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Psychometric properties of the Menopause Specific Quality of Life Questionnaire among Thai women with a history of breast cancer

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Abstract

Purpose: This study evaluated the psychometric properties of the Thai Menopause Specific Quality of Life Questionnaire (MENQOL) instrument in menopausal Thai women with a history of breast cancer.

Methods: Two hundred ninety women with a history of breast cancer who reported hot flashes completed the Thai MENQOL. Internal consistency reliability and item analysis were used to evaluate the reliability of the Thai MENQOL. Construct validity was evaluated by examining the correlations between the self-reported hot flash frequency and severity with the vasomotor MENQOL subscale (convergent validity); and assessed using exploratory factor analysis (structural validity).

Results: The Cronbach's alpha coefficient for the MENQOL total scale was 0.86 and for the vasomotor, psychosocial, physical, sexual domains were 0.73, 0.78, 0.81, and 0.83, respectively. Self-reported frequency and severity of hot flashes were correlated significantly with the vasomotor subscale (r 's = 0.50, p 's < 0.001). The single item "increased facial hair" was poorly correlated with most items (r = 0.13). Confirmatory factor analysis supported four factors explaining 42.35% of the total variance. Item-domain correlation analysis showed that all items correlated more strongly with their own domains than with other domains.

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Conflict of interest statement

The authors declare that no conflict of interest exists.

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Conclusions: The Thai version of the MENQOL demonstrates good psychometric properties (internal consistency reliability, convergent validity, and structural validity). We recommend removal of the single item, “increased facial hair” from the Thai version due to low correlations with most items. The Thai MENQOL can be used to measure menopause-related quality of life in Thai women with a history of breast cancer experiencing menopausal symptoms.

Introduction

Breast cancer is the most frequent cancer among women with an estimated 1.67 million new cancer cases diagnosed in 2012 (International Agency for Research on Cancer World Health Organization, 2017a). In Thailand, the GLOBOCAN project of the International Agency for Research on Cancer (IARC) estimated new breast cancer cases to be about 15,469 in 2020 (International Agency for Research on Cancer World Health Organization, 2017b). For women, breast cancer is one of the top five survivable cancers in Thailand, with 5-year survival ranging from 62% to 65%, depending on stage (International Agency for Research on Cancer World Health Organization, 2011).

With growing numbers of breast cancer survivors, menopausal symptoms can be a long term consequence of treatment, since for many, the goal of treatment is estrogen depletion. Breast cancer treatment with chemotherapy can result in acceleration of menopause due to premature follicular senescence which results in hot flashes (Couzi, Helzlsouer, & Fetting, 1995; Davis, Panjari, Robinson, Fradkin, & Bell, 2014; Gupta, 2006; Hunter et al., 2004). Among menopausal symptoms, hot flashes are considered to be the most troublesome, with prevalence rates between 63% and 80% in breast cancer patients (Barba et al., 2014; Barton & Ganz, 2015). Other important symptoms of menopause and particularly of estrogen depletion can include vaginal dryness, urinary changes, trouble sleeping, and reduced sexual desire and arousal (Barton & Ganz, 2015; Loibl, Lintermans, Dieudonné, & Neven, 2011). In order to study potentially effective treatments for menopausal symptoms in breast cancer survivors in Thailand, a reliable and valid tool is needed.

