The reproductive parameters, lifestyle and health factors in relation to physiological menopausal symptoms in Slovak women

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ABSTRACT: Menopause is associated with various physiological symptoms which can be related to the most common health problems in menopausal women and a decrease in their quality of life. Determinants of experiencing menopausal symptoms are complex because they include reproductive, environmental, lifestyle and social factors.
The aim of this study is to assess whether selected reproductive, lifestyle and health factors are associated with the occurence of hot flushes, night sweats, palpitations, dizzy spells and/or pins and needles in the hands and feet. A total of 346 women aged between 39 and 59 years living in Slovakia were recruited for this cross-sectional survey. Data on menopausal symptoms and potential confounders were collected by questionnaire. Logistic regression analysis revealed an independent effect of peri-/postmenopausal status and depressed mood on the manifestation of hot flushes. Analysis results for night sweats were significant for age, depressed mood and current smoking at $p < 0.05$ while, of all input parameters, only age and depressed mood were significant predictors of palpitations. Logistic regression also revealed the effect of sport and depressed mood on dizzy spells. Depressed women, (B=0.677) and those who did not participate in sporting activities (B= –0.969) suffered more often from dizzy spells. Pins and needles in hands and feet were influenced by peri-/postmenopausal status (B=1.036), by higher numbers of pregnancy (B=0.260) and depressed mood (B=0.505). Potentially modifiable factors, such as current smoking, lack of sport, depressed mood and the number of pregnancies can predispose a woman to a higher prevalence of some of these physiological menopausal symptoms.

KEY WORDS: menopause, vasomotor symptoms, lipids, obesity indices, depressed mood

Introduction

Menopause is defined as the permanent cessation of menstruation resulting from the loss of ovarian follicular activity (WHO 1981), and it marks the end of a woman's reproductive capacity. Most women experience menopause between

49 and 52 years in developed countries and between 41 and 47 years in developing ones (Morabia et al. 1998; Thomas et al. 2001). The overall median age at natural menopause is 51.25 years in Polish women (Kaczmarek 2007) and 50.15 years in Slovak women (Lukáčiková et al. 2011).

Several biological and psycho-social changes take place during this phase of life, when menopause can be associated with various physiological symptoms including hot flushes, night sweats and palpitations. Frequent menopausal symptoms can be disabling, affecting a women´s social life, psychological health, sense of well-being and ability to work. Women with hot flushes are more likely to experience disturbed sleep, depressive symptoms and significant reductions in their quality of life compared with asymptomatic women (Bachmann 2005).

The determinants of experiencing menopausal symptoms are complex; combining biological, reproductive and environmental events with lifestyle and social factors (Sabia et al. 2008). Women with vasomotor menopausal symptoms have a less favourable cardiovascular risk profile while women who experience night sweats have a significantly higher body mass index (BMI), waist to hip ratio (WHR) and systolic and diastolic blood pressure (sBP, dBP) (Gast et al. 2010). Observational and cohort studies have found that physically active women report fewer menopausal symptoms and shorter duration of hot flushes than less active women (Col et al. 2009; Gold et al. 2000; Ivarsson et al. 1998; Moilanen et al. 2010). Both active and passive smoking and alcohol consumption have been reported to be associated with an increased risk of hot flushes and night

sweats during menopausal transition (Gold et al. 2000, 2004; Whiteman et al. 2003; Li et al. 2003; Sievert et al. 2006). A preference for dietary wheat and rapidly absorbed sugars and snacks are additional factors associated with menopausal symptoms (Sabia et al. 2008). The risk of onset of menopausal symptoms was also found to be negatively associated with education level and with some hormonal and reproductive factors (Sabia et al. 2008).

According to Nakano et al. (2012), this risk was also associated with age at last pregnancy, where women ≥36 years at last pregnancy were less likely to report moderate or severe hot flushes than those ≤35 years. Although some risk factors, such as anthropometrical and reproductive factors, have already been investigated in this connection in observational studies, results have proven inconsistent (Aiello et al. 2004). Developing preventive strategies for women undergoing this physiological transition requires understanding the multiple factors which affect symptom-reporting in women from different racial/ethnic backgrounds (Gold et al. 2000).

