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# The influence of educational level in peri-menopause syndrome and quality of life among Chinese women

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## ABSTRACT

**Objective:** To investigate the influence of education level in the peri-menopausal symptoms and quality of life (QoL) among Chinese women.

**Methods:** We carried out a cross-sectional study of 1632 peri-menopausal women (age 40–60 y) who visited Hangzhou Women's Hospital from November 2018 to November 2019. The menopausal symptoms were evaluated by modified Kupperman index (KI). World Health Organization Quality of Life (WHOQOL-BREF) questionnaire was used to evaluate the QoL.

**Result:** In total, 1501 women were included in the analysis. The mean age of natural menopause was 49.63 years in China. The five most frequent symptoms in menopausal women were Hot flash (75.53%), sexual problems (72.62%), insomnia (67.29%), fatigue (65.56%), and irritability (61.89%). Natural menopausal age, parity, BMI, bone mineral density, depression, skin formication, total score of KI, and the score of WHOQOL-BREF questionnaire were different in different educational background women ( $p < .05$ ).

**Conclusions:** The results of the study suggest that education level is associated with the age of natural menopause and menopausal symptoms. A high educational level is correlated with a better score of WHOQOL-BREF in peri-menopause women.

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Menopause; estrogens; ovary

## Introduction

Menopause is caused by depletion of estrogen level, which is the representation of natural cessation of menstruation for more than 12 months and the end of reproductive career in women [1,2]. The aging ovaries lead to the dysfunction of hypothalamic-pituitary-ovary axis, followed by a decline in the production of estradiol and progesterone [3]. During this period, women may suffer from related physical and mental symptoms with a dramatically impact upon the overall quality of life (QoL) [4,5]. With the increase in life expectancy, women are expected to spend 20–30 years in a menopausal state [6]. There are currently 120 million menopausal women in China, and an estimated 280 million women will enter menopause in 2030, at the same time, the population of peri-menopausal or postmenopausal women around the world will be 1.2 billion as anticipated [7].

Among Chinese women, the average age of menopause is estimated to be 49 years, which is low compared to women in UK [8]. Factors influencing natural age of menopause range from nutrition, lifestyle to certain medical disorders. Educational level may also have an effect on age of menopause since there is relationship between educational level and reproductive factors such as pregnancy, lactation, and other lifestyle factors [9].

Fifty percent to 80% of women disturbed by menopausal symptoms such as hot flashes, night sweats, sleep disturbances, tiredness, and depression [5]. With the acceleration of the aging women population in the world, peri-menopausal syndrome has attracted world attention. World Health Organization (WHO)

defines QoL as 'an individual's perception of their position in life, in the context of the culture and value system in which they live, and in relation to their goals, expectations, standards, and concerns' [10]. QoL in peri-menopausal women has become an essential component in clinical practice.

Purpose of this study was to investigate the influence of education level on menopausal symptoms and QoL in peri-menopausal women of China.

## Materials and methods

### Participants

After approval of ethics review board of the hospital, we conducted a cross-sectional study included 1632 Chinese peri-menopausal women aged 40–60 years at the Department of Gynecology, Hangzhou Women's Hospital, People's Republic of China, between November 2018 to November 2019 ( $N = 1632$ ; participation rate, 91.97%). The study population was recruited among women newly attending the outpatient clinic who were naïve to treatment with hormone replacement therapy or any traditional Chinese medicine indicated for menopause. One thousand five hundred and one peri-menopausal women were included in our study. The level of education was categorized in three groups according to the highest qualification received, no education and elementary (6 years or less, Group 1 = 152 patients), high school (7–12 years, Group 2 = 802 patients), and university (13 years or more, Group 3 = 574 patients).

