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Physical activity as a protective factor for climacteric symptoms

Atividade física como fator de proteção para sintomas do climatério

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ABSTRACT

The aim of this study was to investigate the association between the symptoms and quality of life (QOL) in climacteric with the level and intensity of physical activity (PA), body mass index (BMI), use of menopausal hormone therapy (MHT) and education level. The study was carried out with 641 climacteric women, 56 ± 6 years of age, who completed four questionnaires: Kupperman-Blatt Index (KBI) and Menopause Rating Scale (MRS) to assess climacteric symptoms, the Cervantes Scale (CS) for assess QOL, the International Physical Activity Questionnaire – short version (IPAQ) to assess PA and questions about weight, height, use of MHT and level of education. Spearman's correlation was performed in SPSS 26 software and binary logistic regression in Stata 14.0 software, adopting a $p < 0.05$. Having a university education (KBI = 44%), practicing more than 150 minutes of total PA/week (KBI = 48%) and more than 10 minutes of vigorous PA/week (KBI = 36%) were protective factors for vasomotor symptoms, weakness, headache, paresthesia, vertigo, arthralgia or myalgia, palpitations, tingling and symptoms related to moderate/high mood. Having a normal BMI (CS =4 3%), university level of education (CS = 46%) and practicing more than 150 minutes of total PA/week (CS = 61%) are protective factors for better QOL. For psychological, somatic and urogenital symptoms, assessed by MRS, there was no association with exposure factors. Thus, reaching the PA recommendations, having a university education level and having a normal BMI are protective factors for moderate and severe climacteric symptoms and QOL.

Keywords: Motor activity; Menopause; Women's health.

RESUMO

O objetivo desta pesquisa foi investigar a associação entre os sintomas e qualidade de vida (QDV) no climatério com o nível e intensidade da atividade física (AF), índice de massa corporal (IMC), utilização de terapia hormonal da menopausa (THM) e nível de escolaridade. O estudo foi realizado com 641 mulheres climatéricas, com 56 ± 6 anos de idade, que preencheram o Índice de Kupperman-Blatt (IKB) e Menopause Rating Scale (MRS) para avaliar os sintomas do climatério, a Escala de Cervantes (EC) para avaliar a QDV, o Questionário Internacional de Atividade Física – versão curta (IPAQ) para avaliar AF e perguntas sobre peso, estatura, uso de THM e nível de escolaridade. Foi realizado a correlação de Spearman no software SPSS 26 e a regressão logística binária no software Stata 14.0, adotando-se um $p < 0,05$. Ter nível de escolaridade universitário (IKB = 44%), praticar mais de 150 minutos de AF total/semana (IKB = 48%) e mais de 10 minutos de AF vigorosa/semana (IKB = 36%), são fatores de proteção para sintomas vasomotores, fraqueza, cefaleia, parestesia, vertigem, artralgia ou mialgia, palpitações, formigamentos e sintomas relacionados ao humor moderado/acentuado. Ter IMC normal (EC = 43%), nível de escolaridade universitário (EC = 46%) e praticar mais de 150 minutos de AF total/semana (EC = 61%), são fatores protetores de proteção para melhor QDV. Para sintomas psicológicos, somáticos e urogenital, avaliados pelo MRS, não houve associação com os fatores de exposição. Assim, atingir as recomendações de AF, ter nível de escolaridade universitário e o IMC normal são fatores de proteção para sintomas climatéricos moderados e acentuados e QDV.

Palavras-chave: *Atividade motora; Menopausa; Saúde da mulher.*

Introduction

Climacteric symptoms are the main clinical signs of the menopausal transition and affect four out of five climacteric women, often being noticed in perimenopause, around 4 to 6 years before menopause and may extend for years after menopause[1]. The following are considered characteristic climacteric symptoms: vasomotor (e.g., hot flashes and night sweats), mood changes, sleep disorders, genitourinary syndrome of menopause and other changes that are influenced by the lack of estrogen, such as changes in lipid profile and osteoporosis[1,2].

