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Menopausal symptoms and related factors among Cambodian women

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ABSTRACT

This study analyzed the prevalence and severity of menopausal symptoms and associated factors among Cambodian women. A cross-sectional study was performed with 200 women aged 40–60 years in three provinces and one urban area in Cambodia from July 2017 to August 2017. Three symptom categories: somatic, psychological, and urogenital symptoms (totaling 11 symptoms) related to menopause were assessed using the Khmer version of Menopause Rating Scale (MRS). Over one-fifth (21.5%) of the participants were premenopausal; 22.5% were perimenopausal, and 56% were postmenopausal. Somatic and psychological symptoms occurred more frequently than urogenital symptoms in all three statuses. The three most prevalent symptoms for all women were physical and mental exhaustion (88.1%), irritability (85.9%), and sleep problems (82.5%). The average MRS score was 12.22 ± 5.37 (range 0–44). Postmenopausal women had significantly higher rates of menopausal symptoms than pre- and perimenopausal women. Increased severity of menopausal symptoms was associated with less personal income (≤ 100 US\$), higher parity (>4 children), abortion(s), use of calcium supplements, and history of heart disease and rheumatoid arthritis. This study demonstrated a high prevalence of menopausal symptoms among Cambodian women in Cambodia. A multidisciplinary approach is needed to deal with independent factors associated with these symptoms.

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severity; symptom

Introduction

Menopause is an inevitable milestone among the middle-aged women. With women's increasing life expectancy, even in developing countries, one-third to one-half of a woman's lifetime can be spent as postmenopausal (McKinney et al. 2012). Therefore, the health issues of postmenopausal women have become a growing concern in the health-care community.

Menopausal symptoms are believed to be a result of the estrogen depletion as women approaches menopause (Rahman, Zainudin, and Mun 2010). They might also be related to metabolic changes and co-morbidities that occur in some midlife women (Burger et al. 2007) or the psychosocial behaviors and general health factors of women (Binfa et al. 2004). Menopause may lead to various symptoms, such as hot flashes, night sweats, fluctuations in memory, depression, sleep disturbances, vaginal dryness, bone loss, joint pain, weight gain, headache, and diminished libido (Joseph et al. 2014; Rahman, Zainudin, and Mun 2010; Yim et al. 2015).

The literature about the frequency and severity of these symptoms has varying results, along with differences in epidemiologic characteristics of the respondents and tools used (Islam et al. 2015; Punia, Lekha, and Punia 2017). Moreover, the prevalence and severity of menopausal symptoms differed by respondent's age, marital status, race/ethnicity, geographical location, presence of chronic disease, level and amount and type of physical activities, parity (greater with high parity), self-perception of health (greater with poor/fair), and menopausal status (Avis et al. 2001; El Shafie et al. 2011; Li et al. 2012; Yim et al. 2015). In India, the menopause rating scale (MRS) measured frequent somatic (joint and muscle aches) and psychological (physical and mental exhaustion) symptoms among premenopausal women and a high frequency of somatic symptoms (joint and muscle aches) among postmenopausal women (Joseph et al. 2014). In a study from Oman that used the MRS, somatic and psychological symptoms occurred more frequently than urogenital symptoms in all three menopause statuses (El Shafie et al. 2011). A Chinese study assessed menopausal women using the Kupperman Menopause Index and found that fatigue (40.84%) was the most frequent symptom reported (Li et al. 2012), while the Symptom Scorecard was used, and irritability (72.1%) was the most prevalent among women from Iran (Delavar and Hajiahmadi 2011).

It is crucial to study the factors that may alter the severity of menopausal symptoms because they may negatively affect the quality of their life (Utian 2007). Women around the world have reported multi-dimensional biological, psychological, and socio-cultural factors related to menopause that need equally multi-dimensional responses (Huffman et al. 2005). Cambodia is one of the countries with abundant social and cultural beliefs and traditions. According to a World Health Organization (WHO) study in 2015, the life expectancy of a Cambodian female at birth is 71 years, four more than that of their male counterparts (WHO 2015). Further, 12% of Cambodian women aged 30–49 years are approaching the menopausal transition (National Institute of Statistics, Directorate General for Health, and ICF International 2015).

Some women find the menopause transition barely noticeable, while others find it life altering (InformedHealth.org [Internet] 2016). To our knowledge, the prevalence and intensity of menopausal symptoms among Cambodian women have not been extensively explored. Considering that the issues related to menopause are complicated in terms of experience and severity, we sought to assess the menopausal symptoms experienced, their severity and associated factors among women in Cambodia. We aimed to contribute to an understanding of particular health needs of menopausal women and assist public health workers and policy makers in devising appropriate prevention or intervention programs for meeting such needs.