**Table 1.** Reproductive and personal characteristics among 1501 peri-menopausal women according to education level.

	No education and elementary (Group 1 = 152)	High school (Group 2 = 802)	University (Group 3 = 547)	$\chi^2/F$	<i>p</i>
Age (years), <i>n</i> (%)				10.70	>.05
40–45	20 (13.2)	136 (17.0)	92 (16.8)		
45–50	54 (35.5)	291 (36.3)	216 (39.5)		
50–55	66 (43.4)	280 (34.9)	196 (35.8)		
55–60	12 (7.9)	95 (11.8)	43 (7.9)		
Age at menopause (years)	48.63 ± 3.35	49.80 ± 3.54 <sup>a</sup>	49.73 ± 3.24 <sup>ab</sup>	4.48	<.05*
Number of abortions	3.01 ± 1.03	2.89 ± 1.27	2.76 ± 1.35	3.55	<.05*
Number of pregnancies	1.68 ± 0.85	1.14 ± 0.41	0.97 ± 0.36	142.38	<.01*
History of hypertension, <i>n</i> (%)	20 (13.2)	121 (15.1)	73 (13.3)	0.97	>.05
BMI (kg/m <sup>2</sup> )	23.00 ± 3.04	22.50 ± 2.94	22.20 ± 2.94	4.80	<.01*
WHR	0.90 ± 0.05	0.90 ± 0.09	0.89 ± 0.09	0.84	>.05
Income (RMB/month), <i>n</i> (%)				276.23	<.01*
<3000	60 (39.5)	64 (8.0)	6 (1.1)		
3000~	55 (36.2)	428 (53.4)	207 (37.8)		
5000~	37 (24.3)	310 (38.7)	334 (61.1)		
Smoking, <i>n</i> (%)				7.83	>.05
Never use	134 (88.2)	738 (92.0)	497 (90.9)		
Currently smoker	6 (3.9)	11 (1.4)	6 (1.1)		
Ex-smoker	12 (7.9)	53 (6.6)	44 (8.0)		
Alcohol, <i>n</i> (%)				11.33	<.05*
Frequently	20 (13.2)	96 (12.0)	44 (8.0)		
Very rare	23 (15.1)	75 (9.4)	63 (11.5)		
Never use	109 (71.7)	631 (78.6)	440 (80.5)		
Physical activity, <i>n</i> (%)				97.80	<.01*
Never	74 (48.7)	150 (18.7)	138 (25.3)		
1–2 times per month	11 (7.3)	171 (21.3)	63 (11.5)		
1–2 times per week	18 (11.8)	134 (16.7)	138 (25.2)		
>3 times per week	49 (32.2)	347 (43.3)	208 (38.0)		
BMD, <i>n</i> (%)				19.25	<.01*
Normal bone density	82 (53.9)	416 (51.9)	346 (63.3)		
Osteopenia	41 (27.0)	233 (29.0)	132 (24.1)		
Osteoporosis	29 (19.1)	153 (19.1)	69 (12.6)		

\*Statistically significant difference among three; <sup>a</sup>Statistically significant difference versus no education and elementary women; <sup>b</sup>Statistically significant difference versus high school women.

### Date collection

The survey was designed to obtain information on demographics, reproductive history, presence of menopausal symptoms, medical and family history, and health behaviors, including smoking and alcohol use. Women were also asked to provide detailed characteristics of their peri-menopausal symptoms. Trained interviewers carried out the survey.

The questionnaire contained the following information: (1) general information; (2) peri-menopausal syndrome status evaluated by modified Kupperman index (KI). For each symptom, the KI score ranges from 0 to 3 (none, mild, moderate, and severe, respectively). The total score ranges from 0 to 63, calculated as the sum of all items by the weighting factor. Scores ranging from 0 to 6, 7 to 15, 16 to 30, and 30 were used to rate the degree of severity as none, mild, moderate, and severe, respectively [11]. (3) QoL and general health were evaluated by the World Health Organization Quality of life (WHOQOL-BREF) questionnaire. It is an abbreviated version of the WHOQOL-100 QoL assessment. There are a total of seven items in the physical domain, six in the psychological domain, three in the social domain, and eight in the environmental domain. Higher scores denote higher QoL.

### Anthropometric

The participant was weighted without shoes in street clothing. Height was measured without shoes. The body mass index (BMI; kg/m<sup>2</sup>) was calculated using those results [12]. Waist circumference was defined as the minimal distance around the torso

between the costal margin and the iliac crest. Hip circumference was measured at the fullest part of the hips. Blood pressure was measured with a standard mercury sphygmomanometer.

