

# Menopausal symptoms, sexual function, depression, and quality of life in Korean patients with breast cancer receiving chemotherapy

Hyojung Park · Hyeon Gyeong Yoon

Received: 8 January 2013 / Accepted: 4 April 2013 / Published online: 25 April 2013  
© Springer-Verlag Berlin Heidelberg 2013

## Abstract

**Purpose** The purpose of this study was to study the relationships among menopausal symptoms, sexual function, depression, and quality of life in women with breast cancer undergoing chemotherapy.

**Methods** Two hundred women participated in this cross-sectional study. Data were collected with the Menopause Rating Scale (MRS), Female Sexual Function Index (FSFI), Beck Depression Inventory II (BDI-II), and the Functional Assessment of Cancer Therapy—Breast Cancer (FACT-B). Data were analyzed using descriptive statistics, *t*-tests, ANOVA, Scheffe's test, and Pearson product moment correlations using SPSS v. 20.

**Results** Participants had alterations in menopausal symptoms and sexual function, and were depressed with a decreased quality of life. These factors are known to influence satisfaction with family support ( $p < 0.05$ ) and sexual relationships ( $p < 0.05$ ).

**Conclusions** Nurses should provide education to women with breast cancer on their sexual issues and encourage them to attend family support programs. They should also encourage family members to be proactive in addressing menopausal and depressive symptoms in these women with a goal to enhance their sexual functioning and quality of life.

**Keywords** Breast cancer · Menopausal symptoms · Sexual function · Depression · Quality of life · Nursing

## Introduction

Breast cancer has the highest incidence rate of cancers in women in the U.S., England, and other Western countries. In

South Korea, it ranks second; this has been brought about by changes in diet and lifestyle among Korean with increased westernization in their lives [1]. The number of patients with breast cancer in 1998 was 3,801; this figure tripled 11 years to 13,460 cases in 2009 with an annual rate increase of 6.5 %. In Western countries, breast cancer primarily occurs among women in their 50s and older; in South Korea, however, women in their 30s and 40s represent 50 % of cases, with a high survival rate [2]. Although survival is improved due to developments in medical technology, treatment-related side effects cause physical and psychological distress, thus it is important to take steps to improve quality of life (QOL) in women with breast cancer undergoing treatment and subsequent to that time [3, 4].

Chemotherapy is a standard of care for women with breast cancer. It is a long-term and repetitive medical treatment that causes physical side effects by damaging normal cells aside from the cancer cells [5]. Acute ovarian failure as a result of chemotherapy is a known painful complication [6]. Menopausal symptoms due to reduced hormones and adverse physical reactions such as diminished sexual function and depression are also negative side effects of the chemotherapeutic regimen [7, 8].

Women in their 40s have often not undergone menopause; early menopause that results from chemotherapy is present in 89 % of these patients [9]. The toxic action of the anticancer drugs reduces the number of follicle cells, thus the amenorrhea induced by chemotherapy results in more severe and frequent menopausal symptoms than in women who experience menopause naturally [8, 10]. In addition, approximately 90 % of women with breast cancer experience alterations in sexual function during their treatment; this diminished sexual function results in lowered self-esteem and overall well-being [11]. Women with breast cancer need to focus on their treatment and survival; still, their overall QOL is known to be adversely affected [12,

H. Park (✉) · H. G. Yoon  
Division of Nursing Science, College of Health Sciences,  
Ewha Womans University, 11-1 Daehyun-Dong, Seodaemooon-Ku,  
Seoul 120-750, South Korea  
e-mail: hyojungp@ewha.ac.kr

13]. Although women with breast cancer have complained of diverse sexual dysfunction compared to women without breast cancer, they were unwilling to reveal their sexual problems; therefore, it was hard for the nurse to provide practical support or counseling related to these issues in the clinical setting [14].

Chemotherapy is stressful and patients often experience increased levels of anxiety and depression [15]. Treatment-related side effects and psychological depression as a result of ongoing follow-up can negatively impact QOL in these women [16]. More importantly, depression in women with breast cancer may be more prevalent as the site of the cancer is the breast, the symbol of a woman, and the medical treatment often undertaken is mastectomy [17].