A popular and well-validated instrument used in the US for the measurement of menopausal symptoms is the Menopause Specific Quality of Life Questionnaire (MENQOL) (Davis et al., 2014; Kulasingam, Moineddin, Lewis, & Tierney, 2008; Radtke, Terhorst, & Cohen, 2011; Sydora et al., 2016). The MENQOL, developed by Hilditch and colleagues (1996), is a self-administered questionnaire to measure the impact of menopausal symptoms on health related quality of life in menopausal women. This scale consists of 29 items that ask women to rate the degree of bother for each of 29 menopause-related symptoms. The MENQOL has found wide acceptance in menopause research (Kulasingam et al., 2008; Sydora et al., 2016; Van Dole et al., 2012; Williams, Levine, Kalilani, Lewis, & Clark, 2009). Recently, the psychometric properties of the MENQOL have been evaluated in breast cancer survivors experiencing menopausal symptoms in the US and Europe (Doyle et al., 2011; Radtke et al., 2011). Radtke and colleagues (2011) evaluated the psychometric properties of the MENQOL in postmenopausal breast cancer survivors. Adequate validity and reliability was demonstrated with the Cronbach alpha's for each subscale being greater than 0.70. The only evidence of discriminant validity for both the vasomotor and psychosocial subscales of the MENQOL consisted of low, non-significant correlations with the psychosocial (i.e., nervous

irritability, and depressive moods) and vasomotor (i.e., hot flash, and profuse perspiration) items of the Kupperman index and symptom diary (both $r = 0.176$, $p > 0.05$). In addition, convergent validity for both the vasomotor and psychosocial subscales of the MENQOL was established by moderate to high correlations with the vasomotor and psychosocial items of the Kupperman index ($r = 0.614$, $r = 0.724$, $p < 0.001$). As for structural validity, almost all items in the vasomotor, psychosocial, and sexual subscales loaded strongly in their domains, except for physical subscale items which loaded on multiple domains. This may be due to small sample size ($N=108$) for a factor analysis approach (Radtke et al., 2011).

The first translation of the MENQOL was performed by a group of Master's degree students who modified the questions (Imsudjai, 1997; Ngaongarm, 1997; Rattanakit, 1997; Saneebutra, 1997; Sindhunava, 1997). However, a major limitation was that the instrument had not been back-translated into English. The translated, modified measure was then used in several studies to evaluate the impact of menopausal symptoms on quality of life of menopausal women in different regions of Thailand. The final modified MENQOL Thai version included 27 items. The sexual domain was excluded because intimate questions about sexual activities during the menopausal period were believed to be culturally inappropriate and sensitive by the investigators. Evidence of adequate internal consistency reliability was supported by Cronbach's alpha coefficients for each domain ranging from 0.75 to 0.93 (Somsak, 2002).

A second translation of MENQOL was translated into Thai by Pongpatiroj and colleagues (2001) to assess health related quality of life in 36 postmenopausal women who received hormone therapy replacement. Standard translation techniques were not described. Only content validity and internal consistency reliability data were reported. In that study, the MENQOL Thai version was tested for content validity by three experts in gynecology and midwifery. Internal consistency reliability was assessed for each subscale in a pilot study of 12 postmenopausal women who were 47–62 years old, had ceased menstruation for 2–7 years, had not had a hysterectomy, and who had not used hormone therapy during the preceding 6 months. The alpha reliability coefficient was 0.894 for all subscales. This level of psychometric testing was inadequate to fully validate this scale. Despite this, the Thai version has been used to measure menopausal symptoms in Thai women experiencing naturally occurring menopause (Kutheerawong & Vichinsartvichai, 2016; Peeyananjarassri et al., 2006) and in women with HIV infection (Boonyanurak et al., 2012).

In summary, research evidence from two small studies of menopausal women suggests that the Thai MENQOL has good internal consistency reliability. However, standardized translation procedures were either not described or not followed, and the MENQOL has never been validated in women with a history of breast cancer. Cultural and environmental issues have been hypothesized to affect the psychometric properties of MENQOL (Sydora et al., 2016). Hence, the purpose of this study was to evaluate the following four properties: (1) internal consistency reliability, (2) content validity and item analysis, (3) convergent validity, and (4) structural validity of the Thai MENQOL in women with a history of breast cancer who report hot flashes.

Methods

Design

This study was a cross-sectional psychometric analysis. We recruited the participants from a university hospital located in Bangkok, Thailand using a convenience sampling method between May 2016 and September 2016.