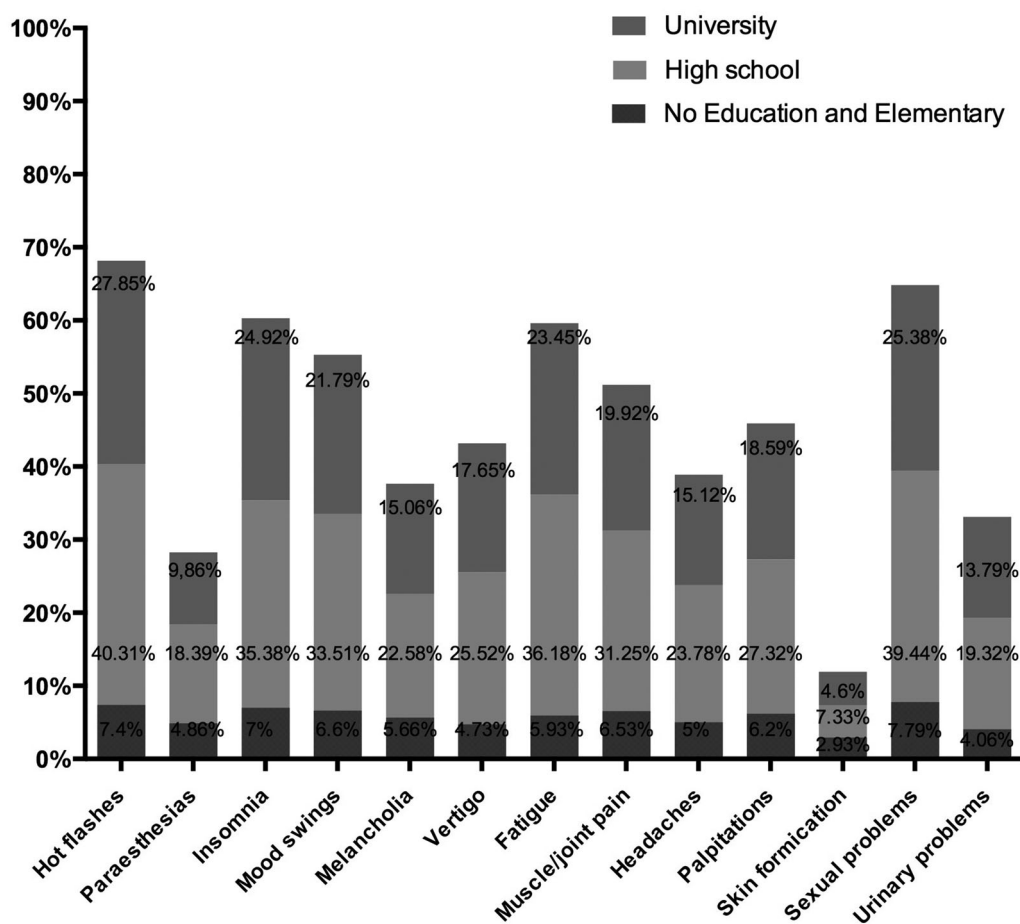
Bone mineral density was measured by dual-energy X-ray absorptiometry (DXA, Discovery QDR 4500 A series, Hologic, Waltham, MA), lumbar segment 1–4 and femoral sites were measured in slow mode and supine position. According to the WHO, osteoporosis was defined as the bone mineral density value more than 2.5 SD below the *T*-score.

### Statistical analysis

Microsoft Excel 2003 and Statistical Package for the Social Science version 21.0 were used to analyze data. Data were statistically described in terms of mean, standard deviation, frequencies (number of cases), and percentages. For quantitative variables, Student *t* test and analysis of variance were used to test significance of difference and for categorical data Chi square test was performed. A probability value (*p* value) less than .05 was considered statistically significant.

### Results

A total of 1632 women agreed to participate in the study but only 1501 completed the questionnaires (91.97%). One hundred and thirty-one subjects (8.02%) were ineligible owing to the following reasons: basic information collection and laboratory test results were not complete, modified KI form completion rate <90%. The mean age of the women was 49.96 ± 4.32 years, height



**Figure 1.** Prevalence of climacteric symptoms among 1051 female study respondents between 40 and 60 years of age.

ranged from 145.0 to 174.5 cm, weight ranged from 37.7 to 84.0 Kg. The median BMI and Waist-to-hip ratio were 22.06 kg/m<sup>2</sup> (range, 16.21–38.46 kg/m<sup>2</sup>) and 0.89 (range, 0.7–1.65), respectively.

