ORIGINAL ARTICLE

Women's Health

Sleep Apnea in Caucasian and Asian Climacteric Women

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Abstract

The aim of our study was to define the structure of sleep in Caucasian and Asian peri- and postmenopausal women with sleep apnea.

Materials and Methods: Two hundred and forty-seven menopausal women between 45 and 60 years of age participated in this study. The participants were divided into 2 ethnic groups, taking into account the genealogy (the representatives having in two generations of parents of one ethnic group) and self-identification, taking into account phenotype elements. Caucasians were represented by the Russian ethnic group (n=115) and Asians by the Buryat ethnic group (n=132). The study included the collection of anamnestic data, physical examinations, clinical (Berlin questionnaire, general medical examination, gynecological examination, polysomnographic monitoring according to American Academy of Sleep Medicine recommendations), and biochemical laboratory methods.

Results: Sleep complaints, such as difficulty falling asleep, frequent night awakenings (more than 2 times), difficulties of morning awakening or problems waking up too early, were increased in perimenopausal Caucasian women. We found ethnic differences in a greater frequency of complaints in Caucasian women, but Asian women also showed a tendency to increased complaints about poor sleep. Polysomnographic monitoring revealed that OSA was more common in Asian postmenopausal women than in Caucasians. However, in structure of sleep we have not seen distinctions.

Conclusion: For improving the quality of life, it is necessary not only to pay attention to menopausal problems, but also to solve the sleep problems associated with various strategies, both age management and lifestyle. (**International Journal of Biomedicine. 2018;8(4):296-300.**)

Key Words: climacteric women • sleep apnea • Caucasians • Asians • sleep structure

Abbreviations

BMI, body mass index; **EEC**, endometrial echo-complex; **FSH**, follicle-stimulating hormone; **LH**, luteinizing hormone; **OSA**, obstructive sleep apnea; **QL**, quality of life*;* **REM**, rapid-eye-movement; **SD**, sleep disorders; **SDB**, sleep-disordered breathing.

Introduction

Earlier, we studied various metabolic aspects of sleep disturbances in the male and female population.[1,2] It is known that menopausal women experience various sleep-related disorders.[3-6] Menopause is characterized by a decrease in the production of female sex hormones, most specifically estrogen. According to the US National Library of Medicine,[7] about 16% to 42% of premenopausal women and 35% to 60% of postmenopausal women have sleep disorders (SD). There are many scientific data on sleep-related symptoms in menopausal women.[8-10] However, in the small number of studies of sleep-related symptoms there are reports of certain ethnic differences in sleep-related those symptoms experienced in the menopausal transition. These studies found no difference in sleep symptoms between black and white participants, but in a cross-sectional analysis among an elderly community cohort, performed by Mezick et al.,[11] snoring, sleepiness and long sleep duration were more common in Hispanics. The SWAN study (2008), which included Caucasian, African and Chinese menopausal women, described ethnic differences for staying asleep and

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early morning awakening. Further studies have evaluated the polysomnographic monitoring indicators, which also have revealed differences in the sleep pattern, showing that African women experience greater sleep latency, shorter total sleep time and lower sleep efficiency than do other ethnic groups. However, there are no studies of SD in Caucasian and Asian peri- and postmenopausal women in Russia. Some researchers have shown that Asian men (Chinese) had the highest rates of SDB among the 3 major ethnic groups.[12]

There are many nationalities living in East Siberia near Lake Baikal. The largest part of Asian representatives are Buryats, and of Caucasian representatives are Russians. The aim of our study was to define the structure of sleep in Caucasian and Asian peri- and postmenopausal women with sleep apnea.

Materials and Methods

The study was approved by the Scientific Center of Family Health Problems and Human Reproduction Ethics Committee. Written informed consent was obtained from each patient.

Two hundred and forty-seven menopausal women between 45 and 60 years of age participated in this study between February 2016 and February 2018. The participants were divided into 2 ethnic groups, taking into account the genealogy (the representatives having in two generations of parents of one ethnic group) and self-identification, taking into account phenotype elements. Caucasians were represented by the Russian ethnic group (n=115) and Asians by the Buryat ethnic group (n=132).