Participants

Participants (N = 290) were recruited through the outpatient cancer clinics from a university hospital located in Bangkok. Women with a history of breast cancer were eligible if they were postmenopausal, defined by either no menstrual period in the past 12 months, surgical menopause through bilateral oophorectomy, no menstrual period in the past 6 months since finishing chemotherapy, or women with hysterectomies and at least one functioning ovary under the age of 50 with biologic (blood test FSH and estradiol) verification of their menopausal status in their medical charts. Women had to be experiencing hot flashes. Participants could not have a diagnosis of major depressive episode or other documented psychiatric illness, acutely deteriorating physical function, or illness that would preclude an individual from being interviewed or filling out questionnaires.

Ethical consideration and consent process

The participants were informed about the purpose of the study and what would be expected of them. Participants were assured of their right to withdraw from the study at any stage without any negative consequences. Steps to protect confidentiality were observed. All participants signed an informed consent. This study was approved by the Institutional Review Board 157/2559 (EC4) and COA No. Si 269/2016 of the hospital where data collection took place.

Procedures

According to a rule of thumb for psychometric analyses, the ratio of the number of subjects to the number of items ranges from 3 to 10, with at least 3 subjects per items being minimally required (Hair, Anderson, Tatham, & Black, 1998; Knapp & Brown, 1995; Rouquette & Falissard, 2011). Thus, 290 participants were included in this study, providing a ratio of 10 women per item. Therefore our sample size was large enough to examine properly the psychometric properties of the MENQOL with the factor analysis approach. First for reliability, we examined whether the subscale of the Thai MENQOL measured the same construct. In doing so, we considered internal consistency reliability for all subscales as a result of calculating Cronbach's alpha coefficients. Second for validity, we examined content, convergent, and structural validity.

Data Collection

All data were collected one time only. The following questionnaires were completed by the participants at one setting. Demographic and medical information forms were developed by the researchers as a structured self-report data collection tool. These forms were used to

quantify breast cancer stage of disease, type of adjuvant therapy, use of tamoxifen or aromatase inhibitors, and perceptions of frequency and severity of hot flashes.

The Menopause Specific Quality of Life Questionnaire (MENQOL) (Hilditch et al., 1996), is a 29-item instrument that assesses the following four domains of menopausal symptoms; vasomotor (3 items), psychosocial (7 items), physical (16 items), and sexual (3 items). It is used to evaluate both the prevalence and the severity of menopause symptoms as experienced in the previous 30 days, allowing us to explore how many women experience specific menopause symptoms and to what extent. The women are first asked whether they have experienced the symptom and secondly to rate the degree of bother for each symptom. If they have not experienced a symptom, the participant circles “no” and proceeds to the next item. If they have experienced the symptom, women are to rate how bothersome it is on a seven-point Likert scale ranging from 0 “not at all bothered” to 6 “extremely bothered”. For analyses, the item scores are converted to scores ranging from 1 to 8 in the following manner: no symptom = 1, have symptom, but not bothered = 2 through to extremely bothered = 8. In this study, we used the Thai version of the MENQOL questionnaire which was first translated by Pongpatiroj and colleagues (2001). This version is often used in healthy postmenopausal women without any modifications or item reductions and additions (Kutheerawong & Vichinsartvichai, 2016; Limpaphayom et al., 2006; Peeyananjarassri et al., 2006).

Data analysis

Analyses were completed using SPSS version 24.0 (IBM Corp, 2016). Descriptive statistics were used to evaluate demographic variables. The following analyses investigated each of psychometric properties listed below.

