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Concomitants of menopause-specific quality of life in premenopausal and post-menopausal women living in South Korea

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ABSTRACT

The present study investigated the concomitants of menopause-specific quality of life among premenopausal and postmenopausal women. Based on the Wilson and Cleary model of quality of life, this cross-sectional study recruited 329 women of age 40–65 years following operational convenience. The study was conducted in the office of the Korea Population, Health and Welfare Association (KPHWA) in Incheon, South Korea. Data collected on sociodemographic characteristics, social support, biological/physiological characteristics, the Pittsburgh Sleep Quality Index (PSQI-K), and self-rated health. Menopause-specific quality of life questionnaire (MENQOL) was used in this study. Hierarchical multiple linear regression analysis was performed. The study found that social support and self-rated health were negatively correlated with MENQOL in premenopausal women, while the income level and self-rated health were negatively associated with MENQOL in postmenopausal women. Sleep quality was positively correlated with MENQOL in both premenopausal and postmenopausal women. The study results indicate the need for tailored approaches based on menopausal status. Especially, social support may help improve the MENQOL of premenopausal women, while in postmenopausal women, improved sleep quality may enhance their menopause-specific quality of life.

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Menopause; menopause-specific quality of life; sleep quality

Introduction

The health-related quality of life (HRQoL) measures individual perception of the level of functioning within the physical, emotional, cognitive, and social domains of health. HRQoL evaluates a person's perspective considered pertinent to the assessment of health outcomes (Ham 2011). Peri- and postmenopausal women experience diverse physical symptoms, such as night sweats and hot flashes due to estrogen deficiency, and psychological symptoms (Greenblum et al. 2012). Psychological symptoms experienced by women during the menopausal transition include fatigue, irritability, anxiety, and depression. All the aforementioned symptoms may decrease the overall MENQOL of women during the menopausal transition (Greenblum et al. 2012; Poomalar and Arounassalame

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2013). Therefore, by identifying the concomitants of the quality of life in menopausal women, the quality of life may be improved.

Ham (2011) found that marital status (widowed/divorced), higher level of stress, and lack of regular exercise significantly impaired the quality of life among Korean middle-aged women. Other studies also investigated the factors that impair the quality of life of menopausal women. However, simultaneous assessments of multi-dimensional concomitants associated with menopausal quality of life (MENQOL) have rarely been conducted (Poomalar and Arounassalame 2013). Studies elucidating the concomitants associated with MENQOL and comparing premenopausal and postmenopausal women have yet to be reported in Korea. This study, therefore, investigated the concomitants associated with MENQOL among pre- and postmenopausal women.

Wilson and Cleary (1995) established a conceptual quality of life model to describe the complex link between the clinical outcomes of patients and their health problems. In this model, the concomitants contributing to patient outcome have been classified into five levels including biological/physiological factors, symptoms, functional status, health perception, and quality of life to explain the relationship among the various health-related symptoms (Wilson and Cleary 1995). Later, Wilson and Cleary's model has been revised and supplemented with individual (i.e., smoking status) and environmental (i.e., social support) factors that impair the quality of life (Ferrans et al. 2005).

The present study identified and compared the concomitants of MENQOL among premenopausal and postmenopausal women to provide practical guidelines for future interventions to improve the MENQOL of middle-aged women.

Materials and methods

Study design and participants

This cross-sectional study is based on the conceptual model of quality of life outlined by Wilson and Cleary (1995). This study is part of a larger study investigating sleep disturbances and cardiovascular disease risk among middle-aged women in Korea. Detailed information related to the original study can be found elsewhere (Ham et al. 2017).

The study participants were recruited in one metropolitan city (Incheon) of South Korea adjacent to Seoul, with the help of the Korea Population, Health and Welfare Association (KPHWA). Potential participants were recruited using leaflets and local newspapers. Women who volunteered to participate in the study contacted the KPHWA local office or research assistant and left their telephone numbers. The researchers then contacted women via telephone to screen for eligibility. The eligibility criteria included premenopausal and postmenopausal status and Korean nationality, age between 40 and 65 years, and basic reading and writing ability. Women with mental health problems (other than insomnia), those who had undergone cancer treatment, and perimenopausal women were excluded. Premenopausal status was defined by regular frequency of menstrual cycles within the past three months, whereas the postmenopausal group included women who, for more than one year, had no menstrual period or had undergone a hysterectomy (World Health Organization [WHO] Scientific Group 1996). Originally, a total of 430 women intended to participate; however, seven women were excluded due to age limits, and another 94 women were excluded owing to to their perimenopausal status.