Chemotherapy is reported to have more severe psychological side effects than radiotherapy [18] and to cause more stress during the treatment period [16]. Menopausal symptoms, diminished sexual function, and depression as a result of chemotherapy are highly correlated with QOL among women with breast cancer; thus QOL declines with increasing severity of each symptom, that is, an inverse relationship [11, 19, 20]. It is important to study the level and relationship of physical and emotional side effects received by women with breast cancer undergoing chemotherapy. The purpose of this study was to study relationships among menopausal symptoms, sexual function, depression, and QOL in women with breast cancer undergoing chemotherapy.

## Materials and methods

### Study design

This descriptive, correlational, cross-sectional study was conducted in the outpatient and inpatient departments of the Center for Breast Cancer at E University Hospital, Seoul. This study was approved by the institutional review board (ECT 12-13A-28) in E University Hospital. Informed written consent was obtained from each patient.

### Participants

A total of 200 women were selected to participate in the study. Inclusion criteria included: 1) receiving chemotherapy on a daily basis during the 3-month period from May to July 2012; 2) age 18 or older; and 3) did not experience menopause as a result of surgery. In this study, menopause was defined as no menstrual periods for 12 months or more before chemotherapy [21] while amenorrhea was defined as having regular menstruation before chemotherapy but with menstrual period for 3 months or longer after receiving chemotherapy [22].

### Data collection

The study used a series of structured and validated questionnaires to collect data. The purpose of the study was explained to the participants, and a written consent signed. Each participant was provided with a packet of questionnaires that they completed independently and returned to the researcher by mail or in a box.

### Measures

Data collected included sociodemographic information, clinical characteristics, menopausal symptoms, sexual functioning, depression, and QOL.

#### *Menopausal symptoms*

The Menopause Rating Scale (MRS) translated in Korean was used to collect data on menopausal symptoms and it has been shown to have satisfactory validity [23]. MRS is self-report that includes 11 questions in three sub-domains: somato-vegetative (four questions); urogenital (three questions); and psychological domain (four questions). It is rated on a 5-point Likert scale ranging from 0 for 'no symptom' and 5 for 'very severe.' The total scores range from 0 to 44 points, with higher scores (greater than 16) reflecting severely perceived menopausal symptoms. The reliability of the original instrument was 0.86 and the Cronbach's  $\alpha$  in this study was 0.82.

#### *Sexual function*

To assess sexual function, the Female Sexual Function Index (FSFI) [24] translated in Korean was used, and it has been shown to have satisfactory validity [25]. This questionnaire consists of 19 items in six sub-categories: sexual desire (two items), sexual arousal (four items), vaginal lubrication (four items), orgasm (three items), satisfaction (three items), and painful intercourse (three items). The items for sexual desire and satisfaction were measured using a 5-point scale while the rest of the questions were measured with a 6-point scale. The lowest point was 4 and the highest point was 95; thus, lower scores reflected more severe disorder in terms of sexual function. The reliability of the original instrument was 0.97 and the Cronbach's  $\alpha$  in this study was 0.98.

#### *Depression*

Depression was measured using the Korean of the Beck Depression Inventory-II (BDI-II), and it has been shown to have satisfactory validity [26, 27]. It is a self-report scale designed to measure the presence and degree of adult

depression and measures emotional, psychological, and physical symptoms in a total of 21 questions. It is scored with a 4-point Likert scale with scores ranging from 0 to 63. Severity of depression is classified in four stages: 0–13 is not depressed, 14–19 is a mild depression, 20–28 is intensive depression, and 29–63 is severe depression. The reliability of the original instrument was 0.92 and the Cronbach's  $\alpha$  in this study was 0.89.

### QOL

QOL was measured with the Korean version of Functional Assessment of Cancer Therapy—Breast Cancer Version 4 (FACT-B), and it has been shown to have satisfactory validity [28]. The instrument is composed 36 questions in five sub-domains including physical well-being (PWB), social well-being (SWB), emotional well-being (EWB), functional well-being (FWB), and breast cancer subscale (BCS). Each question is rated on a 5-point Likert scale; scores range from 0 to 144 points with higher scores reflecting a positive QOL. The reliability of the original instrument was 0.91 and the Cronbach's  $\alpha$  in this study was 0.91.

### Statistical analysis

All analyses were performed using SPSS v. 20.0. Two-sided  $p$  values less than 0.05 were considered statistically significant. Descriptive statistics were utilized to analyze patient demographics and clinical characteristics. Menopausal symptoms, sexual function, depression, and level of QOL among the subjects were described with means and standard deviations. Differences in menopausal symptoms, sexual function, depression, and QOL among the subjects were analyzed through the  $t$ -test and ANOVA and the Scheffe test for back-testing. The relationships among menopausal symptoms, sexual function, depression, and level of QOL were analyzed with Pearson's correlation coefficients.