For content validity, we examined items to ensure adequate content coverage of an instrument. Content validity was assessed by having six bilingual native Thai-speaking healthcare experts compare the original English version with the Thai version to assure that each item had the same implication as the English version and each item was culturally relevant. Discrepancies among the six experts were resolved through discussion and revision until unanimous agreement was achieved on each translated item and consensus was reached that the Thai version was consistent semantically with the English version. The scale level content validity index (I-CVI) was computed as the number of experts rating each item on an ordinal scale (dividing the ordinal scale into 1 = not relevant, 2 = somewhat relevant, and 3 = quite relevant, 4 = highly relevant), divided by number of experts. Then, content validity index (CVI) was calculated to quantify the extent of agreement among the experts. The recommendation to determine and quantify the CVI for scale when there were six or more judges is that I-CVIs should not lower than 0.78 (Polit & Beck, 2006; Polit, Beck, & Owen, 2007). Furthermore, to confirm item homogeneity of the MENQOL, an item-item correlation analysis was also considered.

Floor and ceiling effects were also examined by descriptive statistics. The floor and ceiling effects were regarded as significant if more than 15% of participants marked the lowest or highest possible score. This can impact the sensitivity of the measure to detect change (Terwee et al., 2007).

Convergent validity was investigated by examining the significant correlations between the self-report of hot flash frequency and severity with the vasomotor subscale of the MENQOL. We hypothesized that scores on the vasomotor subscale would vary in the degree and direction of their association with the self-reported hot flash frequency and severity measures. Pearson correlation coefficients were calculated.

Discriminant validity was not able to be assessed since the entire sample was postmenopausal and experiencing hot flashes. A majority were on tamoxifen, which has hot flashes as a major side effect. Therefore, there was not good variability in the sample around the discriminating variable, hot flashes.

Structural validity was evaluated through exploratory factor analysis (EFA) with varimax rotation to determine if the latent item structure represents the four domains specified in the instrument's construction. Factor extraction was constrained to four factors in a confirmatory approach equal to the original English version of MENQOL. Before performing the factor analysis, Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity was used to examine the measure of sampling adequacy and the strength of the relationships among the items as a part of deciding whether factor analysis is appropriate (Hair et al., 1998). The number of extracted components was determined by the scree plot, percentage of variance explained by each component, number of eigenvalues over one, and consideration of prior psychometric MENQOL analyses.

Results

Participant characteristics

Two hundred ninety women were approached and agreed to participate in this study. No one refused to participate, for a participation rate of 100%. Demographic characteristics are shown in Table 1. The mean age was 52.13 years, with a range 40–79 years, over half were married, and almost all were Buddhist. Approximately 70% of the participants had stage I and II of breast cancer. Eighty-six percent were using tamoxifen. The majority of the participants had cancer for about three years.

Mean scores, floor and ceiling effects

The mean, standard deviation, and ranges are reported in Table 2. The lowest mean score was for the item of “increased facial hair” (0.17) and the highest mean score was for the item of “experience poor memory” (2.39).

The floor and ceiling effects of each item are displayed in Table 2. None of 29 items demonstrated ceiling effects, but 28 of 29 items showed floor effects. The only question that did not exhibit floor or ceiling effects was hot flashes within the vasomotor domain. Fewer than 15% of the participants reported either the lowest (7.6%) or the highest (1.7%) actual domain score.

Internal consistency reliability

As for item-item analysis, the correlation coefficients between most items ranged from 0.13 to 0.53, were presented in Table 4. Correlation coefficients of three pairs of items were less

than 0.80, indicating no item redundancy. However, “increased facial hair” was poorly correlated with most other items ($r = 0.13$).

Item-domain correlation analysis showed that all items correlated more strongly with their own domains than with other domains. Most items indicated a strong to moderate correlation with their own subscale. Nevertheless, item number 21 “increased facial hair”, number 26 “involuntary urination when laughing or coughing”, and number 20 “weight gain” showed a low correlation with the physical subscale ($r = 0.22$, $r = 0.31$, and $r = 0.35$, respectively). The overall Cronbach’s alpha coefficient for the Thai MENQOL total scale was 0.85. The Cronbach’s alpha coefficients for the vasomotor, psychosocial, physical, and sexual domains were 0.73, 0.78, 0.81, and 0.83, respectively (Table 4).