In addition to relevant clinical signs, climacteric symptoms profoundly affect the personal, social functioning and quality of life of women who experience the climacteric period. A survey of North American women found that 70% of them have their general quality of

life affected by symptoms, and vasomotor symptoms, in particular, affect sleep (82.0%), concentration (69.0%), mood (68.0%), total energy level (63.3%), free time (47.6%), daily activities at work (46.0%), social activities (44.4%) and sexual activities (40.9%)[2].

Symptoms are multifactorial and influenced by low estrogen levels, ethical-cultural differences, biopsychosocial factors and the aging process[3]. Factors such as educational level can influence the search for treatment, the way in which health services are accessed and the decision-making process[4].

Among the treatment options, menopausal hormone therapy (MHT) is the most recommended because it shows positive results, mainly in reducing the frequency and intensity of vasomotor symptoms, but it is only suggested for women free of contraindications[5].

Physical activity performed chronically, which is another form of treatment, promotes several health benefits for climacteric women, such as reducing the perception of stress[6], improving the cardiometabolic profile, reducing the risk of developing cardiovascular diseases and reducing mortality[7]. However, Guthold et al.[8] found that, among 168 countries, Latino women were the ones with the highest levels of physical inactivity. Associated with the increase in body mass index and the change in the distribution of fat mass after menopause, physical inactivity is harmful in this population, which can lead to a worsening of quality of life and general health status, as well as increase the risk of developing cardiovascular diseases[8].

In the study carried out by El Hajj et al.[9], an inverse association was found between climacteric symptoms assessed by the Menopause-Specific Quality of Life Questionnaire (MENQOL) and the level of physical activity, in which more active individuals showed lower climacteric symptoms. However, in this study, only the general classification of physical activity level (low, medium and high) provided by the International Physical Activity Questionnaire (IPAQ) was considered but without addressing more specific aspects of exercise, such as type and intensity.

The intensity and frequency of climacteric symptoms, as well as the way in which they interfere with the quality of life of women, can be assessed using specific questionnaires for this population, such as the Kupperman-Blatt Index (KBI)[10], Menopause Rating Scale (MRS)[11], Cervantes Quality of Life Scale (CS)[12], and hot flash diary. The use of only one of these instruments can, in a certain way, limit the scope and understanding of the results when other forms of evaluation of symptoms and their domains are used.

Understanding the relationship between the level of physical activity and the variables that influence climacteric symptoms is of fundamental importance for the management of health practices for this population, since the adequate prescription of physical activity for women at this stage can impact the improved health and quality of life. Thus, the main objective of this research is to investigate the association between climacteric symptoms and quality of life, taking into consideration the level and intensity of physical activity, body mass index (BMI), use of MHT and educational level.

Our hypothesis is that women with higher levels of physical activity and education, associated with lower BMI, had lower climacteric symptoms measured by the different assessment instruments.

Methods

This is an observational, cross-sectional study carried out in the form of an interview in the city of Uberlândia, Minas Gerais. The research had the participation of 641 women in the climacteric period aged between 39 and 83 years. The inclusion criterion for the research group was being in the climacteric period. Women with irregular menstrual cycles were considered pre-menopausal, and women with 12 uninterrupted months of amenorrhea were considered postmenopausal.

The sample size was calculated according to the formula presented by Tabachnick and Fidell[13], which takes into account the number of explanatory variables to be included in the model: N = 50 + 8m (m is the number of explanatory variables). In our study, the following categorical explanatory variables (m = 7) were considered: educational level (primary, secondary and university), BMI (normal, overweight and obesity), MHT (yes or no), total minutes of physical activity (≤ 149 min/week and ≥ 150 min/week), minutes of walking (≤ 10 min and ≥ 11 min/week), moderate (≤ 10 min and ≥ 11 min/week) vigorous (≤ 10 min and ≥ 11 min/week) physical activity. Therefore, a minimum of 106 women should be recruited in this study.