Methods

Study setting and participant recruitment

This cross-sectional study was conducted from July 2017 to August 2017 among 200 Cambodian women living in three rural provinces (Kandal, Kompong Speu and Kampong Chhnang) and one urban area (Phnom Penh) of the country. The eligibility criteria for the study included native women of age 40–60 years, with the ability to understand a questionnaire with the help of an interviewer and those who were mentally sound. Pregnancy or lactation, self-reported undiagnosed vaginal bleeding, and current and

gynecological cancer (breast, cervix or ovary) were the exclusion criteria. The estimated sample size was 194 as determined by using G*power 3.1.9.2; considering a maximum of 14 variables associated with the prevalence of menopause symptoms and symptom severity, a two-sided level of significance of 0.05, power 0.95, and an effect size of 0.15. The areas and participants were selected by convenience sampling. We collected information on the population statistics of these areas before starting the study and found that roughly 10% of the total population in each province were females in the age group 40–60 years (National Institute of Statistics 2009).

Permission from the village leaders was obtained prior to data collection. The interviews were conducted by a team of four (one interviewer for each interview) Cambodian research assistants (local female nursing students), who were trained twice through two workshops to read the questionnaire, explain it to the participant, and document the responses with accuracy. Team members approached all women in each selected community who were aged 40–60 years, through door-to-door home visits, and provided information about the study purpose and participation. Participation was voluntary and upon the willingness of women to participate, they were screened for eligibility. Each of the eligible participants then signed an informed consent before completing an interview. To accommodate the participants who were illiterate and to avoid the error that could arise due to the misunderstanding of the items in the tool, the questionnaires were read aloud to each of the participant instead of being self-administered. To maintain confidentiality, data were collected through an in-person interview in the privacy of each participant's house, and no any influence from family members or others throughout the interview was ensured. We approached 211 women for data collection. Out of them, 11 (5.2%) declined to participate and thus 200 women were finally recruited. On completion of each interview, we provided a small gift as a token of appreciation, although participants were not informed about this before the interview.

The Human Subjects Committee of the Chonbuk National University and the Cambodia National Ethics Committee for Health Research and the Ministry of Health, Cambodia reviewed and approved the study protocol prior to its initiation. All participants were provided descriptions of the nature and purpose of the study, informed that they could withdraw from the study at any time without stating a reason. No personal identification of participants were taken, and data remained anonymous. Considering the cultural sensitivity of sexual information, same-gender data collectors were allocated for data collection.

Measurements

Participants' characteristics

Participants were asked about general demographic characteristics (e.g., age, residence, education level, monthly personal income, smoking and drinking habits, etc.), reproductive history (e.g., age of menarche menopausal status, etc.), and disease/infection-related health characteristics (perceived health and life state, medical conditions such hypertension, etc.) using questions derived from a literature review (Chuni and Sreeramareddy 2011; Lee et al. 2010; Li et al. 2012; Makara-Studzińska, Kryś-Noszczyka, and Jakiel 2015). Participants expressed their perceived health and life status by answering questions on a Likert scale rating 0–10. The information about heights and weights for all the participants were themselves-reported. Following the completion of the questionnaires, body mass index

was calculated and categorized as per the WHO guidelines for Asian-Pacific Islanders as underweight ($<18.5 \text{ kg/m}^2$), normal ($18.5\text{--}22.9 \text{ kg/m}^2$), overweight ($23.0\text{--}24.9 \text{ kg/m}^2$) and obese ($\geq 25.0 \text{ kg/m}^2$) (WHO 2000).

Menopausal status definitions

We followed the guidelines of the Study of Women's Health Across the Nation (SWAN) to categorize participants into four groups based on menopausal status (Avis et al. 2001). Premenopausal was defined as reporting menses in the previous 3 months without any irregularity. Early perimenopausal was defined as having had menstrual bleeding in the previous three months but with increasing irregularity in cycle length over the past year, while late perimenopausal was categorized as no menses in the previous three months but having had menses in the previous 12 months. Women without any menses in the previous 12 months (not due to any medication, pregnancy, or severe weight loss) were classified as postmenopausal. Women who had a hysterectomy or oophorectomy were classified as surgical menopause, while women using menopausal hormone therapy were classified as menopausal hormone therapy users. The 23 women with surgical menopause or who were using menopausal hormone therapy were excluded from all but the initial descriptive analyses.

Menopausal symptoms

The standard tool 'Menopause Rating Scale' (MRS) was used as a tool for assessing participants' menopausal symptoms (Heinemann, Potthoff, and Schneider 2003). Because this was the first study of its kind in Cambodia of which we were aware, a Khmer version of the tool was developed. Two professional translators specializing in the health field created a Khmer translation of the MRS using the back-translation technique (Chen and Boore 2010) for quality control of translations. This translation was piloted and validated among 30 women of the study's targeted age group who were not included in the final study analysis. The tool and demographic variables were revised and confirmed after discussions and meetings between the authors and local women's health doctors and nurses from a Phnom Penh hospital.

The Menopause Rating Scale (MRS) tool includes 11 symptoms within three subscales: (1) somatic symptoms, which included items 1, 2, 3, and 11, covering hot flashes, heart discomfort, sleeping problems, and muscle and joint problems; (2) psychological symptoms, which included items 4–7 and covered depressive mood, irritability, anxiety, and physical and mental exhaustion; and (3) urogenital symptoms, which included items 8–10 and covered sexual problems, bladder problems, and vaginal dryness. Each item was scored as none = 0, mild = 1, moderate = 2, severe = 3, very severe = 4. A subscale score was obtained for each of the three categories by adding each item to the relevant category. In addition, a total score was obtained by summing all subscale scores, which could range between 0 and 44. Cronbach's α for the MRS scale was 0.88 for the Serbian version (Gazibara et al. 2015), 0.93 for the Chinese version (Wang et al. 2008) and for this Khmer version was 0.74.

