

ORIGINAL STUDY

Prevalence and risk factors for menopausal symptoms in middle-aged Chinese women: a community-based cross-sectional study

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Abstract

Objectives: To examine the prevalence and risk factors of menopausal symptoms in middle-aged Chinese women.

Methods: A cross-sectional, community-based study recruited 6,745 women aged 40 to 55 years in the eastern, central, and western regions of China during 2018. Menopausal status was categorized into reproductive stage (defined as regular menstruation or subtle changes in menstrual cycle characteristics), menopausal transition (the beginning of a persistent difference of 7 d in the length of consecutive cycles, or the last menstruation having occurred no more than 12 mo), or postmenopause (the end of the 12 mo period of amenorrhea) according to the Stages of Reproductive Aging Workshop classification. Menopausal symptoms were determined by the modified Kupperman Menopausal Index (KMI) questionnaire and considered nonmenopausal symptoms (total KMI score < 15) and menopausal symptoms (total KMI score ≥ 15). Demographic, lifestyle, physical, and menopausal characteristics were collected by face-to-face interviews. Logistic regression models were used to identify factors associated with the risk of menopausal symptoms.

Results: Among all participants, the mean age was 46.9 years, and 15.7% (1,001/6,364) of participants reported experiencing menopausal symptoms. The prevalence of menopausal symptoms was 9.3% (303/3,256), 23.9% (293/1,227), and 21.5% (405/1,881) in the reproductive stage, menopausal transition, and postmenopausal stage, respectively. Overall, the three most prevalent menopausal symptoms were insomnia (44.7%), fatigue (40.4%), and mood swings (37.2%). The multivariable logistic regression model showed that menopausal status, residence, nulliparity, and chronic diseases were associated with the risk of menopausal symptoms (all $P < 0.05$). Women during menopausal transition (OR = 2.66, 95% CI: 2.21-3.20) or postmenopause (OR = 2.26, 95% CI: 1.82-2.80) had significantly increased risk of menopausal symptoms compared with those in the reproductive stage.

Conclusions: Menopausal status, residence, nulliparity, and chronic diseases were associated with menopausal symptoms in middle-aged Chinese women.

Key Words: Menopausal symptoms – Menopause – Perimenopause – Postmenopause – Risk factors.

Menopause is a physiological event for women caused by failure of ovarian follicular function that leads to decreased secretion of ovarian hormones estrogen and progesterone.¹ The average age at natural

menopause was reported to be 48.8 years globally, ranging from 47.2 years in Latin America to 51.3 years in Australia.² With the rise in life expectancy, women spend more than one-third to one-half of their lifetime beyond the menopausal

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The study protocol was approved by the Ethical Review Committee of the Chinese Center for Disease Control and Prevention. Participants provided informed consent.

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transition.³ Therefore, attention to the process of menopause may contribute to improving menopause-related health conditions for middle-aged women. Prior research indicated that women during menopausal transition were more likely to experience various menopause-related symptoms including central nervous system-related disorders, urogenital and skin atrophy, sexual dysfunction, and weight, metabolic, cardiovascular, and musculoskeletal changes.⁴⁻⁷ Although the majority of menopausal symptoms are not life-threatening, they have an adverse influence on the social and work lives, and the quality of life of middle-aged women.^{4,8}

Previous epidemiologic studies have suggested that the prevalence of menopausal symptoms varies considerably among women of different ethnicities.⁴ For example, White women reported a high prevalence of vasomotor symptoms such as hot flashes and night sweats, while Asian women mostly suffered from physical and somatic symptoms such as headaches, body or joint pains, and sleeping problems.^{9,10} The Pan-Asian Menopause study investigated the prevalence of 18 menopausal symptoms in 9 Asian countries and suggested that the percentages of overall and individual menopausal symptoms differed among the ethnic groups, with the lowest overall rates reported by Indonesian women and the highest for Vietnamese women.¹⁰ In addition, several factors including menopausal status, socioeconomic status, lifestyle factors, and chronic conditions were identified to be associated with menopausal symptoms.^{4,11,12} An earlier longitudinal cohort study based on US women suggested that menopausal status exhibited the strongest association with vasomotor symptoms, followed by education background, anxiety symptoms, and smoking.¹¹ Another study indicated that increased abdominal adiposity was associated with elevated odds of menopausal symptoms.¹² Previous evidence for menopausal symptoms assessed by validated instruments mainly accumulated from Western countries; however, few large-scale epidemiological studies focused on Asian countries including China.