A total of 329 (76.5%) women were eligible for inclusion in the final study (81 premenopausal, 248 postmenopausal women). After initial screening, the researchers explained to them about their visit to the local office of KPHWA for data collection. The validation of post-hoc power analysis using the G*power3.1 software revealed that inclusion of 81 participants the study yielded a power of 0.85 (α = 0.05) with a medium effect size (f = 0.20), which was statistically significant in hierarchical regression analyzes with six concomitants in the premenopausal group. In the postmenopausal group, a small effect size (f = 0.06) was detected as statistically significant when 248 participants and six concomitants were included (power =.85, α = 0.05).

Instruments

1) Sociodemographic characteristics

The sociodemographic parameters related to age, marital status, educational level, income level, occupational status, smoking status (currently or not), alcohol drinking (currently or not), and physical activity. A single question was used to determine the income level: "What do you think of your income level?" and the response was evaluated on an ordinal scale. The questions related to physical activity were based on its intensity and frequency. The frequency of vigorous and moderate exercise at least 10 min/day, and walking at least 30 min/day were measured separately. In this study, those who conducted vigorous exercise 3 days/week or moderate exercise/walking for 5 days/week were defined as regular exercisers (physical activity = yes) (Korea Centers for Disease Control and Prevention 2012).

2) Social support

Social support was measured using the Social Support Scale developed by Park (1985) and reconstructed by Kim (1999). This scale consists of 17 questions aimed at measuring self-perception regarding social support of family, friends, neighbors, and health care providers. Three dimensions of social support were measured, including emotional, informative, and physical support. It was based on a total of 17 items evaluated on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicated better social support system. Cronbach's alpha was 0.98 in the former study (Kim 1999) and was 0.96 in our study.

3) Biological/physiological characteristics

To determine body mass index (BMI), both the height (m) and weight (kg) of each participant were measured using an electronic scale (GL-150, G-TECH International, Uijungbu, Korea). The level of obesity was determined based on the obesity standard recommended by the Korean Society for The Study of Obesity (Kim 1999). BMI (kg/m2) was categorized into six groups: underweight (< 18.5), normal (18.5–22.9), pre-obese (23.0–24.9), obesity class I (25.0–29.9), obesity class II (≥ 30), and obesity class III (≥ 35) (Kim 1999).

Systolic/diastolic blood pressure (SBP/DBP) was measured twice, 20 min apart. The mean BPs were used in the data analysis. After eight hours of fasting, 5 mL of blood was drawn from the forearm vein of each participant to test for triglyceride, glucose, total

cholesterol, and high density lipoprotein (HDL) levels. The blood samples were drawn and analyzed by certified clinical laboratory technologists affiliated with the KPHWA.

4) Sleep quality

Sleep quality was measured using the Korean version of the Pittsburgh Sleep Quality Index (PSQI-K) (Sohn et al. 2012). The PSQI-K was developed to survey ordinary sleep habits during the previous month and included questions regarding sleep quality, sleep duration, sleep latency, sleep efficiency, sleep disturbances, medication related to sleep, and daytime dysfunction. The scale of responses for each question ranged from 0 to 3, and the global scores ranged from zero to 21 for the seven components, with higher scores representing worse sleep quality. Scores of five or under were defined as good sleep quality, while those over five were defined as poor sleep quality (Sohn et al. 2012).

5) Self-rated health

Self-rated health was included as a health perception variable. It was measured using the question: "what do you think of your health condition in general?" A five-point Likert scale was used for grading from 1 (very bad) to 5 (very good).

6) Menopause-specific quality of life (MENQOL)

The Korean version of the MENQOL questionnaire was used, and was originally developed by Hilditch et al. (1996) and translated into Korean by Kim (Kim 1998). Two items from the original questionnaire were modified after an expert review and validation of the instrument. The modified instrument included 30 questions in four domains: three in the vasomotor domain, seven in the psychosocial domain, 17 in the physical domain, and three in the sexual domain. The degree of discomfort was measured for each item using a seven-point Likert scale (1 = no symptom, and 7 = very uncomfortable). Higher scores indicate impaired MENQOL. Cronbach's alpha ranged from 0.81 and 0.89 in former studies (Hilditch et al. 1996; Kim 1998), while it was 0.97 in our study.