Content validity

The six experts who were involved in the Thai MENQOL version agreed that each translated item was consistent semantically with the English version. Two experts recommended that question 6 “experiencing poor memory” might be ambiguous and suggested changing this item to difficulty concentrating. The item content validity index (I-CVI) for this item was lower than other items (I-CVI = 0.67). After thorough discussion, the six experts agreed not to change this item. The CVI for the entire scale from the 29 items calculation was 0.94.

Convergent validity

Self-reported hot flash frequency and severity were significantly correlated with the vasomotor subscale ($r = 0.50$, and $r = 0.54$, respectively, $p < 0.01$). The vasomotor subscale was positively correlated with self-reported frequency and severity of hot flashes.

Structural validity

Exploratory factor analysis was used to assess structural validity. The result of the KMO test was 0.813, indicating an adequate sample size for factor analysis. Bartlett’s test of sphericity (Approx. *Chi-Square* = 2615.50, $df = 406$, $p < 0.001$), indicated that there were correlations with the data, implying that principal component analysis (PCA) with varimax rotation was appropriate. As a result of the confirmatory factor analysis, four factors were retained. The rotated factor matrix for the four-factor solution explained 42.35% of the total variance.

All items from the four-factor loadings were consistent with the original English MENQOL version. The vasomotor domain contained its original items (hot flashes, night sweats, and sweating) and sexual symptoms also grouped together in the sexual domain (change in your sexual desire, avoiding intimacy, and vaginal dryness) with moderate to high factor loadings. The psychosocial domain gathered seven items similar to the original English MENQOL with high factor loadings. Sixteen items of the physical subscale had low to moderate factor loadings as illustrated in Table 3.

With a four-factor extraction from the study sample, the factor matrix showed that one item-factor loading was under the accepted criterion of 0.30 (Hair et al., 1998). Item 21, “increased facial hair,” had low factor loadings of 0.20 on the physical subscale. Three other items (poor memory, weight gain, and involuntary urination) were under 0.40 (Table 3). Item

21 “increased facial hair” in the physical domain was removed following factor analysis and because of low factor loading. The Cronbach’s alpha coefficient was only slightly increased by 0.01 (Cronbach’s $\alpha = 0.86$). However this item was problematic in all analyses, with lowest incidence ($n = 23$) and lowest correlation coefficient with the physical subscale ($r = 0.22$) as well as lowest correlation coefficient with most other items ($r = 0.13$).

Discussion

The main contribution of this study was to evaluate the psychometric properties of the Thai MENQOL in breast cancer survivors, since the instrument was originally created for healthy postmenopausal women. The validation of the Thai MENQOL was carried out as part of the feasibility/ pilot study to evaluate the effect of a hypnosis intervention for menopausal symptoms in Thai breast cancer survivors.

In this analysis, the results support the reliability and validity of the MENQOL questionnaire for use among women with a history of breast cancer. The data support strong internal consistency reliability for all subscales with acceptable Cronbach Alpha Coefficients. Furthermore, the internal consistency reliability of the Thai version of MENQOL subscales is comparable with those reported in a previous study of the original English version (Hilditch et al., 1996; Lewis, Hilditch, & Wong, 2005; Radtke et al., 2011).

There were floor effects for most items except for hot flashes. Since the sample was recruited based on hot flash presence, it is unknown whether this measure would lack sensitivity in the Thai population for other menopausal symptoms or whether this particular sample just did not experience any menopausal symptoms other than hot flashes.

Interestingly, three items in the physical subscale (“increased facial hair,” “involuntary urination when laughing or coughing,” and “weight gain”) were not correlated with the other items. None of these items were reported as distressful. In fact, most participants ($N=267$) did not have facial hair increase as well as the mean score of the item was rather low (0.18), indicating that it was rarely seen or a very mild symptom in the participants included in this study. This is consistent with published literature that “increased facial hair” and “weight gain” are not prevalent in Asian women (Chen, Lin, Wei, Gao, & Wu, 2007; Nie, Yang, Liu, Zhao, & Wang, 2017; Yim et al., 2015). In particular, Nie et al. (2017) reported that the low incidence of increased facial hair in Chinese women is difficult to explain. Therefore, we decided to remove this item. More research is needed to understand the ethnic and cultural differences of the menopause experience in Thai women with breast cancer.