Inclusion criteria were amenorrhea ≥12 months; a basal level of FSH>20iU/ml, LH/FSH ratio<1; ultrasounds criteria: (1) thin non-functional endometrium, the EEC measured <5mm; (2) the loss of ovarian reserve.

Exclusion criteria were exacerbation of chronic diseases; hormone replacement therapy; surgical menopause; the presence of chronic sleep disorders in a case history (insomnia, parasomnia, hypersomnia, OSA syndrome); the use of hypnotic pills in the previous two weeks; shift work.

Most of the Caucasian women were recruited for study in Irkutsk and Asian women in Ulan-Ude (Byryat Republic). The study included the collection of anamnestic data, physical examinations, clinical (questionnaire, general medical examination, gynecological examination, polysomnographic monitoring), and biochemical laboratory methods. All participants were asked to take part in the follow-up questionnaire.

The questionnaire was available in Russian because it is the major language spoken in East Siberia. The questionnaire included self-reported sleep symptoms and the menopausal status. Menopausal status was assessed by self-reports based on the Modified Menopausal Index (MMI).

The Berlin questionnaire for OSA is one of the most commonly used. It combines risk factors, such as snoring, sleepiness, obesity and hypertension, to reliably predict OSA syndrome. According to this questionnaire, there are 2 levels of severity of the risk: a high risk (if there are 2 or more categories where the score is positive) and a low risk (if there is only 1 or no categories where the score is positive).[13-16]

The polysomnographic monitoring was carried out in a specially equipped room, which was as close as possible to the conditions of a bedroom, using the GRASS-TELEFACTOR Twin PSG(Comet) system with an As 40 amplifier with the SPM-1(USA) integrated sleep module, according to the standard methodology. We evaluated overnight 16-channel polysomnography with 2 electroencephalograms (C4,C3,O1,O2), 2 electrooculograms (ROC, LOC) and 2 electromyogram channels; oral/nasal airflow by thermistor; respiratory effort via conductance belts on chest and abdomen; snoring sounds via microphone; oxygen saturation via pulse oximeter. Each 30-sec epoch was manually scored using standard scoring criteria supplemented by apnea-hypopnea criteria, according to American Academy of Sleep Medicine recommendations.[17]

Statistical analysis was performed using STATISTICA 6.1 software (Stat-Soft Inc., USA). Baseline characteristics were summarized as frequencies and percentages for categorical variables and as mean±standard deviation for continuous variables. Differences of continuous variables departing from the normal distribution were tested by the Mann-Whitney U-test. The frequencies of categorical variables were compared using Pearson χ2 or Fisher's exact test, when appropriate. A probability value of *P≤0.05* was considered statistically significant.

Results

Results of sleep complaints and comparative analysis of sleep characteristics of Caucasian and Asian menopausal women are presented in Table 1. Sleep complaints, such as difficulty falling asleep, frequent night awakenings (more than 2 times), difficulties of morning awakening or problems waking up too early, were increased in perimenopausal Caucasian women. We found ethnic differences in a greater frequency of complaints in Caucasian women, but Asian women also showed a tendency to increased complaints about poor sleep. However, results of the Berlin questionnaire showed a high risk of having OSA syndrome in Asian postmenopausal women.

Basic physical characteristics of participants are summarized in Table 2. After the clinical-anamnestic method, the following stage of the research was polysomnographic monitoring in a sleep laboratory in participants with high and low risk of OSA syndrome. Results of polysomnographic characteristics in participants are presented in Table 3. OSA was more common in Asian postmenopausal women than in Caucasians. However, in structure of sleep we have not seen distinctions.

Discussion

Our study showed ethnic features of SD in menopausal women of 2 races living in East Siberia. Asian women self-reported frequent night awakenings and high risk of SDB, but more severe menopausal symptoms were found in White women compared to Asian women. It is known that a low level of female sex hormones can lead to SDB, which worsens QL.[18-20] The differences in the course of menopause in women of different races has been demonstrated in many studies. [21-25]

Table 1.