Therefore, the aim of the present study was to describe the prevalence of menopausal symptoms assessed by the Kupperman Menopausal Index (KMI) according to menopausal status in middle-aged Chinese women, and to examine the association of menopausal status and other influential factors with menopausal symptoms.

METHODS

Study design and participants

The National Survey of Women's Health is a cross-sectional, community-based study of women residing in three socioeconomic regions of China: eastern (Jiangsu and Shandong provinces), central (Hunan and Anhui provinces), and western (Shanxi and Sichuan provinces). Details of this study have been described elsewhere.¹³ Briefly, one urban and one rural area were selected as investigation sites in each province, and we recruited women aged 40 to 70 years by a multistage stratified random cluster sampling at each investigation site. Face-to-face interviews were conducted to collect information on demographic characteristics, medical history,

menopausal status, and symptoms (only collected in women aged 40-70 y) by using a structured questionnaire. Among 6,745 participants aged 40 to 55 years, the present analysis was limited to 6,364 participants. Those meeting the following criteria were excluded: incomplete data collection for menopausal symptoms ($n = 69$); women who had gynecological tumors ($n = 72$) or breast cancer ($n = 25$); women who took estrogen in the past 6 months ($n = 60$); and women who were in artificial menopause ($n = 200$). All participants provided written informed consent, and the study was approved by the Ethical Review Committee of the Chinese Center for Disease Control and Prevention.

Measurements

According to the 2011 Stages of Reproductive Aging Workshop + 10 criteria,¹⁴ menopausal status was categorized into 1) reproductive stage, defined as regular menstruation, or subtle changes in menstrual cycle characteristics; 2) menopausal transition, defined as the beginning of a persistent difference of 7 days in the length of consecutive cycles, or the last menstruation having occurred no more than 12 months; and 3) postmenopause, defined as the end of the 12 month period of amenorrhea.

The modified KMI in the Chinese version, which has been validated and widely used in China, was utilized to describe the severity and intensity of menopause symptoms.¹⁵ All of the following definitions and criteria were recommended by the *Chinese Obstetrics and Gynecology*.¹⁶ The KMI consists of 13 items including hot flashes, paresthesia, insomnia, mood swings, depression, dizziness, fatigue, arthralgia and myalgia, headache, palpitations, skin formication, sexual problems, and urinary tract infection. A scale ranging from 0 to 3 points is utilized to assess the severity of each item: 0, no symptoms; 1, mild symptoms; 2, moderate symptoms; and 3, severe symptoms. Each item was scored individually and multiplied by its weighting factor: hot flashes scored 4 points; paresthesia, insomnia, mood swings, sex life, and urinary tract infection scored 2 points each, and all other symptoms scored 1 point each. According to the total score of KMI that was calculated as the sum of all items by the weighting factors, participants were classified into two groups: nonmenopausal symptoms (total KMI score < 15) and menopausal symptoms (total KMI score ≥ 15).¹⁶ Further, the severity of menopausal symptoms was considered mild ($15 \leq$ total KMI score < 35) and moderate-to-severe (total KMI score ≥ 25).¹⁶ Cronbach's α was 0.87 in the present study.

