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Assessment of insomnia and related risk factors in postmenopausal women screened for the metabolic syndrome

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ABSTRACT

Background: Sleep disturbances are common during female mid-life. Nevertheless, there is limited available information linking sleep characteristics to the menopause and the metabolic syndrome (METS).
Objective: To assess insomnia prevalence and related risk factors in postmenopausal women screened for the METS.
Methods: In this cross sectional study 204 natural postmenopausal women participating in a METS screening program filled out the Athens insomnia scale (AIS), the hospital anxiety and depression scale (HADS) and a general socio-demographic questionnaire. Criteria of the Adult Treatment Panel III (ATP-III) were used to define the METS.
Results: Median age of the whole sample was 56 years. A 50.5% of women had the METS, 57.4% hot flushes, 58.3% were abdominally obese, 51.5% hypertension, 25.0% hyperglycemia, 15.7% depressed mood and 29.9% anxiety. A 33.8% presented insomnia according to the AIS (scores 6 or more). The AIS displayed a high internal consistency as computed Cronbach's alpha was determined to be 0.86. Multiple linear regression analysis determined that male premature ejaculation, female psychotropic drug use, hot flush intensity, mood morbidity (higher total HADS scores) and higher parity positively and significantly correlated to higher AIS scores (more insomnia).
Conclusion: In this postmenopausal sample insomnia was not related to the METS or its components yet to other psycho-somatic female and partner issues.

1. Introduction

Mid-life is a time related to several bio-psycho and social changes. Progressive decline in estrogen levels is frequently related to hot flushes, urogenital discomfort, muscle-skeletal limitations, depression and sleep disorders [1–4]. Regarding the latter, postmenopausal women have more sleep disturbances than premenopausal ones [5,6]. Indeed they report few hours of sleep and more fatigue or difficulty in initiating and maintaining sleep [7]. Kravitz et al. [8] have reported that 38% of women aged 40–55 present sleep difficulties significantly related to the menopause. Using the insomnia severity index (ISI) we have previously reported that 46.7% of postmenopausal Ecuadorian women report insomnia [9]. Using a different cut-off value for the same ISI, 36.6% of mid-aged Spanish women present insomnia [10]. Given the heterogeneity of sleep disturbances, various instruments have been designed to quantitatively and qualitatively assess sleep quality and its impact on every-day life [11]. One such test is the Athens insomnia scale (AIS) which has been developed to quantify sleep difficulty based on the international classification of diseases (ICD) in reference to mental and behavioral disorders [12]. Using the AIS, a recent large multinational Latin American study reported a 57.7% prevalence of insomnia among mid-aged women [13].

Sleep disorders have not only been associated to age and the menopause yet also to a number of chronic entities including cardiovascular disease, diabetes, obesity, the metabolic syndrome (METS) and mood disorders [14–18]. In this sense important to bear in mind is that the prevalence of the METS increases after the menopause [19] and that individually each of its components have also been related to sleep problems [20–22]. Despite the

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aforementioned, there is limited available information linking sleep characteristics to the menopause and the METS. Thus, the aim of the following research was to assess insomnia prevalence and related risk factors using the AIS in postmenopausal women screened for the METS.

2. Methods

2.1. Participants and study design

This cross-sectional study was carried out from December 2011 to June 2012 at the Institute of Biomedicine of the Medical Faculty of the *Universidad Católica de Santiago de Guayaquil*, Guayaquil, Ecuador. The initiative aimed at assessing menopause related quality of life (QoL) and the prevalence of the metabolic syndrome (METS), insomnia and mood problems among non hormone therapy (HT) using natural postmenopausal women (40–65 years), recruited through newspaper advertising. Women taking phytoestrogens or drugs intended to decrease lipid levels were excluded from the study. The study protocol was approved by the Medical Faculty's Bioethics Committee. Eligible women were asked to attend the Institute to be informed about the study, its purposes and provide written consent of participation. Those consenting and fulfilling the inclusion criteria were asked to return after an 8 h overnight fast, moment in which socio-demographic data, waist circumference, weight, height and blood pressure measurements were recorded. Also a 10–15 mL peripheral venous blood sample was obtained to provide plasma, serum and white cells. Women were counseled and managed according to the results and participated in educational group sessions aimed to discuss topics related to the menopause, the METS, its risk determinants and cardiovascular risk implications.