Their reproductive and demographic characteristics among 1501 women according to education level were shown in Table 1. When comparing the age at menopause, the least educated women showed a statistically significant earlier age than that of the other groups ( $p < .05$ ). The mean ages of three groups were  $48.63 \pm 3.35$ ,  $49.80 \pm 3.54$ , and  $49.73 \pm 3.24$ , respectively ( $p < .05$ ). There was no significant difference between Group 2 and Group 3.

There was a significant difference with respect to number of abortions and pregnancies among three groups ( $p < .05$ ) and number of abortions and pregnancies was higher in Group 1 and 2 than those of Group 3 ( $p < .05$ ). Number of abortion and pregnancies of Group 3 was  $2.76 \pm 1.35$  and  $0.97 \pm 0.36$  (Table 1). Compared with Group 1 and Group 2, Group 3 had higher income, higher BMI, less alcohol intake, more physical activity, and higher bone mineral density values ( $p < .05$ ). There was no significant difference among all groups with respect to age, waist-to-hip ratio, history of hypertension and smoking ( $p > .05$ ; Table 1).

As shown in Figure 1, the five most common symptoms which were experienced by women in the 40–60 years of age were hot flashes (75.56%), sexual problems (72.61%), insomnia (67.30%), vertigo (65.56%), and mood swings (61.90%).

The modified KI score was significant higher in Group 1 than that of other groups ( $p < .05$ ; Table 2). The mean modified KI

score of three groups was  $21.05 \pm 10.34$ ,  $17.89 \pm 9.50$  and  $16.82 \pm 9.22$ , respectively. Compared with Group 1 and Group 2, Group 3 had a lower prevalence of paraesthesias, melancholia and skin formation ( $p < .05$ ; Table 2).

Regarding the assessment of QoL, it was estimated that among all 1501 participants, social relationships domain showed the highest score (68.07), while psychological and environmental domains showed the lowest scores (49.76 and 63.50; Table 3). Comparing the three groups according to education level, it was found that Group1 had the lowest scores in overall all domains with statistically significant difference ( $p < .05$ ; Table 3), while Group3 showed the highest scores in all domains ( $p < .05$ ; Table 3).

## Discussion

In our study, the mean age of natural menopause is  $49.63 \pm 3.43$  years among Chinese women, which is similar to other studies from China [13]. Some studies have shown that the age of menopause is affected by many factors such as race, long-term oral contraceptives use, income and the number of births and other factors [14,15]. Affected by national economy and different lifestyle, the menopausal age of women in Asia, Africa and the Middle East was earlier than that in Europe, Australia, and the United States [15]. The average age of European and American countries was 51.4 years. At the same time, the study showed that women with higher