The aim of this study is to assess whether selected reproductive, lifestyle and health factors are associated with the occurrence of hot flushes, night sweats, palpitations, dizzy spells and/or pins and needles in the hands and feet of Slovak women.

Subjects and methods

This 2006 to 2013 research was conducted by cross-sectional survey to analyze the effect of genetic variants of some candidate genes on health biomarkers in Slovak midlife women. Details of the studies have been published elsewhere

(Luptáková et al. 2012a; Luptáková et al. 2012b; Benčová et al. 2012; Luptáková et al. 2013). Women were recruited from different localities in the western, southern and middle parts of Slovakia, via an invitation letter regarding the study which was circulated and distributed prior to data collection with the help of local medical doctors and/or nurses. Following written Informed Consent, volunteers were interviewed during their routine health checkups, and they were investigated with respect to their health, anthropometric and lifestyle aspects at local Health Centres. All participants were always accompanied by trained anthropologists. Only selected volunteers were considered for the purpose of this paper; so women with hysterectomy, oophorectomy, those undergoing hormonal replacement therapy at the time of the investigation and those recovering from acute disorders such as cancer, myocardial infarction or stroke were excluded from this survey.

A total of 346 women, ranging between 39 and 59 years, completed the menopause-specific questionnaire, designed by Kaczmarek (2005) and validated in Polish studies. This questionnaire included questions regarding socio-demographic information, lifestyle behaviour such as physical activity and smoking, reproductive-history, health status, especially regarding hypertension and diabetes mellitus, and physiological and psychological menopausal complaints. The questionnaire was extended to issues related to sport activity and health status.

The women were divided according to their menopausal status into three groups; pre-, peri- and postmenopausal. The pre-menopausal group included women who had experienced regular menstruation during the last 12 months and also at the time of the study. The peri-menopausal group comprised women who reported that their menstrual cycle length had become more irregular in the preceding 12 months, or that they had stopped menstruating for between 3 and 12 months (Kaczmarek 2007). Women were considered post-menopausal if they reported 12 consecutive months of amenorrhoea for which there was no other obvious pathological or physiological cause, in accordance with the WHO definition (1996). Due to the low number of perimenopausal women, this group was amalgamated with postmenopausal women because complaints are typical both during menopausal transition and also in the early postmenopausal period.

All anthropometrical parameters of body height, weight, and waist and hip circumference were measured by professional anthropologists, with the same instruments used on all subjects. Anthropometric measurements were taken using standard anthropometric techniques. Body height was measured by anthropometer (Sieber and Hegner), and body weight was measured on a personal balance scale. The waist and hip circumferences were measured using a non-elastic tape. The waist circumference was measured at the level of the umbilicus, and the hip circumference was measured at the maximum posterior protrusion of the buttocks. Body mass index (BMI) was calculated as body weight divided by height squared and waist-to-hip ratio (WHR) was calculated as the circumference of the waist divided by the circumference of the hips.

Blood pressure was measured in the morning during medical examination, in the sitting position using a mercury sphygmomanometer.

Data analysis

Considered characteristics of the study subjects are described statistically by means, standard errors and deviations and frequencies/percentages for categorical variables. A detailed baseline description of the study sample is presented in Tables 1 and 2.

Univariate analysis of variance was used to test quantitative variables for differences between groups with present and absent menopausal symptoms. Adjustment for age was applied appropriately for anthropometric factors and blood pressure. Associations between the categorical variables of menopausal status, lifestyle and health factors and particular menopausal symptoms were analysed by Pearson's chi-square test in contingency tables. Differences of $p < 0.05$ were considered statistically significant.