Recruitment took place through advertisements in traditional media (newspapers, radio and TV) and electronic media (social media) with the provision of a telephone contact (landline and mobile) for interested parties from July 2015 to July 2017. After the contact, face-to-face or telephone interviews were scheduled to verify compliance with the inclusion criteria and ap-

plication of the questionnaires. The face-to-face interviews took place at the Laboratory of Cardiorespiratory and Metabolic Physiology (LAFICAM), which is located at the Faculty of Physical Education and Physiotherapy (FAEFI) of the Federal University of Uberlândia (UFU). This study was approved by the local ethics committee (Federal University of Uberlândia; CAAE: 40622414.9.0000.5152).

The research instruments were four questionnaires, the first part consisting of a general section referring to clinical information, including age (years), time after menopause (in the case of postmenopausal women), educational level (primary, secondary or university), health conditions, and use of MHT (yes or no). Also, weight (kg) and height (meters [m]) (self-reported) were used to calculate BMI with the classifications: normal (< 24.9 kg/m^2), overweight (25-29.9 kg/m^2) and obesity (≥ 30 kg/m^2). The second part of the interview consisted of the short form of the IPAQ[14] and the questionnaires to assess climacteric symptoms, including the KBI[10], MRS[11] and CS[12].

The version of the IPAQ questionnaire validated in Brazilian Portuguese, which was used to assess the level of physical activity of the volunteers, is an instrument with low to moderate validity and reproducibility coefficients (rho: -0.12, p = 0.13; CCI: 0.77, p = 0.74; respectively), with the advantage of its short form being practical, fast and enabling surveys of large population groups. The IPAQ contains seven items that estimate the weekly time spent in physical activities (moderate and vigorous intensity) and physical inactivity in everyday situations[14]. For analysis, we considered the time (in minutes per week) of total physical activity (≤ 149 min/week or ≥ 150 min/week) and in each session of the questionnaire (≤ 10 min/week or ≥11 min/week) in walking, moderate physical activity and vigorous physical activity.

The KBI is a questionnaire with moderate reliability (r: 0.68; p = 0.001)[15] that assesses the severity of climacteric symptoms and comprises 11 symptoms, including vasomotor (hot flushes and night sweats), weakness, headache, paresthesias, vertigo, arthralgias or myalgias, palpitations, tingling, and mood-related symptoms (nervousness, melancholia, and depressed mood), which are assigned different scores. The total score of the sum of these values is classified as mild (values up to 19), moderate (from 20 to 35) or intense (above 35)[16]. To analyze the scores, we used the following two groups: mild (values up to 19) and moderate + intense (from 20 to above 35)[17].

The MRS is a questionnaire covering questions in the psychological, somatic and urogenital domains. The scale guarantees reliability (α = 0.86) and reproducibility (r = 0.82) of documented results[11]. It consists of 11 questions with five possible answers for each question according to the intensity of the symptoms: absent (0 points), mildly severe (1 point), moderate (2 points), severe (3 points) or very severe (4 points). The total score can range from 0 to 44 points and is classified according to the total score: asymptomatic or scarce (0-4 points), mild (5-8 points), moderate (9-15 points) or severe (more than 16 points)[18]. For analysis, scores were regrouped as follows: absent + mild (0 to 8 points) and moderate + severe (above 9 points).

The CS is a questionnaire with good psychometric properties (internal consistency α: 0.90 and reliability r = 0.847; p < 0.001) that is composed of 31 questions in the following domains: menopause and health (15 items), psychic domain (nine items), couple relationship (three items) and sexuality (four items). For each question, there are six possible answers with scores from 0 to 5. The positive questions (4, 8, 13, 15, 20, 22, 26 and 30) have a negative scale, with inverted scores in the total sum. The total score can range from 0 to 155, which corresponds to the best and worst quality of life in the climacteric period, respectively[12]. For analysis, two groups were considered according to the median obtained by the participants, being ≤ 47 (better quality of life) and > 47 (worse quality of life).