**Table 2.** Comparison of peri-menopause syndrome of 1501 women according to education level [*n* (%)].

	No education and elementary (Group 1 = 152)	High school (Group 2 = 802)	University (Group 3 = 547)	$\chi^2/F$	<i>p</i>
Hot flashes					
Positive	111 (73.02)	605 (75.44)	418 (76.42)	0.75	.69
Negative	41 (26.98)	197 (24.56)	129 (23.58)		
Paraesthesias					
Positive	73 (48.03)	276 (34.41)	148 (27.06)	24.94	<.01*
Negative	79 (51.97)	526 (65.59)	399 (72.94)		
Insomnia					
Positive	105 (69.08)	531 (66.21)	374 (68.37)	0.94	.63
Negative	47 (30.92)	271 (33.79)	173 (31.63)		
Mood swings					
Positive	99 (65.13)	503 (62.72)	327 (59.78)	1.94	.38
Negative	53 (34.87)	299 (37.28)	220 (40.22)		
Melancholia					
Positive	85 (55.92)	339 (42.27)	226 (41.32)	11.09	<.01*
Negative	67 (44.08)	463 (57.73)	321 (58.68)		
Vertigo					
Positive	71 (46.72)	383 (47.76)	265 (48.45)	0.16	.92
Negative	81 (53.29)	419 (52.24)	282 (51.55)		
Fatigue					
Positive	89 (58.55)	543 (67.71)	352 (64.35)	5.30	.07
Negative	63 (41.45)	259 (32.29)	195 (35.65)		
Muscle/joint pain					
Positive	98 (64.47)	469 (58.48)	299 (54.66)	5.20	.08
Negative	54 (35.53)	333 (41.52)	248 (45.34)		
Headaches					
Positive	75 (49.34)	357 (44.51)	227 (41.50)	3.23	.20
Negative	77 (50.66)	445 (55.49)	320 (58.50)		
Palpitations					
Positive	93 (61.18)	412 (51.37)	279 (51.01)	5.52	.06
Negative	59 (38.82)	390 (48.63)	268 (48.99)		
Skin formication					
Positive	44 (28.95)	110 (13.72)	69 (12.61)	26.86	<.01*
Negative	108 (71.05)	692 (86.28)	478 (87.39)		
Sexual problems					
Positive	117 (76.96)	592 (73.82)	381 (69.65)	4.45	.11
Negative	35 (23.03)	210 (26.18)	166 (30.35)		
Urinary problems					
Positive	61 (40.13)	290 (36.16)	207 (37.84)	1.03	.57
Negative	91 (59.87)	512 (63.84)	340 (62.16)		
Total score	21.05 ± 10.34	17.89 ± 9.50	16.82 ± 9.22	11.84	<.01*

\*Statistically significant difference among three.

**Table 3.** Comparison of QoL assessment among 1501 women according to education level.

	All ( <i>n</i> = 1501)	No education and elementary (Group 1 = 152)	High school (Group 2 = 802)	University (Group 3 = 547)	<i>F</i>	<i>p</i>
Physical domain	66.62 ± 11.85	64.97 ± 11.58	65.91 ± 12.26	68.14 ± 11.85ab	7.48	<.01*
Psychological domain	49.76 ± 10.55	48.08 ± 11.49	49.09 ± 10.20	51.21 ± 10.63ab	8.83	<.01*
Social relationships	68.07 ± 10.84	65.63 ± 11.52	67.77 ± 10.69 <sup>a</sup>	69.20 ± 10.76ab	7.18	<.01*
Environmental domain	63.50 ± 11.37	62.44 ± 10.65	62.78 ± 11.55	64.84 ± 11.20ab	6.10	<.01*
Total score	95.07 ± 8.41	93.55 ± 7.75	94.71 ± 8.46	96.04 ± 8.42ab	6.91	<.01*

\*Statistically significant difference (ANOVA test); <sup>a</sup>Statistically significant difference versus no education and elementary women; <sup>b</sup>Statistically significant difference versus high school women.

education levels have an elder menopause age than women with low educational levels [15], which was consistent with the findings of this study.

Several lines of evidence support the role of education level in impact on women natural menopause. First, some studies have shown that the differences in lifestyle caused by different levels of education affect ovarian function [9]. Liu et al. reported that lower educational level and low socioeconomic women were more liable to be associated with decreased mobility, usual activity problems, pain, and also had a lower EQ5D index in the menopausal period [16]. Women with higher educational levels had lower BMI and fewer pregnancies in this study, suggesting that the awareness of women's health management increased as

their education level. Second, in our study, a higher education level is correlated with a fewer number of pregnancies. It has been noted that the larger number of pregnancies, the higher the possibility of a delayed menopause [15]. Abortions would not reduce the total number of ovarian cycles, so would not have impact on the age of natural menopause. However, we have not observed in this study, the natural menopause age of higher educated population is still relatively late. The reason is that the natural menopause age is influenced by many factors, including race, parity, and marital status [17]. Third, the age of menopause is affected by family background in teenage and young adult years, and family background in young age will affect the educational attainment [18,19].

In our study, the most prevalent symptom reported is hot flashes and sweating (75.93%). Sexual problems (71.20%) and insomnia (66.48%) is the top two symptoms reported. This is consistent with the findings of a study of Korean postmenopausal women, which showed that vasomotor symptoms are the major reasons for medical consultations among peri-menopausal women [4,20–23]. Studies from Beijing, Hong Kong, and Australia also support this observation [13,24,25]. Our study also find that insomnia is a troublesome menopause symptom, which is associated with hot flashes and sweating at night. Changes in sexual life during climacteric period would not only disturb the QoL but also affect the relationship of the paternal. Taking these into consideration, multidimensional nursing interventions are essential.