A logistic regression analysis (Stepwise method, Forward: LR) was performed, with the presence of menopausal symptom as dependent variable and menopausal status, age, lifestyle and anthropometric, reproductive and health factors as covariates. Only those variables with values of $p < 0.05$ in the Univariate analysis of variance and Pearson's chi-square test were included in the logistic regression as covariates. All statistical computations were performed by the SPSS 17.0 software programme (SPSS Inc., Chicago, IL).

Results

Table 3 shows the differences in anthropometric and reproductive variables between the two groups of women with regard to presence or absence of physiological menopausal symptom. Analysis of variance with age as covariate re-

vealed the effect of BMI on the presence of pins and needles in hands and feet (in absent symptom, BMI= 26.1 ± 4.56 and in present symptom, BMI= 27.49 ± 5.69, $p < 0.05$). With regard to reproductive characteristics, the test of univariate analysis of variance revealed statistically significant differences in the following parameters: higher age at menarche in women with hot flushes than without this symptom (13.4 ± 1.60 vs. 13.0 ± 1.41), longer duration of menses in women with palpitations than without them (5.75 ± 1.33 vs. 5.45 ± 1.32, $p < 0.05$), longer duration of menses (in days) in women with present pins and needles in hands and feet (5.78 ± 1.36 vs. 5.45 ± 1.32, $p < 0.05$) and more pregnancies in women with the same symptom than women without it (pins and needles in hands and feet) (2.72 ± 1.41 vs. 2.35 ± 1.17, $p < 0.05$), respectively. The results of Pearson's chi square test confirmed the effect of menopausal status on all investigated physiological symptoms ($p < 0.05$); with higher prevalence in the peri- and postmenopausal groups.

The results of Pearson's chi square test documented in table 4 confirmed the effect of self-reported depressed mood and sport on almost all investigated physiological symptoms ($p < 0.05$). Women suffering hot flushes and/or night sweats felt depressed, "down" or "blue" more often than women without these symptoms (44.7% vs. 30.9%; 47.9% vs. 27.3%, $p < 0.05$). Women with palpitations, dizzy spells and/or pins/needles also reported more often having depressed mood than women without these symptoms (54.9% vs. 22.3%; 47.7% vs. 30.7%; 44.7% vs. 31.4%, $p < 0.05$). The women who reported regular sport activity suffered less often from hot flushes, night sweats, palpitations and/

Table 1. Baseline characteristics of the study population

Characteristic	N	Min	Max	Mean	SE	SD
Age *	346	39	59	48.53	0.29	5.38
Height (cm)	346	148.6	178.0	163.51	0.31	5.81
Weight (kg) *	346	40	140	71.64	0.77	14.41
WC (cm) *	346	60	156	84.16	0.73	13.62
HC (cm)	346	80	145	103.14	0.55	10.23
BMI (kg/m2) *	346	16.84	48.74	26.78	0.28	5.15
WHR	346	0.64	1.11	0.81	0.00	0.08
sBP (mmHg) *	345	70	170	123.81	0.86	16.02
dBP (mmHg) *	345	50	175	79.51	0.60	11.23
Pulse	294	54	128	74.90	0.54	9.34
Number of pregnancies *	340	0	9	2.51	0.07	1.29
Age at menarche *	342	9.00	18.00	13.21	0.08	1.51
Duration of menses *	325	2.00	10.00	5.59	0.07	1.34
Age of first pregnancy *	322	17.00	39.00	22.22	0.19	3.33
		n	%			
Hot flushes	341	162	47.5			
Night sweats	341	163	47.8			
Palpitations	343	153	44.6			
Dizzy spells	345	131	38.0			
Pins/needles in hands/feet	343	154	44.9			
Depressed, down or blue	342	127	37.1			
Breastfeeding	329	298	90.6			
Hormonal therapy	329	78	23.7			
Sport	322	51	15.8			
Hyperglycaemia/DM	346	24	7.0			
Hypercholesterolaemia	345	141	41.0			
Central obesity, WHR>0.89	346	50	14.5			
Obesity, BMI≥30.0	346	80	23.1			
Hypertension	345	125	36.2			
Current smoking	346	114	33.0			
Duration of menstruation cycle	336	<28 days		n=91	27.1%	
		28–32 days		n=223	66.4%	
		>32 days		n=17	5.1%	
		Other		n=5	1.5%	
Menopausal status		Premenopause		n=168	48.5%	
		Perimenopause		n=39	11.3%	
		Postmenopause		n=139	40.2%	

*Not normally distributed parameters.