Statistical analysis

Using SPSS Version 20.0, baseline demographic and anthropometric measures were described by descriptive statistics. A p value of <0.05 was considered statistically significant. Mean age and median age at menarche (16 years old), age at first pregnancy (22 years old), and parity (≤ 4) were used for analysis. Graphical observations and formal tests were used to test the normality of the data. Chi-square tests were used to compare categorical data. Parametric analysis of variance (ANOVA) with Duncan and multiple linear regression analysis were performed to determine factors associated with and the severity of menopausal symptoms. Multiple linear regression models 1, 2, 3 and 4 were employed for somatic, psychological, urogenital and total MRS symptoms, respectively. Based on literature reviews, confounding variables for the study were identified, and only those that were significant at $p < .05$ in bivariate analyses were entered into the multiple linear regression analyses. Goodness of fit was determined by whether the proportion of variance (r^2) accounted for the model was significant ($p < .05$).

Results

Of the total 200 women who participated in the study, 79 were between the ages of 40 and 50 years, and 121 were over 50 years old (Table 1). Although the SWAN guidelines had led to four menopausal status categories, early perimenopausal and late perimenopausal were combined into one perimenopausal group because of small numbers in each category so that 43 (21.5%) were in the premenopausal group, 45 (22.5%) in the perimenopausal group, and 112 (56%) in the postmenopausal group. The number of women who had had hysterectomies was 19 (9.5%), and such women were classified into post-menopausal status.

Most participants were from rural provinces (64.5%), earned $\leq \$100$ US monthly (64.5%), and were married (62.5%). Of the total, 22.5% were overweight, and 20% were obese, and the majority (61.5%) reported never exercising. Only 6 (3%) reported being current smokers, while 23 (11.5%) currently drank alcohol. Over half ($n = 103$, 51.5%) of the participants had menarche after 16 years of age. More than half (51.5%) had their first pregnancy at age 22 years or less; 124 participants (62.0%) had anywhere from 1 to 4 children. A total of 77 (38.5%) women reported having had abortion(s) (either natural or artificial) at least once. At the time of the study, only 48% were sexually active. Women taking oral contraceptives made up 47 (23.5%) of the participants, and 76 (38.5%) were taking calcium. A visual analog scale (0–10) rated participants' satisfaction with their own health with a mean of 5.49 ± 1.42 (SD) and satisfaction with their life with a mean of 5.42 ± 1.38 (SD). Among the major morbidities, the prevalence of hypertension was highest (20%), followed by rheumatoid arthritis (14.5%), and depression (4.0%), while the lowest prevalence was for diabetes (1.5%). Forty-nine (24.5%) of the women reported other diseases.

The three most frequently observed symptoms from the MRS were physical and mental exhaustion (88.1%), irritability (85.9%) and sleep problems (82.5%) (Table 2). The two most frequent symptoms reported within each of the subscales were: sleep problems (82.5%) and joint and muscular pain (79.7%) (included in somatic symptoms); physical and mental exhaustion (88.1%) and irritability (85.9%) (psychological symptoms); bladder problems (46.9%) and vaginal dryness (37.3%) (urogenital symptoms). Hot flushes were reported by

Table 1. Demographic and clinical characteristics by menopausal status (N= 200).

Characteristics	All (%) (N = 200)	Menopausal status (n, %)		
		Pre (n = 43)	Peri (n = 45)	Post (n = 112)
Socioeconomic condition				
Age group, years	40–50	79 (39.5)	31 (39.2)	12 (15.2)
	51–60	121 (60.5)	14 (11.6)	100 (82.6)
Residence	Phnom Penh	71 (35.5)	17 (23.9)	36 (50.7)
	Province	129 (64.5)	28 (21.7)	76 (58.9)
Education	Primary and below	140 (70.0)	25 (19.4)	89 (63.6)
	Above primary	60 (30.0)	26 (18.6)	23 (38.3)
Employment status	Employed	174 (87.0)	19 (31.7)	94 (54.0)
	Unemployed	26 (13.0)	41 (23.6)	18 (69.2)
Monthly personal income	≤100US\$	129 (64.5)	4 (15.4)	18 (16.2)
	>100US\$	71 (35.5)	22 (17.1)	92 (71.3)
Marital status	Married	125 (62.5)	23 (32.4)	19 (26.8)
	Unmarried	23 (11.5)	32 (25.6)	62 (49.6)
	Divorced/widowed/separately living	52 (26.0)	6 (26.1)	12 (52.2)
Body mass index (kg/m ²) ^a	Underweight	35 (17.5)	7 (13.5)	38 (73.1)
	Normal	80 (40.0)	4 (11.4)	28 (80.0)
	Overweight	45 (22.5)	21 (26.2)	40 (50.0)
	Obesity	40 (20.0)	9 (20.0)	26 (57.8)
Physical exercise	Never	123 (61.5)	13 (32.5)	18 (45.0)
	1–4 days/week	33 (16.5)	25 (20.3)	69 (56.1)
	5–7 days/week	44 (22.0)	9 (27.3)	21 (63.6)
Smoking	Yes	6 (3.0)	11 (25.0)	22 (50.0)
	No	194 (97.0)	0 (0.0)	5 (83.3)
Drinking	Yes	23 (11.5)	43 (22.3)	107 (55.2)
	No	177 (88.5)	5 (21.7)	11 (47.8)
Reproductive history				
Age at menarche	≤16	97 (48.5)	38 (21.5)	101 (57.1)
	>16	103 (51.5)	21 (21.6)	53 (54.6)
Age at first pregnancy, years	≤22	91 (51.5)	22 (21.4)	59 (57.3)
	>22	87 (48.9)	21 (23.1)	53 (58.2)
Parity	≤4	124 (62.0)	18 (20.7)	48 (55.2)
	>4	76 (38.0)	34 (27.4)	59 (47.6)
History of abortion(s)	Yes	77 (38.5)	11 (14.5)	53 (69.7)
	No	123 (61.5)	12 (15.8)	41 (53.2)
Sexually active	Yes	96 (48.0)	21 (27.3)	71 (57.7)
	No	104 (52.0)	28 (22.8)	37 (38.5)
			15 (14.4)	75 (72.1)