Assessment of covariates

The interviewer-administered structured questionnaire was used to assess the information of all participants, as well as anthropometric parameters such as height, weight, and waist circumference. Covariates included age, residence, education, employment status, marital status, average monthly household income, drinking, smoking, regular physical activity, body mass index (BMI) categories, parity, and chronic diseases. Regular physical activity was defined as light to vigorous exercise of at least 20 minutes each time and at

least three times per week. BMI was calculated as the weight in kilograms divided by the square of height measured in meters, and classified into four groups according to the Chinese standard:¹⁷ underweight (BMI <18.5 kg/m²), normal weight (18.5 kg/m² ≤ BMI <24 kg/m²), overweight (24 kg/m² ≤ BMI <28 kg/m²), and obese (BMI ≥ 28 kg/m²).

Statistical analysis

Demographics characteristics were presented as numbers and frequency distributions for categorical variables, or median and interquartile range for continuous variables, and were compared using the chi-square test or Mann-Whitney *U* test. Generalized linear models were used to estimate mean KMI scores adjusted for age, and we further adjusted for residence, education, employment status, marital status, average monthly household income, and study sites. We first performed univariate logistic regression models to assess the association of menopausal status, and demographic, lifestyle, and physical factors with the presence of menopausal symptoms. Then, multivariate logistic regression models were conducted using variables associated with menopausal symptoms at the *P* ≤ 0.2

level in each univariate model to evaluate the independent effect of these potential variables on menopausal symptoms. Further, we conducted univariate and multivariate logistic regression models to examine the association of menopausal status with each individual menopausal symptom. In the multivariate models, we adjusted for age, residence, education, employment status, marital status, average monthly household income, drinking, smoking, regular physical activity, BMI categories, parity, chronic diseases, and study sites. The reproductive stage group was used as the reference groups. Analyses were conducted using SAS software version 9.4 (SAS Institute, Cary, NC). All *P* values are two-sided, and a 0.05 level was used to declare significant differences.

RESULTS

Characteristics of study participants

Among 6,364 women aged 40 to 55 years, the mean age was 46.9 years, and 15.7% (1,001/6,364) of participants reported to experience menopausal symptoms based on the total KMI score. Table 1 shows demographic characteristics of study participants according to menopausal status. Women

TABLE 1. Characteristics of participants by menopausal status

	Total	Reproductive stage	Menopausal transition	Postmenopause	<i>P</i> value
Participants, <i>n</i> (%)	6,364	3,256 (51.1)	1,227 (19.3)	1,881 (29.6)	
Age, y, median (IQR)	47 (43, 50)	44 (42, 47)	47 (44, 49)	52 (49, 54)	<0.001
Residence					0.005
Urban	3,159 (49.6)	1,650 (50.7)	558 (45.5)	951 (50.6)	
Rural	3,205 (50.4)	1,606 (49.3)	669 (54.5)	930 (49.4)	
Education					<0.001
High school and below	5,711 (89.7)	2,820 (86.6)	1,110 (90.5)	1,781 (94.7)	
College or graduate school	653 (10.3)	436 (13.4)	117 (9.5)	100 (5.3)	
Employment status					<0.001
Unemployed/retired	1,117 (17.6)	493 (15.1)	200 (16.3)	424 (22.5)	
Employed	5,247 (82.4)	2,763 (84.9)	1,027 (83.7)	1,457 (77.5)	
Marital status					<0.001
Married	5,881 (92.4)	3,069 (94.3)	1,109 (90.4)	1,703 (90.5)	
Single/divorced/widowed	483 (7.6)	187 (5.7)	118 (9.6)	178 (9.5)	
Average monthly household income, RMB					<0.001
<5,000	4,145 (65.1)	1,918 (58.9)	827 (67.4)	1,400 (74.4)	
5,000-10,000	1,953 (30.7)	1,182 (36.3)	355 (28.9)	416 (22.1)	
>10,000	266 (4.2)	156 (4.8)	45 (3.7)	65 (3.5)	
Drinking					0.003
No	5,648 (88.8)	2,873 (88.2)	1,068 (87.0)	1,707 (90.8)	
Yes	716 (11.2)	383 (11.8)	159 (13.0)	174 (9.2)	
Smoking					0.040
Not current smoker	6,188 (97.2)	3,175 (97.5)	1,180 (96.2)	1,833 (97.5)	
Current smoker	176 (2.8)	81 (2.5)	47 (3.8)	48 (2.5)	
Regular physical activity					0.533
No	3,857 (60.6)	1,957 (60.1)	760 (61.9)	1,140 (60.6)	
Yes	2,507 (39.4)	1,299 (39.9)	467 (38.1)	741 (39.4)	
BMI, kg/m ²					<0.001
<18.5	559 (8.8)	210 (6.4)	108 (8.8)	241 (12.8)	
18.5-23.9	3,460 (54.3)	1,955 (60.0)	606 (49.4)	899 (47.8)	
24-27.9	1,779 (28.0)	845 (26.0)	385 (31.4)	549 (29.2)	
≥28	566 (8.9)	246 (7.6)	128 (10.4)	192 (10.2)	
Parity					<0.001
0	130 (2.0)	76 (2.3)	30 (2.4)	24 (1.3)	
1-2	5,614 (88.2)	2,958 (90.9)	1,078 (87.9)	1,578 (83.9)	
≥3	620 (9.8)	222 (6.8)	119 (9.7)	279 (14.8)	
Chronic diseases					<0.001
No	5,254 (82.6)	2,923 (89.8)	963 (78.5)	1,368 (72.7)	
Yes	1,110 (17.4)	333 (10.2)	264 (21.5)	513 (27.3)	