Prior to the analyses, data normality was analyzed using the Shapiro-Wilk test. To verify the correlation between the three climacteric symptomatology questionnaires, Spearman's correlation was used in SPSS 26 software. To verify the association between the outcome and the exposure variables, binary logistic regression was used, performed in Stata 14.0 software and a p < 0.05. The outcomes were the climacteric symptoms obtained in the questionnaires (CS, MRS and KBI). The following exposure factors were considered: level of physical activity in the categories of total minutes, moderate physical activity, vigorous physical activity and minutes of walking, in addition to educational level, BMI and use or non-use of MHT.

Results

The study included 641 climacteric women with a mean age of 56 ± 6 years, with the majority being overweight (41%) and postmenopausal (89%). The mean total physical activity was 308 ± 233 min/week, 33 ±

27 min/week of walking, 41 ± 35 min/week of moderate physical activity and 10 ± 16 min/week of vigorous physical activity (Table 1). Among the most reported health conditions were arterial hypertension (30%), thyroid disorders (8%), dyslipidemia (8%), diabetes (5%), and anxiety and/or depression (5%).

Table 1 – Sample distribution according to exposure factors (n = 641).

Variables	%
BMI	
Obesity	21
Overweight	41
Normal	38
Level of education	
Primary	22
Secondary	46
University	32
MHT	
Yes	26
No	74
Menopause	
Yes	89
No	11
Total weekly PA (average 308 ± 233 minutes)	
<150 minutes	38
>150 minutes	62
Walking (average 33 ± 27 minutes/week)	
<10 minutes	35
>11 minutes	65
Moderate PA (average 41 ± 35 minutes/week)	
<10 minutes	35
>11 minutes	65
Vigorous AF (average 10 ± 16 minutes/week)	
<10 minutes	80
>11 minutes	20

BMI = body mass index; MHT = menopause hormone therapy; PA = physical activity.

Table 2 presents the mean values and standard deviations of the total score of each questionnaire on climacteric symptoms (the KBI, MRS and CS).

All three instruments used to assess climacteric symptoms show that the higher the numerical results were, the more frequent the symptoms. Thus, we correlated the total results of the three instruments, and the Spearman correlation (rho) showed that the results of the three questionnaires presented positive, strong and statistically significant correlations ($p < 0.01$): KBI and MRS (rho > 0.78), KBI and CS (rho > 0.75), and CS and MRS (rho > 0.74).

Table 2 – Total score of the Kupperman-Blatt Index, Menopause Rating Scale (n = 641).

Questionnaries	Mean	Standard deviation
KBI	19.95	10.04
MRS	15.33	8.65

KBI = Kupperman-Blatt Index; MRS = Menopause Rating Scale.

In Table 3, the factors of schooling, total physical activity, vigorous physical activity and walking were associated ($p < 0.05$) with the classification of the KBI in the crude analysis, but in the adjusted analysis, they remained associated with schooling, the total physical activity and vigorous physical activity. Women with a university education level showed a 44% protective factor for moderate and severe symptoms when compared to women with a primary education level. Regarding the level of physical activity, women who performed more than 150 min/week of total physical activity showed a 48% protective factor for moderate and severe symptoms when compared to women who performed less than 149 min/week of total physical activity, and women who performed more than 10 min/week of vigorous activity showed a 36% protective factor for moderate and severe symptoms when compared to women who performed less than 10 min/week.

In the data shown in Table 4, the factors MHT and physical activity (total, walking, moderate and vigorous) were associated ($p < 0.05$) with the MRS classification in the crude analysis, but in the analysis adjusted for BMI, no significant differences between the variables were observed.

In Table 5, the factors BMI; educational level; total, vigorous, and moderate physical activity; and walking were associated ($p < 0.05$) with the CS classification in the crude analysis, but in the adjusted analysis, only BMI, educational level and total physical activity maintained an association. Women with a normal BMI (> 24.9 kg/m^2) showed a 43% protective factor for worse quality of life when compared with obese women. Women with a university education level showed a 46% protective factor for moderate and severe symptoms when compared to women with a primary education level. Women who performed more than 150 min/week of total physical activity showed a 61% protective factor for worse quality of life in the climacteric when compared to women who performed less than 149 min/week.

