition between the reproductive and non-reproductive periods, to a decrease in the production of steroid hormones[6]. This period starts at around age 40 and lasts until age 60-65. Menopause is a milestone in this phase, normally happening at around 49 years of age, diagnosed once a woman has not experienced a menstrual period for twelve consecutive months[6].

Hypoestrogenism resulting from menopause is mentioned as the main cause of obesity, vasomotor, urogenital and psychological symptoms, as well as for poorer sexual performance and the high profile or morbimortality in women after the age of 50, when associated with environmental, psychosocial and cultural factors[7]. Recent information has associated mortality risks to the age at onset of menopause. Women who enter menopause earlier have a higher mortality rate, especially from cardiovascular causes[8,9].

This being the case, although data on morbidity is scarce, data on mortality of women during menopause justifies research to provide subsidies to promote health and disease prevention[10]. Given the importance of this theme and its impact on women's health, the goal of this study was to look for an association between overweight and obesity and sociodemographic, behavioral and clinical factors in menopausal women.

Methods

This is a descriptive, cross-sectional study of menopausal women aged 40 to 60, all of them participants in an annual health education event about breast cancer held between August and October 2013 at a Family Health Strategy Unit (ESF) in Montes Claros, Minas Gerais, Brazil.

This choice is the result of access, as the city lacks a specific location to provide services to menopausal women. Women aged 40 to 60 for whom anthropometric measurements could be made were considered eligible. Pregnant women, those with psychiatric diseases, or who were unable to answer the questionnaire or unavailable for the interview for any reason (e.g. no time, disease, illiteracy, explicit refusal) were excluded. The authors trained all of the interviewers ahead of time and oversaw data collection. Nutritional status, assessed via BMI, was considered the outcome variable of the study. Nutritional status was classified as underweight (BMI < 18.5); eutrophic (BMI = 18.5 - 24.9), overweight (BMI = 25 - 29.9) and obese (BMI ≥ 30) kg/m²[11]. BMI was calculated based on measured height and weight. To assess body weight, women were weighed in light garments without their shoes, standing erect with both feet together and their arms relaxed alongside their bodies. A portable Geratherm® Body Fat Scale was used, with capacity for up to 150 kg, minimum and accurate to 50 g.

Height was measured using a Carci® inelastic 0 to 150 cm tape measure set against a flat wall with no baseboard. Women were told to stand up straight with their feet together and looking straight ahead, without stretching or bending their neck. Weight and height were measured in duplicate and averaged to calculate BMI.

Women were interviewed and answered questions regarding six groups of independent variables: (1) socioeconomic and demographic, (2) reproductive and quality of life-MRS, (3) sexual performance, (4) overall health, (5) eating habits, and (6) health-related behavior.

Socioeconomic and demographic data included age ((40-45, 46-50, 51-55, 56-60), stated color of skin (white or non-white), marital status (stable partner, no stable partner), years of schooling (none/incomplete primary, primary, high-school, university), monthly household income (R$ 340,00 or less, R$ 341 to R$ 678,00, over R$ 678,00), occupation (paid/not paid), and home-owner (yes or no).

The reproductive variables included age at menarche (12 or less, over 12), age when entering

menopause (50 or under, over 50, not yet menopausal), and the climacteric profile (pre or post menopause). Pre-menopause if regular menstrual cycles were present, and post-menopausal if the woman's menstrual periods had been absent for a period equal to or longer than 12 consecutive months. Menopausal status was defined based on the woman's menstrual history in the past year. Quality of life was analyzed using the Menopause Rating Scale (MRS) validated in Portuguese. This is an 11-question questionnaire dealing with symptoms, split into somato-vegetative, psychological and urogenital. This tool allowed each woman to state her opinion regarding each symptom - absent, mild, moderate, severe and very severe[12].

Sexual performance was assessed using the Sexual Quotient questionnaire (SQ-F) - Female Version, made up of 10 questions to be answered using a scale of 0 to 5. This tool enables analyzing the various domains of female sexual activity - desire, excitation, orgasm and their related psychophysical factors. A higher the score on SQ-F questions (except for the question regarding pain) indicates better or more satisfying sexual performance[13].