Values are median (IQR) or *n* (%).

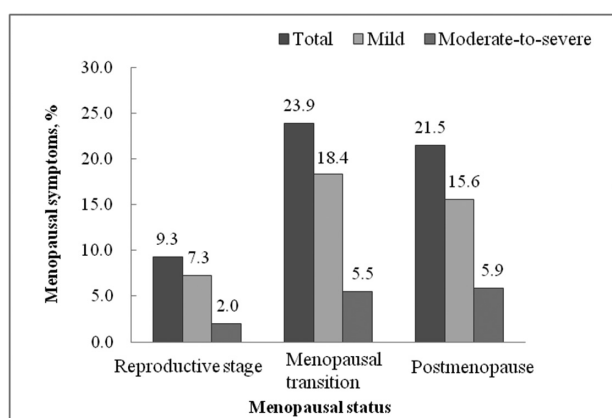


FIG. 1. Percentage of menopausal symptoms by menopausal status.

during menopausal transition were more likely to reside in rural areas, and to drink and currently smoke, and less likely to be married, and had higher rates of overweight and obesity (all $P < 0.05$). The postmenopausal women were older, and more

likely to have lower levels of education and lower average monthly household income, and less likely to be employed and nulliparous, and had a higher prevalence of chronic diseases (all $P < 0.05$).

The prevalence of menopausal symptoms by menopausal status

The prevalence of menopausal symptoms was 9.3% (303/3,256), 23.9% (293/1,227), and 21.5% (405/1,881) in the reproductive stage, menopausal transition, and postmenopausal stage, respectively (Fig. 1). 7.3% (238/3,256), 18.4% (226/1,227), and 15.6% (294/1,881) of women reported mild menopausal symptoms in the reproductive stage, menopausal transition and postmenopausal stage, respectively, while 2.0% (65/3,256), 5.5% (67/1,227), and 5.9% (111/1,881) reported moderate-to-severe menopausal symptoms in the reproductive stage, menopausal transition, and postmenopausal stage, respectively (Fig. 1).