(Continued)

Table 1. (Continued).

Characteristics	All (%) (N = 200)	Menopausal status (n, %)		
		Pre (n = 43)	Peri (n = 45)	Post (n = 112)
Oral contraceptive use				
Yes	47 (23.5)	16 (34.0)	18 (38.3)	13 (27.7)
No	153 (76.5)	27 (17.6)	27 (17.6)	99 (64.7)
Menopausal hormone therapy use				
Yes	4 (2.0)	4 (100.0)	0 (0.0)	0 (0.0)
No	196 (98.0)	39 (19.9)	45 (100.0)	112 (100.0)
Calcium supplements use				
Yes	76 (38.0)	19 (25.0)	16 (21.1)	41 (53.9)
No	124 (62.0)	24 (19.4)	29 (23.4)	71 (57.3)
Surgical menopause				
Yes	19 (9.5)	0 (0.0)	0 (0.0)	19 (100.0)
No	181 (90.5)	43 (23.8)	45 (24.9)	93 (51.4)
Disease/infection related				
Perceived health status	5.49 ±1.42	5.95 ±1.19	5.42 ±1.53	5.33 ±1.44
Perceived life status	5.42 ±1.38	5.69 ±1.47	5.67 ±1.33	5.21 ±1.35
Hypertension				
Yes	40 (20)	2 (5.0)	5 (12.5)	33 (82.5)
No	160 (80.0)	41 (25.6)	40 (25.0)	79 (49.4)
Heart disease				
Yes	18 (9.0)	3 (16.7)	4 (22.2)	11 (61.1)
No	182 (91.0)	40 (22.0)	41 (22.5)	101 (55.5)
Diabetes				
Yes	3 (1.5)	1 (33.3)	0 (0.0)	2 (66.7)
No	197 (98.5)	42 (21.3)	45 (22.8)	110 (55.8)
Rheumatoid arthritis				
Yes	29 (14.5)	1 (3.4)	5 (17.2)	23 (79.3)
No	171 (85.5)	42 (24.6)	40 (23.4)	89 (52.0)
Depression				
Yes	8 (4.0)	3 (37.5)	2 (25.0)	3 (37.5)
No	192 (96.0)	40 (20.8)	43 (22.4)	109 (56.8)
Other diseases				
Yes	49 (24.5)	10 (20.4)	13 (26.5)	26 (53.1)
No	151 (75.5)	33 (21.9)	32 (21.2)	86 (57.0)

^a Underweight = <18.5 kg/m²; Normal = 18.5–22.9 kg/m²; Overweight = 23.0–24.9 kg/m²; Obese = ≥25.0 kg/m².

Table 2. Prevalence of menopausal symptoms by menopausal status (N= 177).^a

Menopausal symptoms (subscale)	All (%) (N = 177)	Premenopausal (n = 39)	Perimenopausal (n = 45)	Postmenopausal (n = 93)	χ^2	p
Somatic						
Hot flushes, sweating	118 (66.7)	27 (69.2)	31 (68.9)	60 (64.5)	0.41	.85
Heart discomfort	107 (60.5)	23 (59.0)	25 (55.6)	59 (63.4)	0.83	.68
Sleep problems	146 (82.5)	30 (76.9)	38 (84.4)	78 (82.9)	1.08	.61
Joint and muscular discomfort	141 (79.7)	23 (59.0)	34 (75.6)	84 (90.3)	17.29	<.001
Psychological						
Depressive mood	144 (81.4)	30 (76.9)	36 (80.0)	78 (83.9)	0.95	.64
Irritability	152 (85.9)	32 (82.1)	41 (91.1)	79 (84.9)	1.55	.51
Anxiety	142 (80.2)	27 (69.2)	36 (80.0)	79 (84.9)	4.28	.13
Physical and mental exhaustion	156 (88.1)	33 (84.6)	37 (82.2)	86 (92.5)	3.64	.19
Urogenital						
Sexual problems	54 (30.5)	15 (38.5)	13 (28.9)	26 (28.0)	1.51	.49
Bladder problems	83 (46.9)	17 (43.6)	16 (35.6)	50 (53.8)	4.26	.12
Dryness of vagina	66 (37.3)	9 (23.1)	15 (33.3)	42 (45.2)	6.13	.04