The general health group of questions was made up of the following variables: present or past use of dichotomized hormone replacement therapy, and the use of other medicines split into continued use nor not. To analyze eating habits, we used as variables the use of soy supplements, eating fruits, vegetables and legumes and dieting.

Use of soy supplements was dichotomized into yes and no. In order to learn about whether the women ate fruits, vegetables and legumes, we asked two questions: how many times a day and how many times a week. The variables were dichotomized into eats fruits 3 to 5 times a week, eats fruits and legumes 3 to 5 times a week due to the small number of women who reported eating the recommended amounts in the Nutritional Guidebook for the Brazilian Population[14]. Women were asked if they were on a weight-loss diet at the time, or had been in the past, or if they had never been on a diet.

The health-related behavior group of questions was comprised of the variable exercise (physical activity), assessed using the criteria established by the Brazilian Cardiology Society[15]. Women with no regular physical activity – defined as at least 30 minutes 3 times a week, regardless of the type of exercise – were considered sedentary[15].

Initially we performed descriptive analyses of all of the survey variables using frequency distributions. We then ran bivariate analyses between the outcome variable and each independent variable, using a Poisson regression model with robust variance. We estimated gross Prevalence Ratios (PR) and their respective 95% confidence intervals. The variables with a descriptive level (p-value) of less than 0.25 were selected for multiple analysis using a hierarchical Poisson regression model. Here we used the model in Figure 1, with blocks of distal (socioeconomic and demographic), intermediate (reproductive and MRS quality of life and sexual performance) and proximal (overall health, eating habits and health-related behavior) variables[16].

The stepwise forward procedure was used for each hierarchical level, starting with the variable with the largest statistical significance selected from the bivariate analysis, and then adding the other variables one by one by decreasing order of descriptive level.

Demographic and socioeconomic characteristics was the first block to be added to the model, remaining as an adjustment factor for intermediate and proximal determinants only when those variables had a descriptive level of p<0.05. We then added intermediate variables (reproductive, quality of life-MRS and sexual performance). Only variables with p<0.05 were kept in the model after adjusting for the distal level variables. We included the proximal variables (overall health, eating habits and health-related behavior) last. Again, only variables with p<0.05 were kept in the model after adjusting for the distal level variables.

We estimated gross Prevalence Ratios (PR) and their respective 95% confidence intervals. The Deviance test was used to assess the quality of the adjustment of the multiple model. Analyses were performed using PASW® 17.0.

This study complies with Resolution 466/2012. This study was approved by the Research Ethics Committee (REC) of Universidade Estadual de Montes Claros.

Women waiting to schedule mammograms were individually approached and invited to participate in the study. After explaining the study goals, responsibilities and procedures, those wishing to participate signed a Free and Informed Consent Form (FICF).
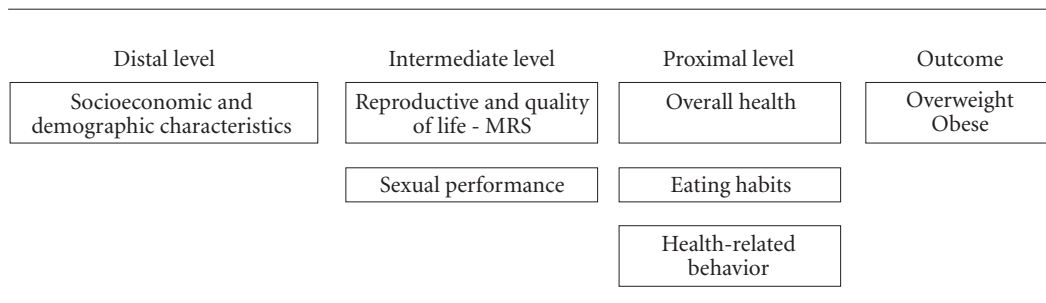
Figure 1. Conceptual hierarchical model.