In this study, the prevalence of paraesthesias, melancholia, skin formication, and total scores of KI are different between women of different educational and levels, which has been noted in a study across six country [15]. The results probably reflect the different degree of awareness of different educational women. Peri-menopause women of higher educated women probably paid more attention to healthy problems, so they went for medical consultations when the disorders were mild, while the less educated women seemed to ignore the problems. Estrogen deficiency occurring after menopause leads to the increasing expression of interleukin-6 and tumor necrosis factor alpha, which is associated with melancholia, paraesthesias, and skin formication [26–29].

The association between peri-menopausal women's education level and bone mineral density is still not clear. In consistent with our findings, some studies showed a low bone mineral density in less educated peri-menopausal women [30–32]. The differences in pregnancy, BMI, breastfeeding time, diet, smoking, exercise, and other factors may lead to differences in bone mineral density [33–35]. The degree of education as a risk factor of bone mineral density is of great significance in the clinician guidance of peri-menopausal women's health management.

This research is the study of the influence of education level on peri-menopausal symptoms and QoL in peri-menopausal women of China. The study finds that the difference of symptoms in different education groups, which could instruct the clinical application. Women with higher education showed better QoL. In addition, the peri-menopausal symptoms and QoL are influenced by many factors, so it is limited to analyze the impact of educational level.

## Disclosure statement

The authors report no conflicts of interest.