### Results

Demographic and clinical characteristics of the sample and descriptive statistics of the study variables are shown in Table 1. The mean age of the sample was 45.64 ( $\pm 7.12$ ), ranging from 25 to 59 years. Stage I or II early breast cancer was the primary diagnosis for 143 women (71.5 %). Most women ( $n=127$ ; 63.5 %) received less than 6 months of chemotherapy, and half reported experiencing amenorrhea after receiving chemotherapy ( $n=107$ ; 53.5 %). Of the sample, 114 women (57.0 %) had undergone lumpectomy. Regarding satisfaction in terms of family support, 125 patients (62.5 %) were satisfied. In terms of intercourse, 73 patients (36.5 %) reported 'no intercourse within 6 months' while 64

**Table 1** Demographic and clinical characteristics

Characteristics	Number	Percentage
Mean age (SD)	45.64 (7.12)	
≤39	31	15.5
40–49	106	53
50–59	63	31.5
Length of chemotherapy (months)		
<6	127	63.5
6–12	50	25.0
≥13	23	11.5
Marital status		
Married or cohabitation	166	83.0
Single	19	9.5
Bereavement, divorce, separation	15	7.5
Perceived economic status		
Rich	11	5.5
Moderate	145	72.5
Poor	44	22.0
Satisfaction of family support		
Satisfaction	125	62.5
Moderation	61	30.5
Unsatisfaction	14	7.0
Status of menstruation before chemotherapy		
Regular	128	64.0
Irregular	29	14.5
Menopause	40	20.0
Others	3	1.5
Status of menstruation after chemotherapy		
Regular	31	15.5
Irregular	16	8.0
Amenorrhea	107	53.5
Menopause	43	21.5
Frequency of sexual activity		
≥1/week	28	14.0
2–3/month	64	32.0
≤3/6 months	35	17.5
None within 6 months	73	36.5
Cycle of chemotherapy		
1–2	58	29.0
3–4	56	28.0
5–6	37	18.5
7–8	16	8.0
≥9	33	16.5
Stage		
Early (I, II)	143	71.5
Advanced (III, IV)	25	12.5
Unknown	32	16.0
Type of surgery		
Mastectomy	39	19.5
Lumpectomy	114	57.0
MRM+breast reconstruction	15	7.5

**Table 1** (continued)

Characteristics	Number	Percentage
Chemotherapy drug		
CMF	60	30.0
AC	46	23.0
AT	41	20.5
Others	53	26.5

patients (32.0 %) said ‘2–3 times a month.’ Table 2 shows the mean and standard deviation for each scale of the MRS, BDI II, FSFI and FACT-B.

As shown in Table 2, the overall average menopausal symptom score was  $13.05 \pm 7.21$ , which qualified as severe. There were 74 participants (37.0 %) in the ‘severe’ group with an average score of  $11.51 \pm 2.31$  and 73 participants (36.5 %) in the ‘very severe’ group with average score of  $20.82 \pm 4.22$ . Based on these results, 73.5 % of the women in this study were experiencing severe menopausal symptoms. Of the menopausal symptom subscales, the somato-vegetative domain had the highest score with an average of  $5.03 \pm 3.07$  points followed by the psychological domain with  $4.89 \pm 3.44$  points, and urogenital domain with  $3.12 \pm 2.41$  points.

Wiegel and colleagues [29] suggested 26.55 points as the average FSFI score for the cut-off score of sexual dysfunction; however, Song and colleagues [30] suggested 25.0 points as the sexual dysfunction score suitable for Korean