Source: Lins et al.[13].

Results

The sample was made up of women with an average age of 50.2 (SD ± 5.8 years), 86 of them (34%) classified as eutrophic, 78 (30.8%) as overweight and 89 (35.2%) as obese. A total of 167 women (66% of the sample) were overweight or obese. The average BMI was 28.1 kg/m² (SD ± 5.6). Other characteristics of the study group are listed in Table 1.

Tables 2 and 3 show the results of the bivariate analyses. This study found a 0.25% association between the following variables and the outcome of overweight or obese: years of schooling (p = 0.120), occupation (p = 0.129), home-owner (p = 0.011), age at menarche (p = 0.012), QoL during menopause (p = 0.002), use of medicines (p = 0.002), use of soy supplements (p = 0.207), eating fruits (0.247) and dieting (0.000). These variables were selected for the final multiple analysis.

The results of factors associated with being overweight or obese from the hierarchical multiple regression analysis are shown in Table 4. In the more distal determination block, the variable "owns home" was associated with being overweight. The prevalence of overweight/obesity was higher among women claiming not own the home they live in (PR = 1.26)

In the intermediate block, Quality of Life during Menopause (MRS) was associated with being overweight or obese, regardless of demographic and socioeconomic characteristics. The prevalence of overweight and obesity was higher among women with mild (PR = 2.02), moderate (PR = 2.03) and severe (PR = 2.53) symptoms compared to women with no symptoms. Among the proximal variables, we found that women using medicines (PR = 1.26) and those who are di-

eting or have dieted (PR = 1.49) showed a higher incidence of overweight/obesity after adjusting for the variables in the hierarchically superior blocks.

Discussion

The frequency of overweight and obesity among the study population was 66%, with an average BMI of 28.1 kg/m² (SD = 5.6), which is close to the number reported by other authors[10,17,18]. In the city of Passo Fundo, RS a study of 298 menopausal women showed that 68.4% of them were overweight, with an average BMI of 28.3 kg/m² (SD = 7.0)[19]. This is close to the 64% prevalence found in a group of 611 women in Caxias do Sul, with an average BMI of 27.4 kg/m² [20]. A survey of Brazilian women showed that 64.9% had some degree of excess weight, confirming the magnitude of this problem among the female population[1].

Data from Brazil (2011) shows a growing prevalence of excess weight among women, with the highest prevalence in women 45 to 54 and 55 to 64 years of age, or 55.9% and 60.9% respectively[21]. Similar results show that obesity among women has also increased[1,20,22]. According to the literature, in middle-aged women, overweight and obesity are relevant risk factors for the development of chronic diseases such as metabolic syndrome[23].

Given this scenario, we find that aging may have be a strong influencer for developing obesity due to the decrease in hormone levels that brings with it a decrease in the amount of energy spent. By associating this change with external factors such as inappropriate eating habits and a sedentary lifestyle, middle-age women may experience an average 2 kg/year weight increase during the course of three years[24].

Table 1. Distribution of women 40 to 60 according to their socioeconomic and demographic, reproductive, quality of life-MRS, sexual performance, overall health, eating habits and health-related behavior characteristics. Montes Claros, 2013.