This study is limited in its generalization due to the use of convenience sampling of women with breast cancer experiencing hot flashes. The use of only one data point results in the inability to evaluate stability reliability or responsiveness to change over time. The test-retest reliability also needs to be studied to examine fully the stability of the MENQOL. Another study limitation was the inability to evaluate discriminant validity as all women were experiencing hot flashes.

Conclusion

The study findings confirm a four-factor structure of the Thai version of MENQOL with good reliability and validity. There is strong evidence supporting the reliability and validity of the Thai version of the MENQOL when used to measure menopause-related quality of life in Thai women with a history of breast cancer experiencing menopausal symptoms. The Thai MENQOL would be a useful tool to evaluate the impact of interventions for menopausal symptoms in Thai breast cancer survivors.

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Highlights

- The first study to evaluate the psychometric properties of the Thai Menopause Specific Quality of Life Questionnaire (MENQOL) in women with a history of breast cancer.
- Provides evidence for the validity of the Thai MENQOL questionnaire.
- Sets the stage for intervention research around menopause in Thai women with cancer now that a valid questionnaire is available.

Table 1

Demographic characteristics of the participants (N=290)

Characteristics	Mean	SD	Range
Age (years)	52.13	7.88	40–79
Duration of the illness (month)	37.71	27.39	4–264
	N		%
Age group			
40–49	118		40.70
50–59	121		41.70
60–69	43		14.80
70	8		2.80
Duration of the illness			
1–6 month	5		1.70
7–12 month	46		15.90
13 month	239		82.40
Marital status			
Single	61		21.00
Married	192		66.20
Widowed/ Divorced/ Separated	37		12.80
Religious			
Buddhist	281		96.90
Christian	7		2.40
Islam	2		0.70
Educational level			
Less than high school	69		23.80
High school	16		5.50
Some college	25		8.60
Bachelor's degree or higher	180		62.10
Employment status			
Employed	204		70.30
Unemployed	86		29.70
Methods of payment			
Out of pocket	48		16.60
Universal health care coverage	55		19.00
Social coverage	30		10.30
Government welfare	148		51.00
Other	9		3.10
Stage of breast cancer			
I	72		24.80
II	131		45.20
III	60		20.70

Characteristics	Mean	SD	Range
IV	27		9.30
Chemotherapy			
Yes	250		86.20
No	40		13.80
Radiation therapy			
Yes	192		66.20
No	98		33.80
Aromatase inhibitors			
Yes	91		31.40
No	199		68.60
Tamoxifen			
Yes	251		86.60
No	39		13.40
Currently using hormone therapy			
Tamoxifen	225		77.60
Aromatase inhibitors	65		22.40