Table 2. Distribution of socio-economic background and educational level in the entire women sample

Variable		n	%
Place of birth	Village	58	16.8
n=346	Small town	63	18.2
	Town	187	54
	City	38	11
Present living place	Village	73	21.2
n=344	Small town	28	8.1
	Town	204	59.3
	City	39	11.3
Marital status	Single	18	5.2
n=346	Married	229	66.2
	Widow	22	6.4
	Divorced	74	21.4
	Separated	3	0.9
Education	Primary	39	11.3
n=346	Vocational	86	24.9
	Secondary	148	42.8
	Academic	73	21.1
Employment	No	57	16.5
n=346	Yes	289	83.5
Retired	No	305	88.2
n=344	Yes	39	11.3

or dizzy spells than women who did not participate in sports (11.3% vs. 20.2%, 10.7% vs. 20.8%, 10.3% vs. 20.6%, 8.6% vs. 20.6%, respectively, $p<0.05$), while smokers reported night sweats more often than non-smokers (38% vs. 28.1%, $p=0.051$). A higher frequency of hypertension was observed in women with palpitations (42.5% vs. 31.2%, $p<0.05$), and these were also associated with significantly increased pulse (73.9±8.99 vs. 76.1±9.66, $p<0.05$). Women with hyperglycaemia/DM reported pins and needles in their hands and feet more often than women without this disorder (9.3% vs. 3.7%, $p<0.05$). We also investigated the effect of categorical reproductive parameters on menopausal symptoms by Pearson´s chi square test, but no statistically significant associations were documented (not shown in the Table).

The results of logistic regression analysis in Table 5 show the associations of selected reproductive, lifestyle and health factors with physiological menopausal symptoms after control for age and menopausal status. In regard to hot flushes, from all the input parameters of age, menopausal status, depressed mood, age at menarche and sport, only peri-/postmenopausal status and depressed mood were significant predictors in this model. We found that depressed women had 1.9-times higher risk of hot flushes than those without depression (Exp (B) 1.907, 95% CI 1.159–3.137). Results for night sweats were significant for age, depressed mood and current smoking at

Table 3. The effect of anthropometrical and reproductive characteristics on physiological menopausal symptoms