Table 2 illustrates the proportion of each menopausal symptom by menopausal status. Among all participants, the three most prevalent menopausal symptoms were insomnia

TABLE 2. Individual menopausal symptoms by menopausal status

	Total (n = 6,364)	Reproductive stage (n = 3,256)	Menopausal transition (n = 1,227)	Postmenopause (n = 1,881)	P value
Hot flashes					<0.001
No	4,532 (71.2)	2,556 (78.5)	784 (63.9)	1,192 (63.4)	
Yes	1,832 (28.8)	700 (21.5)	443 (36.1)	689 (36.6)	
Paresthesia					<0.001
No	4,854 (76.3)	2,635 (80.9)	856 (69.8)	1,363 (72.5)	
Yes	1,510 (23.7)	621 (19.1)	371 (30.2)	518 (27.5)	
Insomnia					<0.001
No	3,518 (55.3)	2,044 (62.8)	604 (49.2)	870 (46.2)	
Yes	2,846 (44.7)	1,212 (37.2)	623 (50.8)	1,011 (53.8)	
Mood swings					<0.001
No	3,997 (62.8)	2,206 (67.8)	677 (55.2)	1,114 (59.2)	
Yes	2,367 (37.2)	1,050 (32.2)	550 (44.8)	767 (40.8)	
Depression					<0.001
No	5,197 (81.7)	2,785 (85.5)	930 (75.8)	1,482 (78.8)	
Yes	1,167 (18.3)	471 (14.5)	297 (24.2)	399 (21.2)	
Dizziness					<0.001
No	4,340 (68.2)	2,446 (75.1)	755 (61.5)	1,139 (60.6)	
Yes	2,024 (31.8)	810 (24.9)	472 (38.5)	742 (39.4)	
Fatigue					<0.001
No	3,795 (59.6)	2,090 (64.2)	657 (53.6)	1,048 (55.7)	
Yes	2,569 (40.4)	1,166 (35.8)	570 (46.4)	833 (44.3)	
Arthralgia and myalgia					<0.001
No	4,355 (68.4)	2,499 (76.8)	771 (62.8)	1,085 (57.7)	
Yes	2,009 (31.6)	757 (23.2)	456 (37.2)	796 (42.3)	
Headache					<0.001
No	4,070 (64.0)	2,261 (69.4)	735 (59.9)	1,074 (57.1)	
Yes	2,294 (36.0)	995 (30.6)	492 (40.1)	807 (42.9)	
Palpitations					<0.001
No	4,991 (78.4)	2,713 (83.3)	892 (72.7)	1,386 (73.7)	
Yes	1,373 (21.6)	543 (16.7)	335 (27.3)	495 (26.3)	
Skin formication					<0.001
No	5,700 (89.6)	3,004 (92.3)	1,062 (86.6)	1,634 (86.9)	
Yes	664 (10.4)	252 (7.7)	165 (13.4)	247 (13.1)	
Sexual problems					<0.001
No	5,021 (78.9)	2,843 (87.3)	899 (73.3)	1,279 (68.0)	
Yes	1,343 (21.1)	413 (12.7)	328 (26.7)	602 (32.0)	
Urinary tract infection					<0.001
No	5,412 (85.0)	2,853 (87.6)	986 (80.4)	1,573 (83.6)	
Yes	952 (15.0)	403 (12.4)	241 (19.6)	308 (16.4)	

P values were determined by using the chi-square tests.

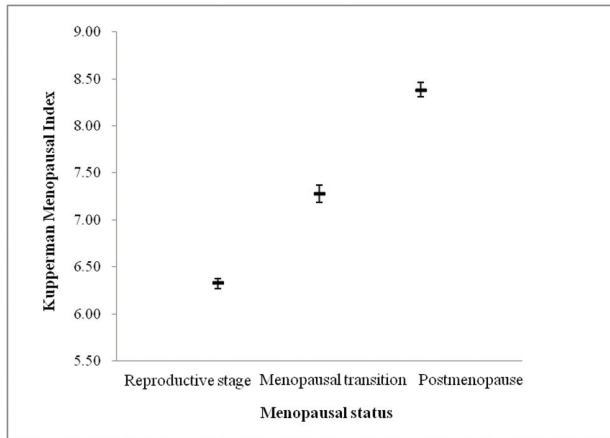


FIG. 2. Means and 95% CIs for total Kupperman index according to menopausal status. Adjusted for age, residence, education, employment status, marital status, average monthly household income, and study sites.