Table 2

Mean, standard deviation, ranges, and floor and ceiling effects

Item and subscale	n ^a	Mean ^a	n ^b	Mean ^b	SD ^a	SD ^b	Range ^a	Range ^b	Floor effect %	Ceiling effect %
Vasomotor subscale	290	5.95			3.86		0–18	1–18		
(1) Hot flashes		2.26	268	2.44	1.36	1.25	0–6	1–6	7.60	1.70
(2) Night sweats		1.46	179	2.37	1.48	1.18	0–6	1–6	38.30	0.30
(3) Sweating		2.23	211	3.07	1.90	1.55	0–6	1–6	27.20	6.60
Psychosocial subscale	290	8.48			6.94		0–42	1–42		
(4) Being dissatisfied with my personal life		0.60	75	2.32	1.24	1.42	0–6	1–6	74.10	1.00
(5) Feeling anxious or nervous		1.77	188	2.73	1.76	1.47	0–6	1–6	35.20	3.40
(6) Experience poor memory		2.39	225	3.08	1.91	1.61	0–6	1–6	22.40	7.20
(7) Accomplishing less than I used to		0.74	97	2.21	1.28	1.29	0–6	1–6	66.60	1.00
(8) Feeling depressed, down or blue		0.84	113	2.16	1.33	1.33	0–6	1–6	61.00	0.70
(9) Being impatient with other people		1.47	171	2.49	1.63	1.40	0–6	1–6	41.00	2.80
(10) Feelings of wanting to be alone		0.67	80	2.43	1.31	1.41	0–6	1–6	72.40	0.70
Physical subscale	290	24.44			13.39		0–70	1–68		
(11) Flatulence (wind) or gas pains		1.38	157	2.56	1.65	1.43	0–6	1–6	45.90	2.80
(12) Aching in muscles and joints		2.33	227	2.98	1.80	1.50	0–6	1–6	21.70	5.50
(13) Feeling tired or worn out		2.15	210	2.97	1.80	1.43	0–6	1–6	27.60	3.40
(14) Difficulty sleeping		2.20	185	3.45	2.15	1.72	0–6	1–6	36.20	12.10
(15) Aches in back of neck or head		1.75	186	2.74	1.78	1.50	0–6	1–6	35.90	3.40
(16) Decrease in physical strength		1.94	221	2.55	1.61	1.36	0–6	1–6	23.80	1.70
(17) Decrease in stamina		2.00	219	2.65	1.64	1.36	0–6	1–6	24.50	1.40
(18) Feeling a lack of energy		1.39	173	2.33	1.58	1.42	0–6	1–6	40.30	1.40
(19) Drying skin		1.83	197	2.69	1.84	1.64	0–6	1–6	32.10	5.90
(20) Weight gain		1.16	127	2.65	1.72	1.68	0–6	1–6	56.20	4.50
(21) Increased facial hair		0.18	23	2.22	0.71	1.38	0–6	1–5	92.10	0.70
(22) Changes skin		1.49	165	2.61	1.75	1.56	0–6	1–6	43.10	2.80
(23) Feeling bloated		1.02	124	2.38	1.50	1.42	0–6	1–6	57.20	1.40
(24) Low backache		1.70	185	2.66	1.74	1.46	0–6	1–6	36.20	3.10
(25) Frequent urination		1.37	150	2.65	1.67	1.42	0–6	1–6	48.30	2.10
(26) Involuntary urination when laughing or coughing		0.52	86	1.76	0.99	1.07	0–6	1–5	70.30	1.00
Sexual subscale	290	4.21			4.91		0–18	1–18		
(27) Change in your sexual desire		1.44	123	3.41	1.99	1.61	0–6	1–6	57.60	5.90
(28) Vaginal dryness during intercourse		1.60	155	3.00	1.86	1.52	0–6	1–6	46.60	3.10
(29) Avoiding intimacy		1.17	103	3.28	1.83	1.58	0–6	1–6	64.50	3.10

^aAll participants^bParticipants with menopausal symptoms scores 1

Table 3

The four factors extracted by the confirmatory factor analysis with varimax rotation