Discussion

This study investigated the association between cli-

Table 3 – Logistic regression using the Kupperman-Blatt Index as outcome and sociodemographic variables and physical activity as exposure variables (n = 641).

KBI	Raw Analysis			Adjusted Analysis		
Variables	OR (IC-95%)	p	Effect size (d)	OR (IC-95%)	p	Effect size (d)
MHT						
Yes	1			1		
No	1.05 (0.74-1.5)	0.78	0.03	0.97 (0.66-1.41)	0.87	0.08
BMI classification						
Obesity	1			1		
Overweight	0.95 (0.61-1.47)	0.82	0.03	1.12 (0.70-1.78)	0.64	0.25
Normal	0.69 (0.44-1.08)	0.10	0.20	0.83 (0.52-1.34)	0.45	0.10
Level of education						
Primary	1			1		
Secondary	0.83 (0.54-1.28)	0.41	0.10	0.89 (0.57-1.40)	0.63	0.06
University	0.48 (0.30-0.75)	< 0.01*	0.40	0.56 (0.35-0.91)	0.02*	0.32
Total weekly PA						
≤149min/week	1			1		
≥150min/week	0.41 (0.29-0.58)	< 0.01*	0.49	0.52 (0.33-0.82)	< 0.01*	0.36
Vigorous PA						
≤10min/week	1			1		
≥11min/week	0.46 (0.31-0.68)	< 0.01*	0.43	0.64 (0.42-0.99)	0.04*	0.25
Moderate PA						
≤10min/week	1			1		
≥11min/week	0.77 (0.55-1.07)	0.12	0.14	1.14 (0.76-1.69)	0.53	0.07
Walking						
≤10min/week	1			1		
≥11min/week	0.58 (0.41-0.82)	< 0.01*	0.30	0.77 (0.51-1.16)	0.21	0.14

KBI = Kupperman-Blatt Index; BMI = body mass index; MHT = Menopause hormone therapy; PA = Physical activity; *p < 0.05.

Table 4 – Logistic regression using MRS as outcome and sociodemographic variables and physical activity as exposure variables (n = 641).

MRS	Raw Analysis			Adjusted Analysis		
Variables	OR (IC-95%)	p	Effect size (d)	OR (IC-95%)	p	Effect size (d)
MHT						
Yes	1			1		
No	1.58 (1.05-2.39)	0.03*	0.25	1.50 (0.98-2.31)	0.06	0.22
BMI						
Obesity	1			1		
Overweight	1.38 (0.81-2.34)	0.24	0.18	1.63 (0.94-2.82)	0.08	0.27
Normal	0.74 (0.45-1.23)	0.24	0.16	0.92 (0.54-1.56)	0.75	0.05
Level of education						
Primary	1			1		
Secondary	0.97 (0.58-1.62)	0.89	0.01	1.09 (0.64-1.85)	0.74	0.05
University	0.78 (0.45-1.32)	0.35	0.14	0.90 (0.52-1.57)	0.72	0.06
Total weekly PA						
≤149min/week	1			1		
≥150min/week	0.46 (0.30-0.71)	< 0.01*	0.43	0.65 (0.37-1.11)	0.12	0.24
Vigorous PA						
≤10min/week	1			1		
≥11min/week	0.59 (0.38-0.91)	0.02*	0.29	0.77 (0.48-1.25)	0.29	0.14
Moderate PA						
≤10min/week	1			1		
≥11min/week	0.65 (0.43-0.99)	0.04*	0.24	0.82 (0.51-1.31)	0.41	0.11
Walking						
≤10min/week	1			1		
≥11min/week	0.58 (0.38-0.89)	0.01*	0.30	0.70 (0.43-1.41)	0.15	0.20

MRS = menopause rating scale; BMI = body mass index; MHT = menopause hormone therapy; PA = physical activity; *p < 0.05.