Result of self-reported sleep symptoms in Caucasian and Asian menopausal women

Characteristics	Caucasian women (n = 115)		Asian women (=132)		*P-value*
	Perimenopausal women (n=56) (1)	Postmenopausal women (n=59) (2)	Perimenopausal women (n=56) (3)	Postmenopausal women (n=76) (4)	
Difficulty falling asleep (more than 30 minutes), n (%)	39 (69.6)	32 (54.2)	29 (51.8)	46 (60.5)	P_{1-3}=0.05
Frequent night awakenings (more than 2 times), n (%)	15 (26.8)	37 (62.7)	27 (48.2)	40 (52.6)	P_{1-2}=0.000 P_{1-3}=0.019
Difficulties of morning awakening or problems waking up too early, n (%)	48 (85.7)	29 (49.2)	39 (69.6)	45 (59.2)	P_{1-3}=0.041
ESS (Epworth Sleep Scale)					
0-10, n (%)	17 (30.4)	21 (35.6)	20 (35.7)	46 (60.5)	P_{2-4}=0.004. P_{3-4}<0.005
10-24, n (%)	39 (69.6)	38 (64.4)	36 (64.3)	30 (39.5)	P_{2-4}<0.01 P_{3-4}<0.005
Berlin questionnaire					
Low risk n (%)	27 (48.2)	30 (50.8)	23 (41.1)	26 (34.2)	P_{2-4}=0.05
High risk, n (%)	29 (51.8)	29 (49.2)	33 (58.9)	50 (65.8)	P_{2-4}=0.05

Table 2.

Basic physical characteristics of Caucasian and Asian menopausal women

Characteristics	Caucasian women (n=115)		Asian women (n=132)		*P-value*
	SD+ n=70 (1)	SD- n=45 (2)	SD+ n=88 (3)	SD- n=44 (4)	
Age, yrs	54.34±4.81	53.25±5.18	54.92±5.04	54.1±4.32	
BMI, kg/m²	30.14±2.21	27.39±4.27	31.02±2.89	28.91±1.26	P_{1-2}=0.000 P_{3-4}=0.000
Place of residence, n (%) Irkutsk, n (%) Ulan-Ude, n (%) Other region	57 (81.4) 9 (12.8) 4 (5.7)	39 (86.7) 6 (13.3) -	11 (12.5) 77 (87.5) -	6 (13.6) 38 (86.3) -	
Marital status, n (%) Married/partnered Nonmarried /separated	48 (68.5) 22 (31.4)	28 (62.2) 17 (37.8)	67 (76.1) 21 (23.9)	26 (59.1) 18 (40.9)	P_{3-4}=0.043
Menopausal status Perimenopause, n (%) Postmenopause, n (%)	37 (52.8) 33 (47.14)	19 (42.2) 26 (57.8)	33 (37.5) 55 (62.5)	23 (52.3) 21 (47.7)	P_{1-3}=0.05
MMI					
12-34, n (%)	20 (28.6)	14 (31.1%)	29 (33.0)	13 (29.5)	
35-58, n (%)	28 (40.0)	15 (33.3%)	36 (40.9)	19 (43.2)	
>58, n (%)	22 (31.4)	16 (35.6%)	23 (26.1)	12 (27.3)	

Table 3.

Polysomnographic measures in Caucasian and Asian menopausal women with high and low risk of sleep apnea