**Table 2** The score of menopausal symptoms, sexual function, depression, and QOL

Variables	Possible range	Min	Max	M±SD
Menopausal symptoms total	0–44	0	35	$13.05 \pm 7.21$
Somato-vegetative domain	0–16	0	13	$5.03 \pm 3.07$
Urogenital domain	0–12	0	9	$3.12 \pm 2.41$
Psychological domain	0–16	0	15	$4.89 \pm 3.44$
Sexual function	4–95	4	85	$24.66 \pm 25.44$
Desire	2–10	2	8	$3.27 \pm 1.43$
Arousal	0–20	0	19	$4.08 \pm 5.52$
Lubrication	0–20	0	20	$5.14 \pm 6.90$
Orgasm	0–15	0	15	$3.47 \pm 4.84$
Satisfaction	2–15	2	10	$4.42 \pm 2.45$
Pain	0–15	0	15	$4.27 \pm 5.78$
Depression	0–63	1	53	$15.79 \pm 8.76$
Quality of life total	0–144	30	138	$85.77 \pm 20.91$
Physical well-being	0–28	3	28	$18.77 \pm 5.70$
Social well-being	0–28	2	28	$15.93 \pm 5.80$
Emotional well-being	0–24	3	24	$16.30 \pm 4.73$
Functional well-being	0–28	1	28	$14.74 \pm 5.59$
Breast cancer subscale	0–36	4	34	$20.02 \pm 5.83$

women. This study used 25.0 points as Song et al. suggested for the sexual dysfunction score. The average sexual function score in this study was  $24.66 \pm 25.44$  points and thus was lower than 25.0. According to the result derived by examining the sexual dysfunction group based on 25.0 points, 124 patients (62.0 %) from all patients with breast cancer belonged to the sexual dysfunction group showing an average of  $5.74 \pm 2.03$ , while 76 patients (38.0 %) belonged to the non-risk group in terms of sexual dysfunction with an average of  $55.52 \pm 12.42$ .

The average depression score of the subjects was  $15.79 \pm 8.76$  which represents a mild depression according to the rating scale. The level of depression was classified into four levels; 90 participants ( $8.51 \pm 3.16$ ) who were not depressed followed by 49 ( $23.08 \pm 2.43$ ) with serious depression, 46 ( $15.80 \pm 1.70$ ) with mild depression, and 15 ( $35.60 \pm 7.21$ ) with severe depression.

The overall average score on QOL was  $85.77 \pm 20.91$ . QOL was composed of five sub-domains and according to the average scores of each domain, FWB had the lowest score with  $14.74 \pm 5.59$  followed by  $15.93 \pm 5.80$  for SWB,  $16.30 \pm 4.73$  for EWB,  $18.77 \pm 5.70$  for PWB, and  $20.02 \pm 5.83$  for BCS.

## Discussion

The purpose of study was to understand the differences and relationships among menopausal symptoms, sexual function, depression, and QOL in women with breast cancer undergoing chemotherapy. The analysis was based on the calculation of the standard score of menopausal symptoms depending on origin of continent, where normal women from each continent were selected through random sampling to conduct a multinational study. The result showed that Asians had higher scores on menopausal symptoms than the average score of women from Europe, North America, and Latin America [31]. In contrast, the score on menopausal symptoms derived in this study was approximately twice higher than the standard score of the Asian women, and it was believed that the menopausal symptom score of the patients with breast cancer who experienced acute ovarian failure due to chemotherapy was higher than the women experiencing menopausal symptoms from other continents.

According to the results of this study, there were significant differences in menopausal symptoms depending on the time-lapse after starting chemotherapy, satisfaction in terms of family support, and frequency of intercourse (Table 3). Cheon and Choi (2010) classified stages of breast cancer according to metastasis, recurrence, and possibility of treatment. The relationship with physical symptoms was assessed depending on family support. Cheon and Choi (2010) revealed that higher family support caused lower