(44.7%), fatigue (40.4%), and mood swings (37.2%). In women during menopausal transition, the three most common menopausal symptoms were insomnia (50.8%), fatigue (46.4%), and mood swings (44.8%), whereas insomnia (53.8%), fatigue (44.3%), and headache (42.9%) were the three most bothersome symptoms among those in postmenopause. Overall, women during menopausal transition and postmenopause had a higher likelihood of each individual

menopausal symptom than those in the reproductive stage (all $P < 0.05$, Table 2).

Means of Kupperman Menopausal Index by menopausal status

The means for total KMI score progressively increased from reproductive stage to postmenopause after adjusting for age (P for trend < 0.001). After multiple adjustment, postmenopausal women had the highest total KMI score (mean = 8.38, 95% CI: 8.31-8.46), and women during menopausal transition had relatively higher total KMI score (mean = 7.28, 95% CI: 7.19-7.37), compared with women in reproductive stage (mean = 6.33, 95% CI: 6.27-6.38) (Fig. 2 and Supplementary Table 1, <http://links.lww.com/MENO/A809>).

Association of menopausal status and demographic, lifestyle, and physical factors with menopausal symptoms

The unadjusted ORs (95% CIs) of potential associated factors by the presence of menopausal symptoms are shown in Table 3 and Supplemental Table 2, <http://links.lww.com/MENO/A809>. Age, menopausal status, residence, average monthly household income, BMI categories, parity, and chronic diseases were associated with menopausal symptoms in unadjusted models (all $P < 0.05$).

A multivariate logistic regression to evaluate independent associated factors for menopausal symptoms using potential

TABLE 3. Association of risk factors with menopausal symptoms

	Univariable analysis		Multivariable analysis	
	<i>P</i> value	OR (95% CI)	<i>P</i> value	OR (95% CI)
Age (per year)	<0.001	1.07 (1.05-1.08)	0.627	1.01 (0.98-1.03)
Menopausal status	<0.001		<0.001	
Reproductive stage		Ref		Ref
Menopausal transition		3.06 (2.56-3.65)		2.66 (2.21-3.20)
Postmenopause		2.67 (2.28-3.14)		2.26 (1.82-2.80)
Residence	<0.001		0.001	
Urban		Ref		Ref
Rural		1.14 (1.02-1.28)		1.29 (1.10-1.50)
Employment status	0.140		0.183	
Unemployed/retired		Ref		Ref
Employed		0.88 (0.74-1.04)		0.88 (0.73-1.06)
Average monthly household income, RMB	<0.001		0.754	
<5,000		Ref		Ref
5,000-10,000		0.74 (0.63-0.86)		0.98 (0.83-1.15)
>10,000		0.66 (0.45-0.97)		0.86 (0.58-1.28)
Smoking	0.081		0.309	
Not current smoker		Ref		Ref
Current smoker		1.39 (0.96-2.02)		1.22 (0.83-1.81)
BMI categories	0.006		0.709	
Underweight (<18.5 kg/m ²)		1.35 (1.07-1.71)		1.06 (0.82-1.36)
Normal weight (18.5-23.9 kg/m ²)		Ref		Ref
Overweight (24-27.9 kg/m ²)		1.22 (1.04-1.43)		1.09 (0.93-1.29)
Obese (≥28 kg/m ²)		1.32 (1.04-1.67)		1.10 (0.86-1.41)
Parity	0.009		0.087	
0		1.53 (1.01-2.34)		1.60 (1.02-2.50)
1-2		Ref		Ref
≥3		1.31 (1.06-1.62)		0.92 (0.73-1.16)
Chronic diseases	<0.001		<0.001	
No		Ref		Ref
Yes		2.25 (1.92-2.62)		1.81 (1.53-2.14)