Items	Factor loadings			
	1 Vasomotor	2 Psychosocial	3 Physical	4 Sexual
Vasomotor subscale	Factor 1			
(1) Hot flashes	0.56			
(2) Night sweats	0.74			
(3) Sweating	0.68			
Psychosocial subscale		Factor 2		
(4) Being dissatisfied with my personal life		0.65		
(5) Feeling anxious or nervous		0.80		
(6) Experience poor memory		0.31		
(7) Accomplishing less than I used to		0.54		
(8) Feeling depressed, down or blue		0.72		
(9) Being impatient with other people		0.66		
(10) Feelings of wanting to be alone		0.59		
Physical subscale			Factor 3	
(11) Flatulence (wind) or gas pains			0.46	
(12) Aching in muscles and joints			0.50	
(13) Feeling tired or worn out			0.55	
(14) Difficulty sleeping			0.41	
(15) Aches in back of neck or head			0.55	
(16) Decrease in physical strength			0.59	
(17) Decrease in stamina			0.61	
(18) Feeling a lack of energy			0.53	
(19) Drying skin			0.42	
(20) Weight gain			0.34	
(21) Increased facial hair			0.20	
(22) Changes skin			0.46	
(23) Feeling bloated			0.47	
(24) Low backache			0.54	
(25) Frequent urination			0.58	
(26) Involuntary urination when laughing or coughing			0.33	
Sexual subscale				Factor 4
(27) Change in your sexual desire				0.88
(28) Vaginal dryness during intercourse				0.78
(29) Avoiding intimacy				0.85
Initial Eigenvalues	6.17	2.41	1.89	1.81
Rotation sum of squares	4.12	3.69	2.43	2.06
Percentage of variance explained	14.19%	12.71%	8.36%	7.09%

Extraction method: Principal Component Analysis

Rotation method: Varimax with Kaiser Normalization

Table 4

Item-domain correlation analysis of the Thai version of MENQOL (29 items, four domains)

Items	Cronbach's alpha coefficients	Domain				
		Vasomotor (3 items)	Psychosocial (7 items)	Physical (16 items)	Sexual (3 items)	Total (29 items)
Vasomotor subscale	0.73					
(1) Hot flashes		0.71	0.30	0.25	0.53	0.39
(2) Night sweats		0.84	0.21	0.23	0.20	0.39
(3) Sweating		0.85	0.26	0.31	0.10	0.41
Psychosocial subscale	0.78					
(4) Being dissatisfied with my personal life		0.22	0.64	0.28	0.20	0.44
(5) Feeling anxious or nervous		0.25	0.78	0.35	0.21	0.53
(6) Experience poor memory		0.18	0.54	0.38	0.23	0.46
(7) Accomplishing less than I used to		0.20	0.59	0.36	0.05	0.41
(8) Feeling depressed, down or blue		0.22	0.73	0.40	0.12	0.52
(9) Being impatient with other people		0.22	0.70	0.28	0.16	0.44
(10) Feelings of wanting to be alone		0.21	0.61	0.27	0.14	0.39
Physical subscale	0.81					
(11) Flatulence (wind) or gas pains		0.22	0.29	0.50	0.15	0.42
(12) Aching in muscles and joints		0.30	0.31	0.54	0.10	0.46
(13) Feeling tired or worn out		0.23	0.30	0.57	0.01	0.43
(14) Difficulty sleeping		0.25	0.28	0.48	0.12	0.39
(15) Aches in back of neck or head		0.19	0.24	0.58	0.09	0.43
(16) Decrease in physical strength		0.07	0.35	0.63	0.01	0.45
(17) Decrease in stamina		0.08	0.35	0.63	0.03	0.47
(18) Feeling a lack of energy		0.11	0.37	0.61	0.15	0.50
(19) Drying skin		0.17	0.29	0.50	0.05	0.38
(20) Weight gain		0.09	0.17	0.35	0.02	0.22
(21) Increased facial hair		0.07	0.04	0.22	0.05	0.13
(22) Changes skin		0.13	0.25	0.50	0.13	0.39
(23) Feeling bloated		0.23	0.27	0.50	0.09	0.40
(24) Low backache		0.19	0.22	0.52	0.18	0.40
(25) Frequent urination		0.12	0.16	0.52	0.01	0.32
(26) Involuntary urination when laughing or coughing		0.11	0.10	0.31	0.14	0.22
Sexual subscale	0.83					
(27) Change in your sexual desire		0.10	0.24	0.13	0.89	0.36
(28) Vaginal dryness during intercourse		0.19	0.22	0.18	0.83	0.37
(29) Avoiding intimacy		0.11	0.20	0.12	0.86	0.32
Overall MENQOL	0.85					