Procedure

Data collection was performed in the office of the KPHWA in one metropolitan city area from June to August 2015. The study participants were recruited via an advertisement campaign conducted using local newspapers, flyers, and banners for a two-month period prior to data collection. Self-reported data were used to evaluate sociodemographic and lifestyle variables, sleep quality, self-rated health, social support, and MENQOL. The study instruments were used to validate content in Korean. Along with the self-reported questionnaire, the height, weight, and blood pressure of each participant were measured by trained nurses. Blood samples were drawn by medical technologists from all participants who successfully maintained eight hours of nothing per oral (NPO). All participants were provided a gift of 20 USD upon completion of the data collection.

Ethical consideration

The study was approved by the Institutional Review Board (150401–1A). The purpose of this study was explained to the participants prior to data collection, and the questionnaires

were distributed after obtaining written consent from all participants. Also, participants were informed that they could withdraw from the study at any time without penalty.

Data analysis

Data were analyzed using the IBM SPSS 21.0 software (Armonk, NY: IBM Corp.). The *t*-test, chi-square test, and Fisher's exact test were employed to compare the study variables between premenopausal and postmenopausal women. We performed hierarchical multiple linear regression to analyze the concomitants related to MENQOL. According to the modified Wilson and Cleary model (1995), six categories of concomitants are related to quality of life. Among the six categories of concomitants, functional status reflects understanding of the level of daily living disorder caused by loss of function (Wilson and Cleary 1995). We assumed that all of our study participants who walked into the data collection location had intact functional status. Accordingly, our study excluded functional status from the model. Therefore, in the first model, sociodemographic and lifestyle variables were entered in blocks to analyze the concomitants of MENQOL. All of the sociodemographic variables were categorical variables except age, which was a numerical variable, while lifestyle variables were dichotomous variables (yes or no). Next, social support (2^{nd} model), biological/physiological variables (3^{rd} model), sleep quality (4^{th} model) and self-rated health (5^{th} model) were entered in sequential order for each group. All of the variables in the models two, three, and four, and the independent variable (MENQOL) were interval variables except for hormone therapy, which was a dichotomous variable, whereas self-rated health in model five was a numerical variable. The variables that were significantly associated with quality of life in previous studies were included in the hierarchical multiple regression model. In addition, based on the conceptual model, the significant variables ($p < .05$) identified through *t*-test, ANOVA, and bivariate analyzes were included in the hierarchical multiple linear regression model. To confirm the normal distribution of the data, scatter plots were used. The Durbin-Watson statistic of the premenopausal model was 2.10, the tolerance was 0.37 ~ 0.98, and the variance inflation factor (VIF) was 1.02 ~ 2.71. The Durbin-Watson statistical value of the postmenopausal model was 2.02, the tolerance was 0.61 ~ 0.98, and the VIF was 1.02 ~ 1.66.

Results

Sociodemographic and lifestyle variables and social support in premenopausal and postmenopausal women

The mean age was 46.6 years (SD = 4.1) in the premenopausal group and 57.9 years (SD = 4.0) in the postmenopausal group. The premenopausal group showed a significantly higher income level, with 35.8% belonging to the upper middle income group compared with 24.6% of the postmenopausal group ($p = .030$). Among postmenopausal women, 39.9% were employed compared with 64.2% of premenopausal women ($p < .001$). In addition, a higher proportion of postmenopausal women participated in physical activity than the premenopausal group ($p = .005$). The mean score of social support was significantly higher in the premenopausal group (63.4 ± 14.0) than the postmenopausal group (59.6 ± 13.5) ($p = .032$) (Table 1).

Table 1. Characteristics of sociodemographic characteristics and social support of participants.

Variables	Categories	Pre- (n = 81)	Post- (n = 248)	χ2	*p*
		n (%)	n (%)		
Marital status	Unmarried	0 (0.0)	6 (2.4)	2.55	.252[a]
	Married/with a partner	71 (87.7)	200 (80.6)		
	widowed/divorced/separated	10 (12.3)	42 (16.9)		
Education level	≤ Primary education	0 (0.0)	24 (9.7)	45.90	.001
	Secondary education	6 (7.4)	86 (34.7)		
	Higher secondary education	47 (58.0)	110 (44.4)		
	≥ Graduate	28 (34.6)	28 (11.3)		
Income level	Lower	10 (12.3)	54 (21.8)	8.54	.030[a]
	Lower middle	42 (51.9)	133 (53.6)		
	Upper middle	29 (35.8)	55 (22.2)		
	Upper	0 (0.0)	6 (2.4)		
Employed	Yes	52 (64.2)	99 (39.9)	14.49	.001
	No	29 (35.8)	149 (60.1)		
Smoking status	Yes	1 (1.2)	2 (0.8)		.573
	No	80 (98.8)	246 (99.2)		
Alcohol drinking	Yes	70 (86.4)	196 (79.0)	2.15	.142
	No	11 (13.6)	52 (21.0)		
Physical activity[b]	Yes	57 (70.4)	210 (85.0)	8.65	.005
	No	24 (29.6)	37 (15.0)		
		M (SD)	M (SD)	t	*p*
Age (year)		46.6 (4.1)	57.9 (4.0)	−21.9	.001
Social support		63.4 (14.0)	59.6 (13.5)	2.15	.032