	Hot flushes		Night sweats		Palpitations		Dizzy spells		Pins/needles in hands/feet	
	Absent Mean ± SD	Present Mean ± SD	Absent Mean ± SD	Present Mean ± SD	Absent Mean ± SD	Present Mean ± SD	Absent Mean ± SD	Present Mean ± SD	Absent Mean ± SD	Present Mean ± SD
Age (years)	47 ± 5.36	50 ± 4.90**	48 ± 5.42	49 ± 5.19*	48 ± 5.47	49 ± 5.22*	48 ± 5.57	49 ± 5.06	47 ± 5.50	50 ± 4.95**
Height (cm)	163.5 ± 5.79	163.5 ± 5.82	163.4 ± 5.69	163.6 ± 6.00	163.4 ± 5.88	163.5 ± 5.75	163.8 ± 5.77	162.9 ± 5.84	164.2 ± 5.70	162.6 ± 5.86
Weight (kg)	71.4 ± 15.47	71.9 ± 13.21	71.6 ± 15.14	71.5 ± 13.45	71.0 ± 14.43	72.3 ± 14.40	71.2 ± 13.68	72.2 ± 15.48	70.5 ± 13.31	72.7 ± 15.47
WC (cm)	83.8 ± 14.40	84.6 ± 12.76	84.1 ± 13.25	84.1 ± 14.01	83.5 ± 13.16	84.9 ± 14.24	84.2 ± 12.74	84.0 ± 14.98	83.1 ± 12.42	85.1 ± 14.86
HC (cm)	103.0 ± 10.88	103.3 ± 9.58	103.0 ± 10.63	103.3 ± 9.77	102.5 ± 9.99	104.0 ± 10.56	103.1 ± 9.80	103.2 ± 10.96	102.2 ± 9.87	104.2 ± 10.58
BMI (kg/m^2)	26.7 ± 5.49	26.9 ± 4.81	26.8 ± 5.37	26.7 ± 4.90	26.6 ± 5.20	27.0 ± 5.12	26.5 ± 4.78	27.2 ± 5.70	26.1 ± 4.56	27.5 ± 5.69*
WHR	0.8 ± 0.08	0.8 ± 0.08	0.8 ± 0.08	0.8 ± 0.08	0.8 ± 0.08	0.8 ± 0.08	0.8 ± 0.08	0.8 ± 0.09	0.8 ± 0.08	0.8 ± 0.08
Age at menarche (years)	13.0 ± 1.41	13.4 ± 1.60*	13.2 ± 1.45	13.3 ± 1.58	13.1 ± 1.41	13.3 ± 1.62	13.2 ± 1.48	13.3 ± 1.56	13.2 ± 1.43	13.2 ± 1.59
Duration of menses (days)	5.48 ± 1.26	5.71 ± 1.40	5.49 ± 1.36	5.69 ± 1.31	5.45 ± 1.32	5.75 ± 1.33*	5.49 ± 1.30	5.75 ± 1.37	5.42 ± 1.29	5.78 ± 1.36*
Number of pregnancies	2.44 ± 1.30	2.57 ± 1.27	2.47 ± 1.38	2.53 ± 1.19	2.40 ± 1.17	2.64 ± 1.42	2.43 ± 1.31	2.64 ± 1.24	2.35 ± 1.17	2.72 ± 1.41*
Age at first pregnancy (years)	22.0 ± 3.28	22.5 ± 3.40	22.0 ± 3.15	22.5 ± 3.53	22.2 ± 3.39	22.3 ± 3.27	22.2 ± 3.51	22.3 ± 3.02	22.0 ± 2.96	22.6 ± 3.73
Menopausal status	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Premenopause	118 (65.9)	48 (29.6)	101 (56.7)	64 (39.3)	104 (54.7)	63 (41.2)	113 (52.8)	54 (41.2)	111 (58.7)	54 (35.1)
Peri- or postmenopause	61 (34.1)	113 (70.4)**	77 (43.3)	98 (60.7)*	85 (45.3)	90 (58.8)*	100 (47.2)	77 (58.8)*	77 (41.3)	100 (64.9)**

*$p<0,05$, **$p<0,001$.

Table 4. The effect of lifestyle and health status on physiological menopausal symptoms