Variable	n	%	Variable	n	%
Socioeconomic and demographic			Sexual performance		
Age group			Sexual activity in past 6 months		
40 to 45	65	25.7	Yes	196	77.5
46 to 50	64	25.3	No	57	22.5
51 to 55	65	25.7	Sexual performance (SQF)***		
56 to 60	59	23.3	Good to excellent	58	29.7
Self-stated skin color*			Fair to good	62	31.8
White (Caucasian)	52	20.6	Unsatisfactory to fair	48	24.6
Light brown (Mullatto)	129	51.2	Poor to unsatisfactory	19	9.7
Brown	34	13.5	None/poor	08	4.1
Black (Afro-descendant)	33	13.1	Overall health		
Yellow (Oriental)	04	1.6	Use of hormone replacement		
Marital status			therapy**		
Has stable partner	165	65.2	Uses or has used	18	7.2
Does not have stable partner	88	34.8	Never used	232	92.8
Years of schooling			Use of medicines		
None/incomplete primary	102	40.3	Yes	158	62.5
Primary school	42	16.6	No	95	37.5
Secondary School	67	26.5	Eating habits		
University	42	16.6	Use of soy supplements*		
Monthly Household Income			Yes	44	17.5
Up to R$ 340,00	20	7.9	No	208	82.5
Between R$ 341,00 and R$ 678,00	80	31.6	Eats fruits 3 to 5 times a week		
Over R$ 678,00	153	60.5	Yes	177	70.0
Occupation*			No	76	30.0
Paid	139	55.2	Eats vegetables 3 to 5 times a week		
Unpaid	113	44.8	Yes	211	83.4
Homeowner			No	42	16.6
Yes	201	79.4	Weight-loss diet		
No	52	20.6	Never	151	59.7
Reproductive and Quality of Life during			Is or has dieted	102	40.3
Menopause - MRS			Health-related behavior		
Age at menarche*			Physical activity		
12 or under	44	17.5	Non-sedentary	86	34.0
Over 12	208	82.5	Sedentary	167	66.0
Climacteric profile			Tobacco use		
Pre-menopausal	123	48.6	No	177	70.0
Post-menopausal	130	51.4	Current/former smoker	76	30.0
Age at menopause*			Ethanol use		
50 or under	99	39.3	No	173	68.4
Over 50	35	13.9	Yes	80	31.6
Not menopausal	118	46.8			
QL during menopause (MRS-Total)			Total	253	100.0
Asymptomatic	23	9.1			
Mild	44	17.5			
Moderate	71	28.2			
Severe	115	45.2			

* 1 person did not answer; ** 3 people did not answer; *** 58 women did not answer the SQF.

Table 2. Percent distribution of overweight/obesity, gross prevalence ratio (PR) and 95% confidence interval according to socioeconomic, demographic and reproductive characteristics, menopause symptoms and sexual function. Montes Claros-MG, 2013.

Variable	Overweight/obese			
	n	%	PR$_{Gross}$ (CI95%)	p-value
Socioeconomic and demographic				
Age group				
40 to 45	43	66.2	1.00	0.999
46 to 50	42	65.6	0.99(0.77;1.27)	
51 to 55	43	66.2	1.00 (0.78;1.28)	
56 to 60	39	66.1	0.99(0.78;1.29)	
Self-stated skin color*				0.688
White (Caucasian)	33	63.5	1.00	
Non-white	133	66.5	1.05 (0.83;1.32)	
Marital status				
Has stable partner	112	67.9	1.00	0.402
Does not have stable partner	55	62.5	0.92(0.76;1.12)	
Years of schooling				
Secondary school/university	66	60.6	1.00	0.120
No schooling/primary school	101	70.1	1.16(0.96;1.39)	
Monthly Household Income				0.590
Up to R$ 678,00	103	67.3	1.00	
Over R$ 678,00	64	64.0	0.95(0.79;1.14)	
Occupation*				0.129
Paid	87	62.6	1.00	
Unpaid	79	69.9	1.12(0.94;0.33)	
Owns home she lives in				0.011
Yes	126	62.7	1.00	
No	41	78.8	1.26(1.05;1.50)	
Reproductive and Quality of Life during Menopause - MRS				
Age at menarche*				0.012
Over 12	131	63.0	1.00	
12 or under	35	79.5	1.26 (1.05;1.52)	
Menopause				0.527
No	75	64.1	1.00	
Yes	91	67.9	1.06(0.89;1.27)	
QV during Menopause (MRS-Total)				0.002
Asymptomatic	07	30.4	1.00	
Mild	27	61.4	2.02 (1.04;3.90)	
Moderate	44	62.0	2.04 (1.07;3.88)	
Severe	89	78.1	2.57 (1.37;4.80)	
Sexual performance				
Sexual activity in past 6 months				0.427
Yes	35	61.4	1.00	
No	132	67.3	1.01 (0.87;1.38)	
Sexual function (QSF)				0.619
Good to excellent	41	70.7	1.00	
Fair to good	43	69.4	0.98 (0.78;1.24)	
Unsatisfactory to fair	33	68.8	0.97 (0.76;1.25)	
Poor to unsatisfactory	11	57.9	0.82 (0.54;1.24)	
None to poor	03	37.5	0.53 (0.21;1.32)	

PR[b]: prevalence ratio; 95% CI: 95% confidence interval.