Variable	Caucasian women (n=115)						Asian women (n=132)						*P-value*
	Perimenopausal (n=56)			Postmenopausal (n=59)			Perimenopausal (n=56)			Postmenopausal (n=76)			
	High risk n=6	Low risk n=38	SD- n=12	High risk n=11	Low risk n=37	SD- n=11	High risk n=18	Low risk n=21	SD- n=17	High risk n=22	Low risk n=37	SD- n=17	P<0.05
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
SE[1], %	71.74±8.4	95.2±3.5	96.2±2.2	87.3±6.3	90.5±2.7	92.5±5.9	75.2±5.3	93.7±5.1	96.3±5.1	74.5±8.5	90.3±4.73	94.3±3.7	$P_{1-2} P_{1-3} P_{4-5} P_{4-6}$ $P_{7-8} P_{7-9} P_{10-11} P_{10-12}$
SL[2], min	28.1±6.4	16.2±3.7	19.2±6.1	26.3±3.3	19.9±6.5	22.3±18.2	25.2±6.1	19.5±2.7	21.2±8.5	19.1±5.8	20.2±5.6	21.8±5.4	
Stage (%)													
1	5.2±3.5	6.8±3.4	5.5±1.6	6.5±1.6	10.2±3.5	7.6±4.1	6.0±4.8	8.2±4.1	7.2±4.1	7.4±3.2	6.5±2.9	6.4±2.4	
2	65.0±18.9	57.7±13.4	58.2±15.9	60.2±19.2	54.1±15.6	53.9±7.0	60.2±20.5	61.5±18.2	56.9±24.3	69.8±24.1	55.1±16.2	53.2±20.1	
3	12.1±4.9	19.1±6.4	23.2±5.8	12.2±5.4	18.5±6.4	19.4±3.8	11.2±5.8	18.1±5.4	20.5±6.1	10.1±5.2	16.2±5.8	18.5±61	
REM	19.8±5.1	21.1±5.4	20.1±5.6	20.6±8.2	21.6±9.3	25.8±4.3	16.1±5.9	15.2±6.4	16.8±5.4	14.5±5.1	22.8±5.3	21.8±6.4	$P_{4-10} P_{10-11} P_{10-12}$
AGI[3], event/ hour	13.2±2.4	7.1±1.2	6.2±0.5	15.2±3.4	8.5±0.5	7.1±0.1	18.2±3.8	8.1±2.1	6.4±4.1	22.1±2.5	9.2±4.1	6.2±1.2	$P_{1-2} P_{1-3} P_{1-7} P_{4-5}$ $P_{4-6} P_{4-10}$
O₂ satura- tion, (%)	90.1±3.1	95.2±4.2	96.4±3.5	90.1±4.5	93.3±0.5	96.2±2.1	91.1±3.8	92.4±2.6	92.1±2.1	88.1±4.1	89.1±3.1	91.1±4.4	P_{4-10}

[1]. *SE (leep efficiency) is a percentage computed as the total time spent asleep / the total amount of time spent in bed × 100*
[2]. *SL (sleep latency) was calculated as time from beginning of the recording period to the first of 10 consecutive min of stage 2 or stage 3-4 sleep*
[3]. *AGI - apnea-hypopnea index*

Results of our study showed differences in SD in Caucasian and Asian women. Although, the SWAN study involving White, African American and Chinese women has demonstrated that African women have the most severe night vasomotor reactions compared to Asian and White women. Moreover, the best sleep patterns have been shown in Asian women compared to Whites and African Americans,[26] and our results confirmed this finding when comparing Asian and Caucasian women. Thus, Caucasian women, compared to Asians, have a high frequency of difficulty falling asleep and difficulties of morning awakening. However, Asian women have a high risk of SDB, both in the survey data and according to polysomnography. In this regard, we should emphasize a certain type of Asian physique with a short neck and trunk that was formed due to the centuries-old residence in a sharply continental climate with a hot summer to 38°C and frosty winters to -50°C.

There were no differences in sleep architecture between ethnic groups. It has been found that the representation of REM is greater in perimenopausal women than in postmenopausal ones, which can be explained by a change in sleep structure with age—decreasing delta-sleep and some compensatory increasing REM. However, some studies have demonstrated that there is a decreasing REM duration in normal aging.[7] According to our results, it is possible that worsening of the vital status contributes to SD, which is also reported in some other studies.

Results of our pilot study are not complete and need to be continued. However, for improving QL, it is necessary not only to pay attention to menopausal problems, but also to solve the sleep problems associated with various strategies, both age management and lifestyle, which have been stressed in a study by Woods et al.[27] We believe that management strategies should be oriented towards ethnic features related to lifestyle and the type of response to aging.

Conflict of interest

The authors declare that they have no competing interests.

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