^a Women with surgical menopause or using menopausal hormone therapy was excluded in the analysis.

about two-thirds (67%) of the participants. While analyzing the prevalence of menopausal symptoms by menopausal status, physical and mental exhaustion was the most prevalent symptom among pre (84.6%) and postmenopausal women (92.5%), and the third most frequent symptom (82.2%) among perimenopausal women. In the premenopausal group, the next two most frequent symptoms were irritability (82.1%) and depressive mood and sleep problems (79.5% each); in the postmenopausal group, they were joint and muscular discomfort (90.3%) and irritability and anxiety (84.9%). Irritability (91.1%) and sleep problems (84.4%) were the two most frequent symptoms reported by women in perimenopause. The occurrence of joint and muscular discomfort ($\chi^2 = 17.29$, $p = <.001$) and vaginal dryness ($\chi^2 = 6.13$, $p = .04$) was higher in women who were postmenopausal than in those who were premenopausal. In general, an increased prevalence of menopausal symptoms was observed from pre- to peri- to postmenopausal status, especially from peri- to postmenopausal status. Overall, somatic and psychological symptoms occurred more frequently than urogenital symptoms in all three menopausal status groups.

A significant increasing trend in total and subscale scores was observed from one menopausal status stage to the next more advanced stage (Table 3). The total MRS score and each subscale score were significantly higher for those who had hypertension. Women over age 50 years and those of parity >4 reported significantly higher somatic, psychological, and total MRS scores than younger women and those of lower parity. Women who had lower monthly personal income ($\leq \$100$ US) had history of abortion(s), used calcium and had rheumatoid arthritis or depression had significantly higher somatic and psychological scores. Women who became pregnant for the first time at ≤ 22 years of age and those with heart disease had higher somatic and total scores, and married women had higher urogenital scores. No statistically significant associations were observed with other socio-demographic variables investigated in the study.

After adjusting for confounding factors (age, monthly personal income, marital status, age at first pregnancy, parity, history of abortion, having a surgical menopause, use of calcium supplements, and history of hypertension, heart disease, diabetes, rheumatoid arthritis, depression, and other chronic diseases), multivariate regression analysis revealed that menopausal transition stage was not significantly associated with the MRS subscale scores or total MRS scores (Table 4).

Table 3. Mean total and subscale MRS scores by participant characteristics.^{a,b}