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## References

- Nelson HD. Menopause. *Lancet*. 2008;371(9614):760–770.
- Minkin MJ. Menopause: hormones, lifestyle, and optimizing aging. *Obstet Gynecol Clin North Am*. 2019;46(3):501–514.
- Yang D, Haines CJ, Pan P, et al. Menopausal symptoms in mid-life women in southern China. *Climacteric*. 2008;11(4):329–336.
- Lee MS, Kim JH, Park MS, et al. Factors influencing the severity of menopause symptoms in Korean post-menopausal women. *J Korean Med Sci*. 2010;25(5):758–765.
- Jenabi E, Shobeiri F, Hazavehei SM, et al. Assessment of questionnaire measuring quality of life in menopausal women: a systematic review. *Oman Med J*. 2015;30(3):151–156.
- Gurney EP, Nachtigall MJ, Nachtigall LE, et al. The Women's Health Initiative trial and related studies: 10 years later: a clinician's view. *J Steroid Biochem Mol Biol*. 2014;142:4–11.
- Cao X, Zhou J, Yuan H, et al. Duration of reproductive lifespan and age at menarche in relation to metabolic syndrome in postmenopausal Chinese women. *J Obstet Gynaecol Res*. 2016;42(11):1581–1587.
- Dunneram Y, Greenwood DC, Burley VJ, et al. Dietary intake and age at natural menopause: results from the UK Women's Cohort Study. *J Epidemiol Community Health*. 2018;72(8):733–740.
- Forman MR, Mangini LD, Thelus-Jean R, et al. Life-course origins of the ages at menarche and menopause. *Adolesc Health Med Ther*. 2013;4:1–21.
- Wu HC, Wen SH, Hwang JS, et al. Validation of the traditional Chinese version of the Menopausal Rating Scale with WHOQOL-BREF. *Climacteric*. 2015;18(5):750–756.
- Chen Y, Yu W, Yang Y, et al. Association between overactive bladder and peri-menopause syndrome: a cross-sectional study of female physicians in China. *Int Urol Nephrol*. 2015;47(5):743–749.
- Practice Committee of the American Society for Reproductive Medicine. Obesity and reproduction: a committee opinion. *Fertil Steril*. 2015;104(5):1116–1126.
- Liu P, Yuan Y, Liu M, et al. Factors associated with menopausal symptoms among middle-aged registered nurses in Beijing. *Gynecol Endocrinol*. 2015;31(2):119–124.
- Taher YA, Ben Emhemed HM, Tawati AM. Menopausal age, related factors and climacteric symptoms in Libyan women. *Climacteric*. 2013;16(1):179–184.
- Langton CR, Whitcomb BW, Purdue-Smithe AC, et al. Association of parity and breastfeeding with risk of early natural menopause. *JAMA Netw Open*. 2020;3(1):e1919615.
- Liu K, He L, Tang X, et al. Relationship between menopause and health-related quality of life in middle-aged Chinese women: a cross-sectional study. *BMC Womens Health*. 2014;14:7.
- Golshiri P, Akbari M, Abdollahzadeh MR. Age at natural menopause and related factors in Isfahan, Iran. *J Menopausal Med*. 2016;22(2):87–93.
- Kye B, Mare RD. Intergenerational effects of shifts in women's educational distribution in South Korea: Transmission, differential fertility, and assortative mating. *Soc Sci Res*. 2012;41(6):1495–1514.
- Steele F, Sigle-Rushton W, Kravdal Ø. Consequences of family disruption on children's educational outcomes in Norway. *Demography*. 2009;46(3):553–574.
- Tao M, Shao H, Li C, et al. Correlation between the modified Kupperman Index and the Menopause Rating Scale in Chinese women. *Patient Prefer Adherence*. 2013;7:223–229.
- Shin H, Shin HS. Measurement of quality of life in menopausal women: a systematic review. *West J Nurs Res*. 2012;34(4):475–503.
- Sun Z, Hao Y, Zhang M. Efficacy and safety of desvenlafaxine treatment for hot flashes associated with menopause: a meta-analysis of randomized controlled trials. *Gynecol Obstet Invest*. 2013;75(4):255–262.
- Ryu KJ, Park HT, Kwon DH, et al. Vasomotor symptoms and metabolic syndrome in Korean postmenopausal women. *Menopause*. 2015;22(11):1239–1245.
- Dennerstein L, Lehert P, Guthrie JR, et al. Modeling women's health during the menopausal transition: a longitudinal analysis. *Menopause*. 2007;14(1):53–62.
- Herber-Gast GC, Mishra GD, van der Schouw YT, et al. Risk factors for night sweats and hot flushes in midlife: results from a prospective cohort study. *Menopause*. 2013;20(9):953–959.
- Llaneza P, García-Portilla MP, Llaneza-Suárez D, et al. Depressive disorders and the menopause transition. *Maturitas*. 2012;71(2):120–130.
- Oppermann K, Fuchs SC, Donato G, et al. Physical, psychological, and menopause-related symptoms and minor psychiatric disorders in a community-based sample of Brazilian premenopausal, perimenopausal, and postmenopausal women. *Menopause*. 2012;19(3):355–360.
- Banaczek Z, Saracen A. Life satisfaction and self-esteem among women in the menopausal time. *Wiad Lek*. 2016;69(2):174–179.
- Ji YF, Jiang X, Li W, et al. Impact of interleukin-6 gene polymorphisms and its interaction with obesity on osteoporosis risk in Chinese postmenopausal women. *Environ Health Prev Med*. 2019;24(1):48.

- [30] Heidari B, Mohammadi A, Javadian Y, et al. Associated factors of bone mineral density and osteoporosis in elderly males. *Int J Endocrinol Metab.* 2017;15(1):e39662.
- [31] Żolnierczuk-Kieliszek D, Kulik TB, Janiszewska M, et al. Influence of sociodemographic factors on quality of life in women living in Lublin Province in Poland. *Prz Menopauzalny.* 2014;13(1):13–17.
- [32] Tabor E, Kuźniewicz R, Zagórski P, et al. The relationship of knowledge of osteoporosis and bone health in postmenopausal women in Silesia Osteo Active Study. *J Clin Densitom.* 2018;21(1):98–104.
- [33] Ugurlu U, Nayki U, Nayki C, et al. Assessment of smoking for low bone mineral density in postmenopausal Turkish women. *Wien Klin Wochenschr.* 2016;128(3–4):114–119.
- [34] Heidari B, Hosseini R, Javadian Y, et al. Factors affecting bone mineral density in postmenopausal women. *Arch Osteoporos.* 2015;10:15.
- [35] Mori T, Ishii S, Greendale GA, et al. Physical activity as determinant of femoral neck strength relative to load in adult women: findings from the hip strength across the menopause transition study. *Osteoporos Int.* 2014;25(1):265–272.