Table 3. Percent prevalence of overweight/obesity, gross prevalence ratio and 95% confidence interval according to overall health variables, eating habits and health-related behavior. Montes Claros-MG, 2013.

Variable	Overweight/obese			
	n	%	PRGross (95% CI)	p-value
Overall health				
Hormone replacement therapy				0.980
Uses or has used	12	66.7	1.00	
Never used	154	66.4	0.99 (0.71;1.40)	
Use of medicines				0.002
No	50	52.6	1.00	
Yes	171	74.1	1.41 (1.14;1..74)	
Eating habits				
Use of soy supplements				0.207
Yes	25	56.8	1.00	
No	141	67.8	1.19 (0.91;1..57)	
Eats fruits 3 to 5 times a week				0.247
Yes	113	63.8	1.00	
No	54	71.1	1.11 (0.93;1.33)	
Eats vegetables 3 to 5 times a week				0.921
Yes	139	65.9	1.00	
No	28	66.7	1.01 (0.80;1.28)	
Weight-loss diet				0.000
Never	83	55.0	1.00	
Is or has dieted	84	82.4	1.49 (1.27;1.78)	
Health-related behavior				
Physical activity				0.831
Non-sedentary	56	65.1	1.00	
Sedentary	111	66.5	1.02 (0.85;1.23)	
Tobacco use				0.398
No	114	64.4	1.00	
Current/former smoker	53	69.7	1.08 (0.90;1.30)	
Ethanol use				0.70
No	113	65.3	1.00	
Yes	54	67.5	1.03(0.85;1.25)	

PR_b: prevalence ratio; 95% CI: 95% confidence interval.

We reiterate the importance of these findings, as they make this population a target for public health programs seeking to prevent obesity and its associated comorbidities. The city of Montes Claros is located on the border between the Southeast and Northeast regions of Brazil. From an economic and social point of view, it is closer to the Northeast than the Southeast, being located in the semi-arid region of the state of Minas Gerais, a poor region with low rainfall and consequently limited water resources. The recent increase in the purchasing power of lower income households has influenced an imbalance between calories ingested and calories burned, resulting in excess weight. An explanation for this may be related to the recent trend to replacing traditional foods in the Brazilian diet (such as rice, beans and vegetables) with processed foods and beverages, with a higher energy density and eating patterns that can compromise the energy balance and increase the risk of obesity in this population.

According to the results of the multiple analysis, not owning a home, severe symptoms according to the MRS, continued use medicines and past dieting are associated with being overweight or obese. On the other hand, a study of 456 menopausal women in Paraná found different results, showing that the main factors related to obesity are having three or more children and not using hormone replacement therapy[25].

This study found that women who do not own their own home are twice as likely to be

Table 4. Results of the hierarchical Poisson multiple regression analysis Montes Claros – MG, 2013.

Variable	Overweight/obesity		
	Gross PR	Adjusted PR (05% IC)	p-value
Socioeconomic and demographic			
Home-owner			
Yes	1.00	1.00	
No	1.26	1.26 (1.06;1.50)	0.011
Menopause symptoms[*]			
Menopause symptoms (MRS- Total)			
Asymptomatic	1.00	1.00	
Mild	2.02	2.02 (1.05;3.89)	0.035
Moderate	2.04	2.03 (1.07;3.85)	0.030
Severe	2.57	2.53 (1.36;4.70)	0.003
Overall health[**]			
Use of medicines			
No	1.00	1.00	
Yes	1.41	1.26 (1.01;1.26)	0.041
Eating habits[***]			
Weight-loss diet			
Never	1.00	1.00	
Is or has dieted	1.49	1.49 (1.26;1.79)	0.000