[a]Fisher's exact test; [b]Physical activity: Yes = vigorous exercise 3 days/week or moderate exercise 5 days/week, and/or walking exercises at least 30 minutes/day and 5 days/week

Biological/physiological variables, sleep quality, self-rated health and MENQOL of premenopausal and postmenopausal women

Premenopausal women were more likely to belong to the normal BMI category than postmenopausal women ($p = .036$). More postmenopausal than premenopausal women exhibited elevated levels of SBP (≥ 130 mmHg), triglycerides (≥ 150 mg/dL), glucose (≥ 110 mg/dL), and total cholesterol (≥ 200 mg/dL) than premenopausal women ($p < .050$). Among premenopausal women, 40.8% rated their health as 'good' or 'very good' compared with 29.4% of postmenopausal women ($p = .040$). Additionally, the two groups were not significantly different in MENQOL ($p = .120$). However, the two groups were significantly different in the vasomotor and sexual domains of quality of life. In the vasomotor domain, the mean score was 3.36 (SD = 4.07) for premenopausal women when compared with the value of 5.17 (SD = 5.42) for postmenopausal women ($p = .002$). In the sexual domain, the mean score was 4.70 (SD = 5.07) for premenopausal women compared with 7.34 (SD = 6.76) for postmenopausal women, demonstrating that the premenopausal group had a significantly higher quality of life in this domain ($p < .001$) (Table 2).

Factors related to quality of life in premenopausal and postmenopausal women

Premenopausal women

Social support was significantly associated with MENQOL from the second to final models. In the fourth model, sleep quality was positively correlated with MENQOL, with the explained variance of 24%.

Table 2. Biological/physiological characteristics, sleep quality, self-rated health and menopause-specific quality of life of participants.

Variables	Categories	Pre- (n = 81) n (%)	Post- (n = 248) n (%)	χ2	*p*
Hormone therapy use	Yes	5 (6.2)	4 (1.6)		.790[a]
	No	76 (93.8)	234 (94.4)		
BMI (kg/m^2)	Underweight (<18.5)	1 (1.2)	0 (0.0)	10.58	.036[a]
	Normal (18.5–22.9)	38 (46.9)	80 (32.3)		
	Preobese (23.0–24.9)	20 (24.7)	77 (31.0)		
	Obesity class I(25.0–29.9)	19 (23.5)	85 (34.3)		
	Obesity class II (≥30)	3 (3.7)	5 (2.0)		
	Obesity class III (≥35)	0 (0.0)	1 (0.4)		
SBP (mmHg)	<130	64 (79.0)	166 (66.9)	4.23	.040
	≥130	17 (21.0)	82 (33.1)		
DBP (mmHg)	<85	74 (91.4)	224 (90.3)	0.08	.782
	≥85	7 (8.6)	24 (9.7)		
Triglycerides (mg/dL)	<150	69 (85.2)	167 (67.3)	9.59	.002
	≥150	12 (14.8)	81 (32.7)		
Glucose (mg/dL)	<110	76 (93.8)	207 (83.5)	5.45	.020
	≥110	5 (6.2)	41 (16.5)		
Total cholesterol (mg/dL)	<200	49 (60.5)	105 (68.2)	8.08	.004
	≥200	32 (39.5)	143 (57.7)		
HDL (mg/dL)	>50	67 (82.7)	205 (82.7)	0.00	.991
	≤50	14 (17.3)	43 (17.3)		
Sleep quality	Good (≤5)	49 (60.5)	143 (57.7)	0.20	.653
	Poor (>5)	32 (39.5)	105 (42.3)		
Self-rated health	Very poor	0 (0.0)	4 (1.6)	9.52	.040[a]
	Poor	16 (19.8)	36 (14.5)		
	Fair	32 (39.5)	135 (54.4)		
	Good	25 (30.9)	64 (25.8)		
	Very good	8 (9.9)	9 (3.6)		
		M (SD)	M (SD)		
MENQOL	Total	50.51(37.93)	59.21(45.38)	−1.56	.120
	Vasomotor	3.36(4.07)	5.17(5.42)	−3.20	.002
	Psychosocial	11.60(10.76)	12.89(11.90)	−0.86	.388
	Physical	30.84(22.22)	33.81(26.15)	0.92	.359
	Sexual	4.70(5.07)	7.34(6.76)	3.72	<.001