**Table 3** Differences in menopausal symptoms, depression and quality of life by participants' characteristics

Characteristics	Categories	Menopausal symptoms			Depression			Quality of life					
		M±SD	F/t	p	Scheffe	M±SD	F/t	p	Scheffe	M±SD	F/t	p	Scheffe
Age (years)	≤39	11.51±7.02	0.906	0.406	13.58±8.11	1.236	0.293	91.41±22.96	1.362	0.259			
	40–49	13.50±7.36			16.38±5.62			84.97±21.28					a>b>c
Length of chemotherapy (month)	50–59	13.04±7.05			15.87±9.26			84.33±19.02					
	<6 <sup>a</sup>	12.11±7.42	3.909	0.022*	15.97±8.94	1.692	0.187	86.85±20.61	0.732	0.482			
	6–12 <sup>b</sup>	13.94±5.90			14.22±7.08			85.08±20.79					
Household income (KRW/month)	≥13 <sup>c</sup>	16.30±7.72			18.17±10.64			81.26±23.00					
	<2 million <sup>a</sup>	11.57±6.52	1.053	0.351	16.00±7.69	1.909	0.151	79.87±19.10	3.928	0.021*			
	2–4 million <sup>b</sup>	13.74±7.03			17.15±8.82			83.26±17.76					
Satisfaction of family support	≥4.01 million <sup>c</sup>	12.98±7.59			14.51±8.99			90.14±23.28					
	Satisfaction <sup>a</sup>	11.96±7.25	4.472	0.013*	14.21±8.19	6.760	0.001**	90.72±19.82	13.611	<0.001**			
	Moderation <sup>b</sup>	14.42±6.02			17.72±8.33			80.22±17.67					
Frequency of sexual activity	Unsatisfaction <sup>e</sup>	16.71±9.61			21.42±11.82			65.71±26.33					
	≥1/week <sup>a</sup>	9.10±6.59	3.799	0.011*	11.96±7.30	2.801	0.041*	97.85±17.19	5.699	0.001**			a>d
	2–3/month <sup>b</sup>	13.81±6.75			15.21±8.32			87.92±20.14					
Stage	≤3/6 months <sup>c</sup>	14.68±7.07			17.48±9.64			84.45±23.17					
	None within 6 months <sup>d</sup>	13.10±7.49			16.94±8.89			79.87±19.80					
	Stage I <sup>a</sup>	12.28±6.84			14.97±9.52	2.499	0.061	90.02±21.07	5.101	0.002**			a,b<c
	Stage II <sup>b</sup>	13.26±7.34			14.90±7.46			86.25±20.05					
	Stage III, IV <sup>c</sup>	16.12±7.00			20.04±9.70			71.64±21.03					
Unknown <sup>d</sup>	11.87±7.49			16.28±8.34			86.25±18.36						

\**p*<0.05, \*\**p*<0.01

physical symptoms among the patients with breast cancer in all three stages [32]. However, the study conducted by Cheon and Choi did not examine menopausal symptoms; thus, their study results were limited compared to this study. Satisfactory family support could bring positive effects to alleviate the menopausal symptoms that were perceived by the patients with breast cancer.

According to the results of this study, there was a great difference between the average and standard deviation between the sexual dysfunction group and non-risk groups. A total of 108 participants (54 %) reported having sexual intercourse less than three times in 6 months. This fact implies the great difference in the two groups.

Previous studies reported reduced sexual activity during the treatment period as a result of drug-related side effects including chemotherapy [33]. Since this study focused only on women with breast cancer who were currently receiving medical treatment, this study was limited compared to studies conducted with patients who have completed treatment and are breast cancer survivors.

The sexual function depending on the time-lapse after starting chemotherapy and the number of times for receiving chemotherapy was statistically significant (Table 4). The group that received chemotherapy once or twice had higher sexual function scores than the group of women who received chemotherapy more than five times. It was believed that the

**Table 4** Differences in Sexual function by participants' characteristics

Characteristics	Categories	Sexual function			
		<i>M</i> ± <i>SD</i>	<i>F</i> / <i>t</i>	<i>p</i>	Scheffe
Age (years)	≤39	26.38±26.40	0.846	0.431	
	40–49	26.20±25.99			
	50–59	21.20±24.06			
Length of chemotherapy (month)	<6 <sup>a</sup>	28.79±27.31	4.799	0.009**	<i>a</i> > <i>b</i>
	6–12 <sup>b</sup>	16.98±19.73			
	≥13 <sup>c</sup>	18.52±21.09			
Marital status	Cohabitation or married	26.83±26.05	3.839	0.023*	
	Unmarried	16.21±21.66			
	Bereavement, divorce, separation	11.26±15.91			
Status of menstruation after chemotherapy	Regular	34.74±30.31			
	Irregular	34.43±27.61			
	Amenorrhea	23.57±24.39			
	Menopause	16.60±20.44			
Frequency of sexual activity	≥1/week <sup>a</sup>	46.71±26.26	35.437	<0.001**	<i>a</i> , <i>b</i> > <i>c</i> > <i>d</i>
	2–3/month <sup>b</sup>	36.23±25.54			
	≤3/6 months <sup>c</sup>	22.88±24.39			
	None within 6 months <sup>d</sup>	6.90±7.05			
Cycle of chemotherapy	1–2 <sup>a</sup>	35.40±28.61	4.952	0.001**	<i>a</i> > <i>c</i> , <i>d</i>
	3–4 <sup>b</sup>	24.94±25.39			
	5–6 <sup>c</sup>	16.18±18.52			
	7–8 <sup>d</sup>	19.06±20.32			
	≥9 <sup>e</sup>	16.93±22.35			
Metastasis	Yes	18.64±22.22	3.361	0.001**	
	No	30.44±27.07			
Collaborative therapy	CTx	21.22±25.58	2.700	0.070*	
	CTx+OP	27.52±26.31			
	CTx+OP+RTx	17.32±20.48			
Stage	Stage I <sup>a</sup>	32.74±27.88	4.785	0.003**	<i>a</i> > <i>c</i>
	Stage II <sup>b</sup>	21.81±23.13			
	Stage III, IV <sup>c</sup>	13.04±17.20			
	Unknown <sup>d</sup>	22.18±25.74			
Type of chemotherapy drug	AC <sup>a</sup>	29.91±27.76	4.818	0.003**	<i>c</i> > <i>d</i>
	AT <sup>b</sup>	19.58±23.68			
	CMF <sup>c</sup>	31.50±26.89			
	Others <sup>d</sup>	16.28±19.70			