		Frequency (n) (N = 177)	Somatic mean±SD	Psychological mean±SD	Urogenital mean±SD	Total MRS
Menopausal status						
	Premenopausal ^a	39	4.38 ±2.31	4.77 ±2.18	1.38 ±1.44	10.54 ±4.62
	Perimenopausal ^b	45	4.64 ±2.09	5.07 ±2.38	1.38 ±1.63	11.09 ±4.06
	Postmenopausal ^c	93	5.32 ±2.75	6.03 ±2.70	2.12 ±2.28	13.47 ±5.91
	F(p)		2.36 (0.10)	4.40 (0.01)	3.09 (0.05)	5.75 (<0.001)
	Duncan			c > a		c > a
Age group, years						
	40–50	72	4.36 ±2.29	5.01 ±2.48	1.57 ±1.63	10.94 ±4.85
	51–60	105	5.34 ±2.60	5.85 ±2.58	1.90 ±2.20	13.10 ±5.54
	t(p)		–2.58 (0.01)	–2.15 (0.03)	–1.10 (0.27)	–2.67 (0.01)
Monthly personal income						
	≤100 US\$	114	5.40 ±2.61	5.82 ±2.68	1.96 ±2.18	13.19 ±5.69
	>100 US\$	63	4.11 ±2.13	4.94 ±2.25	1.41 ±1.55	10.46 ±4.23
	t(p)		3.36 (0.001)	2.23 (0.03)	1.77 (0.08)	3.63 (<0.001)
Marital status						
	Unmarried ^a	22	4.45 ±2.44	4.77 ±2.43	0.82 ±1.44	10.05 ±4.88
	Married ^b	110	4.79 ±2.39	5.40 ±2.46	2.17 ±2.21	12.36 ±5.35
	Divorced/widowed/separately living ^c	45	5.56 ±2.82	6.13 ±2.78	1.24 ±1.30	12.93 ±5.46
	F(p)		1.96 (0.15)	2.38 (0.96)	6.73 (0.002)	2.28 (0.11)
	Duncan			c > a	b > a,c	c > a
Age at first pregnancy, years						
	≤22	85	5.51 ±2.58	6.04 ±2.68	2.01 ±2.00	13.55 ±5.47
	>22	73	4.52 ±2.41	5.16 ±2.40	1.75 ±2.11	11.44 ±5.14
	t(p)		2.46 (0.02)	2.14 (0.03)	0.79 (0.43)	2.49 (0.01)
Parity						
	≤4	107	4.46 ±2.26	4.95 ±2.19	1.59 ±1.69	11.00 ±4.44
	>4	70	5.69 ±2.73	6.36 ±2.86	2.04 ±2.37	14.09 ±6.11
	t(p)		–3.25 (0.01)	–3.49 (0.001)	–1.481 (0.14)	–3.64 (<0.001)
History of abortion(s)						
	Yes	69	5.46 ±2.46	6.06 ±2.30	2.12 ±2.37	13.64 ±5.12
	No	108	4.61 ±2.52	5.16 ±2.67	1.55 ±1.69	11.31 ±5.34
	t(p)		2.22 (0.03)	2.31 (0.02)	1.74 (0.08)	2.87 (0.01)
Calcium supplements use						
	Yes	67	5.54 ±2.68	6.22 ±2.67	1.93 ±1.73	13.69 ±5.23
	No	110	4.58 ±2.36	5.07 ±2.40	1.67 ±2.14	11.33 ±5.27
	t(p)		2.48 (0.01)	2.96 (0.003)	0.82 (0.42)	2.89 (0.004)
Hypertension						
	Yes	35	6.09 ±2.83	6.57 ±2.92	2.43 ±2.63	15.09 ±6.25
	No	142	4.66 ±2.37	5.25 ±2.41	1.61 ±1.78	11.51 ±4.90
	t(p)		3.06 (0.003)	2.79 (0.01)	0.06 (0.95)	3.15 (0.003)
Heart disease						
	Yes	15	7.13 ±2.83	7.00 ±3.98	1.80 ±1.66	15.93 ±6.92
	No	162	4.74 ±2.40	5.37 ±2.36	1.77 ±2.03	11.88 ±5.09
	t(p)		3.64 (<0.001)	1.56 (0.14)	0.06 (0.95)	2.86 (0.01)
Rheumatoid arthritis						
	Yes	25	6.68 ±2.79	6.72 ±2.97	1.96 ±1.99	15.36 ±6.26
	No	152	4.66 ±2.36	5.31 ±2.44	1.74 ±2.00	11.70 ±5.04
	t(p)		3.86 (<0.001)	2.59 (0.01)	0.52 (0.61)	3.24 (0.001)
Depression						
	Yes	8	6.38 ±1.19	7.63 ±2.07	1.25 ±1.58	15.25 ±3.20
	No	169	4.88 ±2.55	5.41 ±2.55	1.79 ±2.01	12.08 ±5.41
	t(p)		3.24 (0.01)	2.42 (0.02)	–0.75 (0.45)	1.64 (0.10)

^a Women with surgical menopause or using menopausal hormone therapy was excluded in the analysis.^b Total possible range of somatic score: 0–16; Total possible range of psychological score: 0–16; Total possible range of urogenital score: 0–12.

Table 4. Multivariate results for factors associated with MRS subscale scores.^d

Variables	Model 1			Model 2			Model 3			Model 4		
	β	t	p	β	t	p	β	t	p	β	t	p
Menopausal status ^a												
Perimenopause	-0.022	-0.263	.79	0.019	0.216	.83	-0.025	-0.256	.79	-0.011	-0.126	.90
Postmenopause	-0.040	-0.419	.68	0.111	1.126	.26	0.123	1.136	.26	0.080	0.851	.39
Monthly personal income ^b												
>100 US\$	-0.220	-2.944	.004	-0.093	-1.193	.23	-0.086	-1.016	.31	-0.180	-2.431	.02
Parity ^c >4	0.184	2.676	.008	0.213	2.982	.003	0.056	0.722	.47	0.209	3.075	.002
History of abortion(s)	0.200	2.986	.003	0.183	2.630	.009	0.156	2.053	.04	0.240	3.613	<.001
(Yes)												
Calcium supplements use (Yes)	0.155	2.330	.02	0.209	3.028	.003	0.067	0.891	.37	0.198	3.006	.003
Heart disease (Yes)	0.201	3.020	.003	0.115	1.665	.09	-0.016	-0.215	.83	0.144	2.178	.03
Rheumatoid arthritis (Yes)	0.251	3.714	<.001	0.152	2.168	.03	0.013	0.165	.86	0.195	2.922	.004
Constant		8.360	<.001		7.673	<.001		2.849	.005		9.035	<.001
Adj R ²	0.244			0.184			0.025			0.260		
F	4.803			3.356			1.947			4.600		
p	<.001			<.001			.02			<.001		

Confounding variables age, monthly personal income, marital status, age at first pregnancy, parity, history of abortion, artificial menopause, calcium supplements use, hypertension, heart disease, diabetes, rheumatoid arthritis, depression, and other diseases were controlled.

^aPremenopause as reference

^b≤100 US\$ as reference

^c≤4 as reference

^d Women with surgical menopause or using menopausal hormone therapy was excluded in the analysis.