Values are odds ratios (95% confidence intervals).

variables ($P \leq 0.2$ in each univariate model) was presented in Table 3. In the multivariable model, menopausal status, residence, nulliparity, and chronic diseases were independently associated with the risk of menopausal symptoms (all $P < 0.05$). Women in menopausal transition (OR = 2.66, 95% CI: 2.21-3.20) and postmenopause (OR = 2.26, 95% CI: 1.82-2.80) were more likely to experience menopausal symptoms compared with those in the reproductive stage. Women residing in rural areas had greater odds of menopausal symptoms compared with those living in urban areas (OR = 1.29, 95% CI: 1.10-1.50). Nulliparous women were more likely to suffer from menopausal symptoms than those having one or two births (OR = 1.60, 95% CI: 1.02-2.50). Women who reported having chronic diseases had a higher likelihood of menopausal symptoms compared with those without chronic diseases (OR = 1.81, 95% CI: 1.53-2.14). Moreover, we further evaluated the interaction between age and menopausal status, residence, parity, and chronic diseases for the risk of menopausal symptoms. Results were generally consistent pertaining to associations of age with the risk of menopausal symptoms across different groups of menopausal status, residence, and chronic diseases, respectively, except for parity (data not shown).

We subsequently examined the association between menopausal status and individual menopausal symptoms (Supplementary Table 3, <http://links.lww.com/MENO/A809>). After adjustment for potential confounders, menopausal transition and postmenopausal stage were associated with higher risk for each individual menopausal symptom than during the reproductive stage.

DISCUSSION

In this large-scale cross-sectional study of Chinese women aged 40 to 55 years, 15.7% of women reported experiencing menopausal symptoms, and 9.3%, 23.9%, and 21.5% of women experienced menopausal symptoms during the reproductive stage, menopausal transition, and postmenopause, respectively. We observed that the three most bothersome menopausal symptoms were insomnia, fatigue, and mood swings. In addition, we also found that menopausal status, residence, nulliparity, and chronic diseases were associated with the risk of menopausal symptoms.

In this study, 15.7% of participants experienced menopausal symptoms assessed by the modified KMI, and 11.9% and 3.8% of women reported mild and moderate-to-severe menopausal symptoms, respectively. Several earlier epidemiologic studies conducted in different areas of China also examined the prevalence of menopausal symptoms. A previous cross-sectional study involving 1,054 middle-aged women in Zhejiang province, a southeast region of China, also used the modified KMI to measure the presence of menopausal symptoms and reported a prevalence of 21.6%.¹⁸ Another cross-sectional study performed in 9,939 women from Guangdong province located in Southern China indicated that 77.2% of respondents suffered from menopausal symptoms.¹⁹ This discrepancy might be partly due

to regional differences and using different measurement instruments for menopausal symptoms.

Our findings are also in line with the results of previous Chinese studies in women from Guangdong, Zhejiang, and Hong Kong and other Asian studies from Japan, Korea, and Singapore indicating that the most frequently reported menopausal symptoms in midlife women focused on somatic symptoms including insomnia and fatigue.¹⁸⁻²³ The most common symptom reported in this study was insomnia with the prevalence of 44.7% that was higher in a cross-sectional study based on northern Chinese populations (32.1%) and lower than a survey in Beijing middle-aged nurses (58.9%).^{24,25} The second most prevalent symptom was fatigue (40.4%), and the rate of fatigue reported in our study was slightly higher than a survey conducted in Guangdong (37.2%) and lower than that reported based on Zhejiang populations (46.1%).^{18,19} The third most predominant symptom was mood swings with a rate of 37.2% that was similar to that reported in Japanese populations (38.8%).²⁶