Variable	Hot flushes		Night sweats		Palpitation		Dizzy spells		Pins/needles in hands/feet	
	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Depressed, down or blue										
No	123 (69.1)	89 (55.3)	128 (72.7)	85 (52.1)	146 (77.7)	69 (45.1)	147 (69.3)	68 (52.3)	129 (68.6)	84 (55.3)
Yes	55 (30.9)	72 (44.7)*	48 (27.3)	78 (47.9)**	42 (22.3)	84 (54.9)**	65 (30.7)	62 (47.7)*	59 (31.4)	68 (44.7)*
Sport										
No	134 (79.8)	133 (88.7)	133 (79.2)	134 (89.3)	139 (79.4)	130 (89.7)	154 (79.4)	117 (91.4)	142 (81.1)	127 (87.6)
Yes	34 (20.2)	17 (11.3)*	35 (20.8)	16 (10.7)*	36 (20.6)	15 (10.3)*	40 (20.6)	11 (8.6)*	33 (18.9)	18 (12.4)
Smoking										
No	128 (71.5)	101 (62.3)	128 (71.9)	101 (62.0)	132 (69.5)	97 (63.4)	146 (68.2)	85 (64.9)	128 (67.7)	102 (66.2)
Yes	51 (28.5)	61 (37.7)	50 (28.1)	62 (38.0)a	58 (30.5)	56 (36.6)	68 (31.8)	46 (35.1)	61 (32.3)	52 (33.8)
Hypertnesion										
No	122 (68.2)	95 (59.0)	120 (67.4)	98 (60.5)	130 (68.8)	88 (57.5)	137 (64.3)	83 (63.4)	118 (62.8)	101 (65.6)
Yes	57 (31.8)	66 (41.0)	58 (32.6)	64 (39.5)	59 (31.2)	65 (42.5)*	76 (35.7)	48 (36.6)	70 (37.2)	53 (34.4)
Hyperglycaemia/DM										
No	168 (93.9)	149 (92.0)	167 (93.8)	151 (92.6)	180 (94.7)	139 (90.8)	202 (94.4)	119 (90.8)	182 (96.3)	139 (90.3)
Yes	11 (6.1)	13 (8.0)	11 (6.2)	12 (7.4)	10 (5.3)	14 (9.2)	12 (5.6)	12 (9.2)	7 (3.7)	15 (9.7)*
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
sBP (mm/Hg)	123.1±14.47	124.6±17.67	123.1±15.64	124.5±16.48	122.3±15.08	125.7±17.06	124.5±15.52	122.5±15.81	123.8±15.36	123.6±16.89
dBP (mm/Hg)	79.3±9.34	79.8±13.17	78.6±9.30	80.6±13.09	78.4±9.25	80.9±13.28	79.4±9.78	79.7±13.33	78.9±9.83	80.2±12.82
Pulse	74.9±8.95	75.2±9.81	74.8±8.98	75.2±9.76	73.9±8.99	76.1±9.66*	74.4±8.21	75.7±10.81	75.1±9.10	74.7±9.71

*p<0.05, **p<0.001; ap=0.051.

p<0.05; where women with depressed mood had a 2.5-times higher risk of night sweats and the current smokers' risk was 1.8-times higher; at 95% CI 1.516–3.959 and 1.120–2.988, respectively. From all input parameters of age, menopausal status, depressed mood, sport, duration of menses and hypertension, only age and depressed mood were significant predictors of palpitations. Logistic regression also highlighted the effect of sport and depressed mood on dizzy spells; where women who did not participate in sport (B= –0.969) and depressed women (B=0.677) suffered from dizzy spells more often. Pins and needles in hands and feet were influenced by peri-/postmenopausal status (B=1.036), higher number of pregnancies (B=0.260) and depressed mood (B=0.505). Individuals with peri-/postmenopausal status had 2.8-times higher risk of pins and needles in their hands and feet, while risk of this affliction was1.3-times higher in

Table 5. Logistic regression, after control for age and menopausal status, the risk estimation of selected risk factors on physiological menopausal symptom incidence

Dependent variable	Covariates	ß	SE	p	Exp(ß)	95% CI for Exp(ß)	
Hot flushes	Variables in the equation						
n=312	Peri-, postmenopause	1.536	0.248	<0.001	4.648	2.859	7.556
	Depressed, down or blue	0.646	0.254	0.011	1.907	1.159	3.137
	Variables not in the equation: age, age of menarche, sport						
Night sweats	Variables in the equation						
n=315	Age	0.070	0.022	0.002	1.072	1.026	1.120
	Depressed, down or blue	0.896	0.245	<0.001	2.449	1.516	3.959
	Current smoking	0.604	0.250	0.016	1.830	1.120	2.988
	Variables not in the equation: menopausal status, sport						
Palpitations	Variables in the equation						
n=297	Age	0.055	0.023	0.016	1.057	1.010	1.106
	Depressed, down or blue	1.417	0.258	<0.001	4.126	2.487	6.844
	Variables not in the equation: menopausal status, sport, duration of menses, hypertension						
Dizzy spells	Variables in the equation						
n=318	Sport	–0.969	0.366	0.008	0.379	0.185	0.777
	Depressed, down or blue	0.677	0.240	0.005	1.969	1.229	3.153
	Variables not in the equation: menopausal status						
Pins/needles in hands/feet	Variables in the equation						
n=315	Peri-, postmenopause	1.036	0.242	<0.001	2.818	1.755	4.525
	Number of pregnancies	0.260	0.095	0.006	1.297	1.077	1.562
	Depressed, down or blue	0.505	0.244	0.039	1.657	1.026	2.675