The independent factors accounting for the variance in the severity of menopausal symptoms were lower monthly personal income, higher parity, history of abortion(s), use of calcium supplements, and history of heart disease or rheumatoid arthritis. Having a monthly personal income over \$100 US was associated with significantly lower somatic scores ($\beta = -0.220, p = .04$) and total MRS scores ($\beta = -0.180, p = .02$). Women with parity >4 were more likely to have higher somatic ($\beta = 0.184, p = .008$), psychological ($\beta = 0.213, p = .003$) and total MRS ($\beta = 0.209, p = .002$) scores than those with ≤ 4 children. Similarly, women with a history of abortion(s) had greater somatic ($\beta = 0.200, p = .003$), psychological ($\beta = 0.183, p = .009$), urogenital ($\beta = 0.156, p = .04$) and total MRS scores ($\beta = 0.240, p < .001$). Those who took calcium supplements had higher somatic ($\beta = 0.155, p = .02$), psychological ($\beta = 0.209, p = .003$) and total MRS ($\beta = 0.198, p = .003$) scores than non-users. Also, somatic ($\beta = 0.201, p = .003$), psychological ($\beta = 0.115, p = .09$) and total MRS ($\beta = 0.144, p = .03$) scores were higher among those with heart disease than those without. Lastly, history of rheumatoid arthritis was associated with higher somatic ($\beta = 0.251, p < .001$), psychological ($\beta = 0.152, p = .03$) and total MRS ($\beta = 0.195, p = .004$) scores. Also, 24%, 18% and 2% of total variance of the somatic, psychological and urogenital symptoms, respectively, was accounted for by the multivariate regression model.

Discussion

This study looked at the prevalence and severity of menopausal symptoms and their associated factors among middle-aged women in Cambodia. This study's participants were comparable with the population from which they were drawn. The percentage distribution of demographic measures, such as marital status, BMI, and educational attainment level were similar to those of the national female population; the majority of participants tended to have primary or below education level, were currently married and were less likely to be obese (77%, 61.88%, 4.2% vs. 70%, 62.5%, 20%, respectively) (National institute of statistics [2013](#); WHO [2016](#)). Echoing the results of a 2011 study of Omani women (El Shafie et al. [2011](#)), the present study found lower frequency of urogenital symptoms than somatic and psychological ones in all three menopause status groups. The two most prevalent symptoms were in the psychological subscale (of 177 participants, 156 had physical and mental exhaustion, 152 had irritability). Similar high rates were also seen in Nepal (Ghimire et al. [2015](#)).

When symptom experience within each menopause status was compared, physical and mental exhaustion was the most frequent symptoms among pre- and postmenopausal women, whereas irritability was the most frequent among those in perimenopause. Estrogen acts on the central nervous system (CNS) both through genomic and non-genomic mechanisms, influencing electrical excitability, synaptic function, and morphological features. Therefore, estrogen encompasses chemical and biochemical and genomic mechanisms (Hara et al. [2015](#); Morgan, Derby, and Gleason [2018](#)). Clinical evidence shows that, during the menopausal status, the decrease of estrogen in the limbic system gives rise to depressive moods, irritability, and anxiety (Genazzani et al. [2007](#)). Nevertheless, psychological symptoms in menopausal women are not generally caused by menopause alone (Harlow et al. [2017](#); Makara-Studzińska, Kryś-Noszczyka, and Jakiel [2015](#)). Although estrogen has a direct effect on the central nervous system, psychosocial factors are also significant triggers for the presence and intensity of menopausal symptoms and need to be considered during clinical assessment (Santoro, Epperson, and Mathews [2015](#)).

Moreover, estrogen exerts a positive effect over the urogenital system. The major female genital parts (vagina, vulva, urethra, and trigone of the bladder) all contain estrogen receptors and undergo atrophy when estrogen levels decrease, presenting symptoms such as vaginal dryness, dyspareunia, urinary frequency, repetitive urinary tract infections, and/or urinary incontinence (Castelo-Branco et al. 2005). In the present study, the prevalence of vaginal dryness was significantly higher among postmenopausal women (45.2%). About 50% of postmenopausal women report vaginal atrophy symptoms (Nappi et al. 2014), and dyspareunia leads to decreased interest in coitus. As the frequency of coitus diminishes, vaginal lubrication declines further. Further, the prevalence of joint and muscular discomfort in this study showed an increasing trend in peri- and postmenopause. Among participants, 79.7% reported having this symptom, with 90.3% of postmenopausal women reporting it. This was also reported as the most prevalent symptom in a study of women from 12 Latin American countries (Blumel et al. 2012), similar to the findings of a study conducted in India (Joseph et al. 2014). Overall hormonal changes or alterations in estrogen metabolism may be related to musculoskeletal symptoms being reported as one of the most frequent menopausal symptoms (Alexander et al. 2007; Magliano 2010). Hormone replacement therapy has been suggested to reduce muscular or joint pain (Magliano 2010).

Recently, a study of 442 women attending a clinic in China reported mean total MRS scores of 9.4 ± 6.7 , 16.1 ± 8.5 , and 18.0 ± 8.7 in pre-, peri- and postmenopausal women, respectively (Chou, Wun, and Pang 2014). Another study of 729 Nepalese women from health screening camps reported corresponding scores of 5.3 ± 3.8 , 12.3 ± 3.4 , and 16.2 ± 4.8 in the same groups, respectively (Chuni and Sreeramareddy 2011). Our study showed similar results (pre: 10.54 ± 4.62 , peri: 11.09 ± 4.06 , post: 13.47 ± 5.91). Thus, postmenopausal women presented the most severe symptoms when compared with pre- and perimenopausal women. Our study also found an increase in both somatic and psychological scores and total MRS scores with peri- and postmenopausal status, which may be explained by the decrease in estrogen production as ovaries age (El Shafie et al. 2011). Generally, menopausal symptoms are the consequences decline in ovarian function, but their presence and severity may vary due to sociocultural, lifestyle, racial/ethnic, and geographical aspects as well (Punia, Lekha, and Punia 2017).