Table 5 – Logistic Regression using the Cervantes Scale as an outcome and sociodemographic variables and physical activity as exposure variables (n = 641).

Cervantes Scale	Raw Analysis			Adjusted Analysis		
Variables	OR (IC-95%)	p	Effect size (d)	OR (IC-95%)	p	Effect size (d)
MHT						
Yes	1			1		
No	1.27 (0.89-1.82)	0.18	0.13	1.11 (0.76-1.63)	0.58	0.06
BMI						
Obesity	1			1		
Overweight	0.87 (0.57-1.31)	0.53	0.07	1.02 (0.66-1.58)	0.93	0.01
Normal	0.48 (0.31-0.74)	< 0.01*	0.40	0.57 (0.36-0.90)	0.02*	0.31
Level of education						
Primary	1			1		
Secondary	0.63 (0.41-0.93)	0.02*	0.25	0.67 (0.43-1.03)	0.67	0.22
University	0.44 (0.29-0.69)	< 0.01*	0.45	0.54 (0.34-0.86)	0.01*	0.34
Total weekly PA						
≤149min/week	1			1		
≥150min/week	0.31 (0.22-0.43)	< 0.01*	0.65	0.39 (0.25-0.60)	< 0.01*	0.52
Vigorous PA						
≤10min/week	1			1		
≥11min/week	0.47 (0.31-0.71)	< 0.01*	0.42	0.78 (0.50-1.23)	0.29	0.14
Moderate PA						
≤10min/week	1			1		
≥11min/week	0.62 (0.45-0.86)	< 0.01*	0.26	1.02 (0.69-1.50)	0.93	0.01
Walking						
≤10min/week	1			1		
≥11min/week	0.50 (0.36-0.70)	< 0.01*	0.38	0.78 (0.53-1.16)	0.22	0.14

BMI=body mass index; MHT=menopause hormone therapy; PA=physical activity; *p<0.05.

macteric symptoms (assessed by three questionnaires) and physical activity level, BMI, MHT and educational level. In the adjusted analysis, we found an association between climacteric symptoms and BMI, vigorous physical activity, educational level and total weekly physical activity, with the last two factors being found to be associated in two questionnaires.

In our study, having a university education level proved to be a 43% protective factor against worse quality of life (CS) and a 44% protective factor for moderate/severe symptoms (KBI). The same was found in the study by Freeman et al.[19], in which women with more than a high school education had a 34% lower chance of having hot flashes. In addition to the intensity, the duration of symptoms was shorter in this group[20].

The climacteric period affects each woman in different ways, and the symptoms should not be analyzed only in the hormonal sphere of estrogen reduction, since ethnic-cultural differences are also associated with these symptoms. Education is related to access to health services, awareness of menopause as a non-pathological natural biological process and, consequently, decision making about this process[4]. Health education training has shown improvements in the level of perceived uncertainty, in health behaviors and perceived perimenopausal disorders and in some domains of symptoms[21], which may be a useful strategy to maximize access to health information.

Vasomotor symptoms, including hot flashes, are more frequently reported by climacteric women, and among the treatments for intense symptoms, MHT is the most indicated for women who are within the recommendations[22]. In our study, we found, in the MRS questionnaire, an association with MHT (p = 0.03) only in the crude analysis and with p = 0.06 for the adjusted analysis, which may be related to the lower number of women who underwent the treatment (26%), which may have reduced the visibility of this association when compared to the group without MHT (76%).