Note: BMI = Body mass index, SBP = Systolic blood pressure, DBP = Diastolic blood pressure, HDL = High density cholesterol, MENQOL = Menopause-specific quality of life.
[a]Fisher's exact test

In the final model, social support and self-rated health were negatively correlated, whereas sleep quality was positively associated with MENQOL in premenopausal women. The explained variance of the final model was 38% (F = 7.64, $p < .001$) (Table 3).

Postmenopausal women

In the first model, the lower middle and upper middle income groups manifested a higher MENQOL than those in the lower income group, with the explained variance of 4%. However, in the next model, social support and triglyceride levels were not significantly associated with MENQOL. In the fourth model, sleep quality was significantly associated with MENQOL, increasing the explained variance by 32%. In the final model, self-rated health was negatively associated with MENQOL in postmenopausal women, while sleep quality was positively correlated with it. The explained variance of the final model was 35% (F = 18.58, $p < .001$) (Table 3).

Table 3. Hierarchical regression analysis for menopause-specific quality of life.

		Pre- (n = 81)					Post- (n = 248)				
		β[a]					β[a]				
Variables (baselines)	Categories	1	2	3	4	5	1	2	3	4	5
Income level (lower)	Lower middle	−0.09	−0.06	−0.05	0.10	0.22	−0.22*	−0.22*	−0.22*	−0.09	−0.13
	Upper middle	−0.28	−0.22	−0.18	−0.04	0.15	−0.22*	−0.21*	−0.21*	−0.15*	−0.16*
	Upper	-	-	-	-	-	−0.05	−0.04	−0.04	0.01	0.03
Social support			−0.23*	−0.24*	−0.24*	−0.26*		−0.05	−0.05	0.02	0.07
Triglycerides (mg/dL)				0.18	0.10	0.07			0.02	0.00	0.01
Sleep quality					0.36*	0.17*				0.54**	0.47*
Self-rated health						−0.46**					−0.24*
F		1.85	2.74*	2.78*	4.72*	7.64**	3.20*	2.52*	2.02	18.75**	18.58**
R^2		0.05	0.10	0.13	0.24	0.38	0.04	0.04	0.04	0.32	0.35
/ΔR^2			/0.05	/0.03	/0.11	/0.14		/0.00	/0.00	/0.28	/0.03

[a]Standardized beta.
*$p < .05$, **$p < .001$

Discussion

The present study aims to identify the concomitants of menopause-specific quality of life of pre- and postmenopausal women. The study followed Wilson and Cleary model of quality of life. Our study is unique in that we attempted to differentiate the concomitants associated with quality of life between premenopausal and postmenopausal women, including multiple dimensions of concomitants, such as biological and psychosocial domains.

In the present study, a comparison of sociodemographic and lifestyle variables and social support between premenopausal and postmenopausal women revealed that postmenopausal women had lower education and income levels, a lower employment rate, and lower social support scores than the premenopausal women. These results suggested that postmenopausal women endured greater social isolation and belonged to a lower socioeconomic status than premenopausal women. According to a previous study, middle-aged women suffer from social isolation and withdrawal as well as physical symptoms during menopause, which is associated with depression and ultimately reduced the quality of life of postmenopausal women (Wariso et al. 2017). Therefore, it is necessary to prevent social isolation by linking community resources to provide social support to postmenopausal women.

In this study, we found significant differences in biological and physiological variables between premenopausal and postmenopausal women including BMI, SBP, triglycerides, and glucose levels. In addition to these findings, high blood pressure, obesity, and diabetes raise the risk of cardiovascular disease among postmenopausal women (Stock and Redberg 2012). Thus, a cardiovascular risk monitoring system for postmenopausal women is needed at the community level, along with active intervention by health providers. Additionally, the study found that 6.2% of premenopausal women received hormone therapy. It is possible that this result is due to that premenopausal women take hormonal drugs as a method of contraception. In fact, this result is slightly lower than the reported 11.4% of taking oral contraceptives in Korean adult women (Gu 2016).