In the multivariate analyses, when all control variables were included, menopausal status was not associated with somatic, psychological, urogenital and total MRS scores, although they were significant in the bivariate analyses, suggesting that menopausal symptoms are not just related to menopause status. Age, socio-demographic characteristics (income, education, race/ethnicity), chronic health conditions, psychosocial and lifestyle factors, and menopausal status are important determinants of the prevalence and severity of menopause symptoms (Lee et al. 2010; Makara-Studzińska, Kryś-Noszczyka, and Jakiel 2015). In the present study, increased severity of total menopausal symptoms was associated with lower personal income, higher parity, history of abortion(s), use of calcium supplements, and history of heart disease and rheumatoid arthritis in Cambodian midlife women.

The socio-demographic characteristics of menopausal women were related to symptom severity in this study. Older women reported significantly increased severity for total MRS, somatic, and physiological symptoms. As mentioned earlier, the reason behind this might be the aging of ovaries. As in the results from a recent study, lower economic status is associated with increased severity of symptoms (Thakur, Kaur, and Sinha 2019). Also, higher parity and

those with history of abortion were significantly associated with menopausal symptom severity, which is consistent with the results of other studies (Chuni and Sreeramareddy 2011; Li et al. 2012). This may be because women from low-income backgrounds often have higher parity. In contrast, wealthy women tend to use family planning methods to reduce the number of children they have. As mentioned in other studies (Li et al. 2012; Sierra, Hidalgo, and Chedraui 2005), women who are married, have a high number of children, are unemployed, and/or have limited financial resources might be under more stress and pressure, which may put them at risk of more severe symptoms.

The presence of comorbidities, such as hypertension, heart disease, rheumatoid arthritis, depression, and other diseases have also been found to be associated with increased severity of the MRS symptoms. The years adjoining menopause may be accompanied by an increase in blood pressure and high blood pressure may lead to complaints often attributed to menopause, suggesting that assessment of heart disease be the first priority when intervening women with perimenopausal symptoms (Maas and Franke 2009). The intake of calcium was associated with increased symptom severity among our participants, but the reasons for this finding are unclear and worthy of further research. Koo et al. found that obesity was associated with more severe menopausal symptoms among Korean women (Koo et al. 2017). Meanwhile, similar to our study, a Mexican study found no association between BMI and symptoms and thus need of further detail study on this inconsistency is needed (González-Carrillo et al. 2014).

The strength of this study was that it included many of the possible factors (variables) associated with the prevalence and severity of menopausal symptoms. Some limitations did exist, however. First, this was a cross-sectional design which did not permit assessment of the temporal and thus potentially casual relation of variables. Second, the convenience sampling used likely resulted in a non-representative sample which reduces the generalizability of findings. Third, the potential for social acceptability and reporting biases may have affected the accuracy of the study results. Further, questions regarding sociodemographic characteristics, reproductive and medical histories, and perceived health were drawn from items in the literature, rather than using standard questions, which may have resulted in misclassification of information and/or lack of comparability of results to those of prior studies that have used standard instruments. Fourth, the sample size may not have provided sufficient statistical power to detect some associations (e.g., categorized menopausal status) as statistically significant. Lastly, dietary habits of the participants were not considered in this study but have been found by some investigators to play a role in the occurrence of menopausal symptoms (Whelan, Jurgens, and Naylor 2009). Further research should attempt to elucidate the influence of diet on the occurrence of menopausal symptoms experienced by Cambodian women in all menopause status groups (Whelan, Jurgens, and Naylor 2009).

Conclusion

As elicited by the MRS scale, the results of the present study suggest that Cambodian women tended to be experiencing more somatic and psychological problems than urogenital problems. Analysis of the participants' characteristics illustrated that modifiable factors, such as lower personal income, higher parity, history of abortion(s), use of calcium supplements, and history of heart disease and rheumatoid arthritis were associated with menopausal symptoms. Initial results of this study provide an opportunity for further studies to detail the true prevalence of

menopausal symptoms in Cambodia. This study can inform health-care providers about the health needs of middle-aged women in Cambodia and suggest that they apply a multidisciplinary approach in assessing the unmet needs of menopausal women as well as implementing appropriate health educational programs. It would be beneficial to design special health centers for women to address the health problems of those entering or experiencing the menopausal transition to empower them and improve their quality of life. Further qualitative investigations would reflect more culturally sensitive views on the life situation of menopausal women.

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Author's contributions

All authors contributed to the design of the study and the interpretation of data. Roshna Thapa performed the data analysis and drafted the manuscript. Youngran Yang critically revised the draft manuscript and approved the final manuscript.

Disclosure statement

No potential conflict of interest was reported by the authors.

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