Regular physical activity acts as a treatment and prevention of several non-communicable chronic diseases and has also been shown to be effective in the changes resulting from the climacteric period, namely, depressive symptoms, reduced bone mineral density,

metabolic syndrome factors (blood pressure, glucose, triglyceride and cholesterol levels) and climacteric symptoms, which are directly related to quality of life[23]. In our study, practicing more than 150 minutes of physical activity per week is a 61% protective factor for worse quality of life (CS) and 48% for having symptoms with moderate/severe intensity (KBI). Just as symptoms have multifactorial influences, regular physical activity can act on parameters broader than just symptoms, such as treating and preventing various diseases, improving general well-being and health status, and when performed in a group, it helps in improving social functioning[24].

For postmenopausal women, the study by Elavsky and McAuley[25] suggests that being physically active can reduce the perceived severity of menopausal symptoms and improve psychological well-being. In addition, the relationship between physical activity and QoL seems to be mediated by factors such as physical self-perception associated with menopausal symptoms.

In the study by Dąbrowska-Galas et al.[26], an association was also found between the level of physical activity and symptoms, in which having a high level of physical activity resulted in fewer moderate and severe symptoms. The authors used similar instruments to assess symptoms (MRS) and physical activity levels (IPAQ) in this study, as the data were analyzed differently, applying the long version of the IPAQ (and not the short version as in our study), which contains additional aspects. Furthermore, the results were transformed into metabolic equivalents (METs), which differs from our analysis in minutes and in each aspect of the short version of the questionnaire. On the other hand, the MRS, despite being the same instrument, was analyzed according to its domains and may have contributed to the fact that, in our study, we did not identify an association with physical activity and this instrument, as a possible discrepancy between the domains would not be possible to be identified when analyzed only in the overall score.

In this study, the BMI classified as normal proved to be a 43% protective factor for worse quality of life when compared to women with this index above 30 kg/m^2. Similar results were observed in other studies with climacteric women[27], as well as children and adolescents[28] and adults[29], in which the increase in BMI shows a worsening of QoL in the physical and mental aspects, which are already noticeable in overweight individuals.

Bracht et al.[30] found an increase in estrogen concentrations in obese postmenopausal women, which could hypothesize fewer climacteric symptoms since hypoestrogenism is mainly (not only) responsible for climacteric symptoms. However, estrogen produced via aromatization in adipose tissue, in addition to being less potent, also seems to have no systemic action like the gonadal hormone 17ß-estradiol[30], so acting locally, it would not have any action on all estrogen receptors that have had their actions altered in the climacteric period. In addition, in the broader scope of quality of life assessed by the CS, not only specific symptoms are included but also other aspects of QOL in the climacteric period.

The analyses of the present study present important advantages for understanding the association between the level of physical activity and climacteric symptoms. By stratifying the activity level considering the duration of each type of activity and the total weekly duration, it allows a broader understanding of the characteristics of exercise volume and intensity. This understanding has valuable implications for health professionals, especially physical education professionals, for the prescription and possible benefits of exercise for this population.

The limitations of the study consist in carrying out the research in an interview format, since the chosen questionnaires can be self-administered. Thus, there is the possibility of the interviewee being influenced, even if unintentionally. The self-report of weight and height variables for the calculation of BMI can generate errors in the estimate and do not represent the sample with greater precision. In addition, there is a need for caution when extrapolating the result of the present study to the female population in the climacteric period, as 62% were active, which does not reflect the prevalence results of other studies in which they showed a prevalence of less than 30%[31].

The use of three assessment instruments expands and confirms the results obtained about climacteric symptoms. Since even though having the same assessment objective, they do it in a different and complementary way. In addition, the scales used in this study were used in several studies, which allows the comparison of results in populations other than Brazilian women.

In conclusion, physical activity may be a protective factor for moderate and severe climacteric symptoms, as well as university education and normal body mass index. Thus, it seems that there is an association between climacteric symptoms and BMI, vigorous physical activity, education level and total weekly physical activity.

Conflict of interest

The authors declare no conflict of interest.

Authors' contribution

Puga GM designed the study. Costa JG, Souza TCF and Dias PA collected the data. Nakamura PM analyzed and interpreted the data. Costa JG wrote the manuscript. All authors critically reviewed the content of the manuscript and gave their final approval.

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