2.2. General questionnaire

An itemized questionnaire was constructed to assess and record all general data. This tool was validated in 50 women before being implemented and included the following female data: age, marital status, educational level, parity, years since menopause onset, perceived healthiness and current partner status (yes/no). Lifestyle and other personal factors included in this section were smoking habit, alcohol and coffee consumption, psychotropic drug use, and sedentarism. Postmenopausal women were further categorized as early postmenopausal (1–4 years) and late postmenopausal (≥5 years). Women provided the information related to their partner including: age, educational level, unfaithfulness (yes/no), alcoholism (yes/no), and the presence of sexual dysfunction (erectile dysfunction and or premature ejaculation). Definitions for alcoholism, erectile dysfunction, and premature ejaculation have previously been described [4]. The presence and severity of hot flushes were assessed with item 1 of the menopause rating scale (MRS) as described elsewhere [23].

2.3. Diagnostic criteria for the metabolic syndrome

NCEP-ATP-III diagnostic criteria were used to define the METS [24]. This was the case if three or more of five criteria were encountered: abdominal obesity (waist circumference > 88 cm), increased serum triglycerides (TG) (≥150 mg/dL), decreased high density lipoprotein cholesterol (HDL-C) (<50 mg/dL), high fasting glucose (≥110 mg/dL) and increased blood pressure (≥130/85 mmHg) [24]. A waist circumference cut off value of 88 cm has recently been reported optimal for defining the METS in postmenopausal Latin American women [25]. Women taking oral hypoglycemic or antihypertensive medication prescribed by a physician were considered, respectively, as diabetic or hypertense independent of the serum or blood pressure findings. After a 10 min resting period in sitting position, mean blood pressure was determined by performing two separate determinations 10 min apart.

Weight (kg) and height (m) were recorded and body mass index (BMI) calculated for each participant as weight (in kg) divided by the square of height (in m). Obesity was defined as a BMI ≥30 kg/m^2 [26]. Waist circumference expressed in centimeters was obtained from women in supine position. Subjects were defined as sedentary if carrying out less than 15 min of physical activity twice per week [27].

2.4. Validated tools

2.4.1. The Athens insomnia scale (AIS)

The AIS [28] is a self-administered psychometric instrument designed to quantify sleep difficulty based on the ICD [12]. It consists of eight items: the *first four* assess sleep induction, night awakenings, early awakenings and sufficiency of total sleep duration. The *fifth item* assesses sleep quality, and the *last three* the impact of insomnia over day time performance. Items can be rated from 0 to 3, higher scores denoting more impaired sleep. The total score (sum of all rated items) may range from 0 to 24, with scores of 6 or more used to define insomnia. This study used the Spanish language validated AIS [29].

2.4.2. The hospital anxiety and depression scale (HADS)

This tool was developed to identify cases of anxiety and depression in non-psychiatric settings [30]. It includes 14 items, seven for anxiety (odd numbered items scored 3–0) and seven for depression (even numbered items scored from 0 to 3). Items of each sub-scale are summed up to provide a total anxiety and depression score. A total cut off value of 8 or more on each sub-scale was used to identify cases of anxiety and depressed mood. The total score for the HADS was computed by summing scores obtained on each subscale. These values, representing global mood morbidity, were used as an independent variable for the multiple linear regression analysis.

2.5. Serum assays

Blood samples withdrawn from each participant were centrifuged at 5 °C for 10 min at 3000 rpm. Obtained serum, plasma and white cells were decanted into 0.5 mL aliquots and then stored at −70 °C. TG, HDL-C and glucose levels were assayed using the enzymatic colorimetric method with a Hitachi 717 automatic photometric analyzer (Roche Diagnostics GmbH, Mannheim, Germany).

2.6. Statistical analysis

Statistical analysis was performed using the SPSS version 19.0 (IBM, Armonk, NY, USA). Data are presented as medians (interquartile ranges [IQR]), percentiles (p25–p75), percentages, beta coefficients and 95% confidence intervals. The Kolmogorov–Smirnov test was used to determine the normality of data distribution and the Bartlett test to evaluate the homogeneity of the measured variance. According to this, non-parametric continuous data were compared with the Mann–Whitney *U* test (two independent samples) or the Kruskal–Wallis test (various independent samples). Spearman Rho coefficients were calculated to determine correlations between total AIS scores and various numeric variables (bivariate analysis). Cronbach's alphas were computed for the AIS and HADS to determine their internal consistency.

Multiple linear regression analysis was performed to assess variables related to higher AIS scores and, hence, worse

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