PR: Prevalence ratio; 95% IC: 95% confidence interval. [*] Adjusted by the variable "owns home she lives in". [**] Adjusting by the variables "owns home she lives in" and "menopause symptoms". [***] Adjusted by the variables "owns home she lives in", "menopause symptoms" and "use of medicines".

overweight or obese than those who do. This variable may be understood as an economic indicator, and refers to a higher prevalence of excess weight and obesity, as does a study of 440 women that found that lower income was associated with excess weight[26]. One may infer that lower household income makes it harder to purchase a home, and may be associated with decrease knowledge of which foods are healthier and associated with balanced body weight. A survey of 758 women showed that 73.6% ate a healthy diet, a habit that increases with income[16]. However, this matter must be further explored in new studies, as other authors did not make this same observation[17].

Another economic indicator the authors found to be associated with excess weight are few years of schooling[10,26]. Although referred to in the literature, this study did not find such association.

The chance of being overweight was found to be eight times higher among women with severe menopausal symptoms according to the MRS, than among those with no symptoms. A survey of menopausal women found that higher BMIs were associated with poorer scores on the MRS quality of life scale[17]. A study of 490 women in Saudi Arabia found a strong correlation between

obesity and severe menopausal symptoms[27]. A study in Scotland found a relationship between vasomotor symptoms such as heat waves and obesity[28]. On the other hand, a study of 305 women showed no correlation between BMI and the symptoms assessed by the MRS[29].

Regarding overall health, another factor related to excess weight was the use of medicine. Women making continuous use of medicines were two and a half as likely to be obese than those who did not. A study conducted by the Ribeirão Preto menopause outpatient clinic showed high BMIs, with 62% of the women taking three or more medicines per day[30]. The average BMI found in a study of 200 menopausal women revealed obesity, with almost half (48.5%) claiming they use medicine for cardiovascular diseases and 23% use andi-depressants[17]. One explanation for this positive association is a higher prevalence of morbidities in women of a more advanced age, among them those associated with obesity such as high blood pressure, metabolic syndrome, bone and muscle diseases and depression. Furthermore, medicines symbolize a desire to change the "natural course" of most diseases, and go beyond a specific therapy, becoming a cultural characteristic.

Regarding eating habits, women who had already dieted to lose weight, or who were dieting while the study was underway, had a higher prevalence of excess weight and obesity than women who had never dieted. In this study, 40.3% of the women reported that they were or had dieted to lose weight. An analysis of the medical records of menopausal women showed that 66.7% of the participants had gone on some sort of diet and that the average MI of these women was 30.7% kg/m² , indicating they were obese[18].

Correlating the presence of overweight or obesity and sexual performance, we found no statistical significance, as did another study[31]. On the other hand, other surveys show an association between these factors, relating this association primarily to self-perceived physical attraction[32,33].

The arrival of menopause comes with ageing, and oftentimes weight-gain. Surveys show that obesity changes women's self-esteem, creating a negative body image and compromising their sexual satisfaction[33,34]. Furthermore, this vision may lead women to believe that they have lost their powers of seduction. Thus menopausal and especially post-menopausal women may feel incompetent and unable of good sexual performance.

Conclusion

Although this study was developed with a non-probabilistic sample, which limits the external validity of the results, some variables have been found to be associated with excess weight, such as not owning a home, which is a reflection of an unfavorable economic situation, menopausal symptoms, continuous use of medicines and past dieting.

The frequency of excess weight found in our study is in line with the results of other studies in this country, showing that measures must be taken as this morbid condition in menopausal women is not only influenced by biological factors such as hypoestrogenism, but also by psychosocial and life-style factors.

Thus, overweight and obesity associated with menopause require increased attention and a multidisciplinary approach to women's health to prevent morbi-mortality in this population group. The results also indicate a number of important behavioral, sociodemographic and clinical factors that should be further investigated in new studies.

Colaborations

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