In postmenopausal women, self-rated health was significantly lower than in premenopausal women. Although no significant differences existed in MENQOL between the two groups in this study, self-rated health is a meaningful indicator that is closely related to health-related quality of life (Lee et al. 2015). Hence, the low health-related quality of life in postmenopausal women can be improved by improving biological and physiological indicators.

Further, postmenopausal women had significantly impaired MENQOL in certain domains (vasomotor and sexual) more than premenopausal women. Previous studies indicated that early postmenopausal women had impaired quality of life scores in the vasomotor, psychosocial, and physical domains than premenopausal women, and the scores in the sexual domain were also lower among early and late postmenopausal women than in premenopausal women (Chen et al. 2008), which is consistent with the study findings. Another longitudinal study reported decreased frequencies of menopausal symptoms, such as hot flashes and sweats after five years since the initiation of menopause (Chedraui et al. 2014). This study indicates that the MENQOL of postmenopausal women may increase again after several years since the initiation of menopause. Furthermore, based on this trend, a proactive intervention to alleviate menopausal symptoms is recommended for menopausal women with less than five years since the onset of menopause.

Our study found that social support and MENQOL had a positive association among premenopausal women. Similarly, other studies have reported that middle-aged women with lower scores of depressive symptoms had higher social support, indicating that social support facilitated psychological well-being (Yu, Yang, and Yoon 2000). Based on these results, we conclude that social support is positively related to the psychosocial domain of MENQOL. In addition to physical and physiological changes due to decreased ovarian function, premenopausal women also experience psychological and social changes due to external events, such as independent children and changes in their roles within the family (Lim and Baek 2015). Therefore, the MENQOL of premenopausal women may be greatly improved by encouraging family support and increasing social support via the use of community resources.

Sleep quality was determined as an important variable for MENQOL among premenopausal and postmenopausal women investigated in the present study. In addition to its importance as one of the concomitants related to MENQOL, the relationship between mental health (such as depression) and sleep quality in menopausal women has also been well documented (Conde et al. 2006; Orzeł-Gryglewska 2010). A negative relation of insomnia with the psychological MENQOL has been confirmed in menopausal women (Conde et al. 2006). People with sleep problems show difficulty or aggressive attitudes in their relationships with others due to memory loss, schematic thinking, and emotional problems (Lee et al. 2015). They suffer from health challenges such as obesity, diabetes mellitus, or cardiovascular diseases due to changes in their immune systems and hormone production, in addition to increased sensitivity to pain (Lee et al. 2015; Orzeł-Gryglewska 2010). Hence, sleep quality is an important concomitant for quality of life, including the mental and physical health domains. Therefore, efforts to improve the sleep quality in middle-aged women are key to improving their quality of life,

Self-rated health is an important concomitant for MENQOL in both premenopausal and postmenopausal women. Consistent with the results of our study, a previous study confirmed that higher self-rated health had a positive relation to quality of life (Chen et al. 2008). Self-rated health normally refers to one's subjective judgment of their own physical, physiological, and psychosocial health conditions (Ware 1987), and has been used as a useful indicator in evaluating the quality of life. Therefore, subjective health perception, such as self-rated health or self-rated stress, can be used as a good instrument in future studies evaluating the quality of life among individuals with clinical conditions or in community settings.

The study has a few limitations. First, the cross-sectional design does not permit assessment of temporal or causal relationships between the variables. Second, because the participants were recruited using the convenience sampling method, the non-representative nature of this type of sample limits the generalizability of the results. In addition, the relatively small sample size of the premenopausal group may have resulted in inadequate statistical power for detection of modest but meaningful differences as statistically significant. Finally, we measured sleep quality using a self-reported questionnaire. In future studies, an objective measure of sleep quality, such as polysomnography, may enhance the accuracy of data.

Conclusion

Our study results suggested that the concomitants associated with MENQOL differed between premenopausal and postmenopausal women. The results showed that social

support and self-rated health were negative concomitants of MENQOL in the premenopausal group, whereas sleep quality was positively correlated with it. Further, sleep quality was a positive concomitant of MENQOL in the postmenopausal group, whereas income level and self-rated health were negatively correlated with it. Therefore, interventions to increase social support may help improve the MENQOL of premenopausal women. Policies for postmenopausal women need to improve income levels. In addition to close monitoring of sleep quality among middle-aged women, a systematic sleep intervention program is needed for those with poor sleep quality. Further, interventions are needed for low-income, middle-aged women with poor self-rated health by providing social support systems and counseling to improve sleep quality.

Disclosure statement

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