Variables not in the equation: age, BMI, duration of menses, hyperglycaemia/DM.

the number of pregnancies and 1.7-times higher in depressed mood; at 95% CI 1.755–4.525, 1.077–1.562, 1.026–2.675, respectively.

Discussion

Our results revealed the effect of smoking on night sweats but we failed to detect its effect on hot flushes. We therefore partly confirmed the results reported by Gold et al. (2000) who determined that women smokers would be expected to have a higher prevalence of vasomotor symptoms then non smokers; perhaps due to anti-oestrogenic effects of smoking. On the other hand, Moilanen et al. (2010) reported that smoking was not related to vasomotor symptoms.

According to recent investigations, women with higher body weight have an increased risk of vasomotor symptoms (Whiteman et al. 2003, Gast et al. 2008, Gast et al. 2010). This may be due to the effect of increased insulation from body fat, resulting in elevated core body temperature which triggers hot flushes (Freedman 2002). A further study by Whiteman et al. (2003) revealed that high BMI over 30 kg/m² was associated with increased risk of hot flushes compared to low BMI under 24.9 kg/m². However, increased risks of hot flushes concomitant with increased BMI index-value occurred only in premenopausal and perimenopausal women. In our study, the effect of BMI was detected only for "pins and needles in hands and feet"; with a higher value recorded in women with current symptoms. However, this effect disappeared in logistic regression analysis following control for additional confounding factors such

as hyperglycaemia/DM and the number of pregnancies.

Several studies have reported associations between menopausal symptoms and reproductive factors. Gold et al. (2000) established that multiparity was positively associated with heart pounding and urine leakage, but it was not associated with hot flushes or vaginal dryness. We found a positive association between the number of pregnancies and pins and needles in the hands and feet. While Schwingl el al. (1994) related menarche before the age of 12 to a decreased prevalence in hot flushes, Staropoli et al. (1998) and Sabia et al. (2008) recorded an absence of association between age at menarche and hot flushes. Logistic regression in our study did not confirm this association, thus agreeing with the latter finding.

While Ivarsson et al. (1998), Gold et al. (2000) and Whiteman et al. (2003) endorsed the protective effect of regular physical activity; consistent with the production of hypothalamic B endorphin reported to stabilize thermoregulation, Sabia et al. (2008) established no such relationship. To this end, our regression analysis results confirmed only the positive effect of sport on the absence of dizzy spells.

Women who reported vasomotor symptoms were those who smoked, had lower socio-economic status and were more anxious and depressed. While Cohen et al. (2006) determined that increased risk of depression was greater in women with self-reported vasomotor symptoms, our findings show that menopausal symptoms have a close relationship with untreated subjective depressed mood.

Conclusion

Potentially modifiable factors such as current smoking, lack of sport, depressed mood, and number of pregnancies can predispose a woman to higher prevalence of physiological menopausal symptoms. Our results are central for early identification of women at risk of incurring adverse menopausal symptoms, and essential for developing appropriate prevention strategies including lifestyle modifications.

Author contribution

All authors contributed to data retrieval and management; LL, AM processed data and prepared manuscript; DS revised the manuscript.

Conflict of interests

The authors declare there is no conflict of interests.

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