In contrast to findings from most Asian studies, the most predominant menopausal symptom reported by Western women was vasomotor symptoms, such as hot flashes and night sweats.¹⁰ The Study of Women's Health Across the Nation (SWAN) based on multiethnic US communities indicated that 60% to 80% of women experienced vasomotor symptoms during menopausal transition with the highest rates reported in African Americans,²⁷ whereas the prevalence of hot flashes reported by women during menopausal transition in our study was only 36.1%. This disparity between Asian and Western women might be partly interpreted by ethnic differences, and the difference in health behaviors such as smoking, dietary factors, and physical activity, and the prevalence of obesity and other social and demographic factors.²⁷

In addition, we also found that several factors including menopausal status, residence, chronic diseases, and symptoms of anxiety and depression were associated with menopausal symptoms. In concordance with our results demonstrating that women in menopausal transition or postmenopause were more likely to suffer from menopausal symptoms, a cross-sectional study including 2,201 Korean women aged 44 to 56 years suggested that menopausal status was associated with the risk of menopausal symptoms based on vasomotor, psychosocial, physical, and sexual symptoms related to menopause.²⁰ The SWAN involving five ethnic groups also demonstrated that menopausal status was strongly related to vasomotor symptoms.¹¹ Moreover, we observed that women in menopausal transition had the highest rate of menopausal symptoms (23.9%), followed by postmenopausal women (21.5%), and the rates of both were significantly higher than that of women in reproductive stage (9.3%), which also support the associations between menopausal status and symptoms.

Furthermore, we observed that women residing in rural areas had 18% higher risk of menopausal symptoms compared with those living in urban areas. In contrast, another cross-section study recruiting 1,054 midlife women in

southeast China indicated that women living in rural or suburban areas were less likely to experience menopausal symptoms than those living in urban areas.¹⁸ The relationship between place of residence and menopausal symptoms remains controversial, and might be affected by several factors, such as social and personal attitude toward aging and menopause, knowledge of menopausal symptoms, and awareness of treatment for menopausal symptoms.²⁸

The findings of the current study agree with the results of earlier studies reporting that nulliparity was associated with menopausal symptoms.²⁹⁻³² Our study showed that nulliparous women were more likely to experience menopausal symptoms compared with those having one or two births, which was consistent with a recent cross-sectional study conducted in Northwest China indicating that women with nulliparity appeared to have higher risks of menopausal syndrome.²⁹ Compared with women having one or two births, nulliparous women in our study were less likely to have regular physical activity, and reported lower levels of average monthly household income. However, our findings differ from results in SWAN, which found that nulliparous women had lower odds of menopausal symptoms.³² Inconsistent results might be partly due to disparity in menopausal status and socioeconomic factors of study participants.

The main strengths of this study include a relatively large sample size, and the assessment of menopausal symptoms by using a validated instrument, and adjustment for potential confounding factors comprehensively. There are several limitations to be noted. First, due to the cross-sectional study design, we are unable to determine the causality between menopausal symptoms and their risk factors such as chronic diseases and symptoms of anxiety and depression. Second, our data only consisted of Chinese Han population, which limited the generalizability of the results to middle-aged women of other ethnic groups. Finally, we lacked the data on hormones such as follicle-stimulating hormone, estrogen, and progesterone, so we cannot evaluate the influence of hormone levels on menopausal symptoms in middle-aged women.

CONCLUSIONS

In summary, our study indicated that women in menopausal transition or postmenopause were more likely to suffer from menopausal symptoms than those in the reproductive stage. We found that menopausal transition and postmenopause, residing in rural areas, the presence of chronic diseases, and symptoms of anxiety and depression were significant risk factors for menopausal symptoms in middle-aged Chinese women. Our findings emphasize the importance of paying more attentions to the management of menopausal symptoms among women who were in menopausal transition or postmenopause, and resided in rural areas, and had chronic diseases, and experienced symptoms of anxiety and depression. Further studies are needed to confirm our findings and to explore the potential mechanisms underlying the relationship

between menopausal symptoms and their contributing factors in middle-aged women.

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