CTx chemotherapy, OP operation, RTx radiotherapy

\**p*<0.05, \*\**p*<0.01

sexual function among the participants at the beginning stages of chemotherapy were not much different and then changed as chemotherapy sessions increased to five or more times. This result was similar to the findings of a study on lung cancer patients who received chemotherapy. The sexual function of lung cancer patients worsened with an increase in chemotherapy sessions [34]. Also, in a study that examined the QOL among cancer patients receiving chemotherapy, Saevarsdottir et al. [13] revealed that the sub-domains of QOL like sexual function and physical domain worsened 3 to 6 months after starting chemotherapy treatment.

The sexual function score depending on the frequency of sexual intercourse was shown to be statistically significant. This result was consistent with the results derived from other studies as the groups conducting sexual and non-sexual activity showed significant differences [35] which showed that sexual life satisfaction was higher depending on intercourse frequency [36]. Other studies claimed that the partner relationship was important to improve sexual function of patients with breast cancer who received mastectomy [12, 37]. Higher partner intimacy was related to increased sexual satisfaction among the patients with gynecologic cancer [38]. Comprehensively, as the instinctive desire of a human, sexual activity should be normally maintained since it improves sexual satisfaction by enhancing partner intimacy.

For depression, this study found that there were significant differences among groups depending on satisfactory family support (Table 3). According to the results derived from the Scheffe test, groups that were satisfied with their family support had lower depression scores compared to those who were unsatisfied in terms of family support. This result was consistent with the findings of other studies that showed that level of depression decreased along with spouse's support [39] and patients positively perceived their state of health and showed higher self-esteem when they had high level of family support [40]. Therefore, family support served a significant role in the mental and psychological well-being of patients with breast cancer in this study.

In addition, the level of depression depending on frequency of intercourse was shown to be statistically significant. In other studies, sexual life was assumed to include the sexual relationship and stability and femininity obtained through human relationships [41]. Since the group with regular intercourse had lower depression levels compared to the group with an inactive sexual life [12], sexual relationship worked as a means to sustain the value of women and lower depression through emotional stability shared with a spouse.

Regarding the QOL, there was significant difference depending on the satisfaction level with family support while showing differences depending on the frequency of intercourse. Such results were consistent with the findings from other studies claiming that the group with sexual activity had a higher QOL than the group with absent sexual

**Table 5** Correlation among menopausal symptoms, sexual function, depression, and quality of life

Variables	Menopausal symptoms	Sexual function	Depression	Quality of life (FACT-B)					
				PWB	SWB	EWB	FWB	BCS	Total
Menopausal symptoms		0.169* (0.017)	0.592** (<0.001)	0.482** (<0.001)	0.347** (<0.001)	0.595** (<0.001)	0.413** (<0.001)	0.413** (<0.001)	0.588** (<0.001)
Sexual function			0.153* (0.031)	0.099 (0.162)	0.219** (0.002)	0.189** (0.007)	0.250** (<0.001)	0.185** (<0.001)	0.249** (<0.001)
Depression				0.544** (<0.001)	0.394** (<0.001)	0.712** (<0.001)	0.623** (<0.001)	0.565** (<0.001)	0.743** (<0.001)

activity [35]. Since sexual function was different in other studies depending on level of QOL, the findings of Saevarsdottir et al. [13] were consistent with these results.

In examining the correlation between menopausal symptoms, sexual function, depression, and QOL among participants in this study, each variable showed statistically significant correlations (Table 5). According to a study that examined the correlation between the physical symptoms and QOL among breast cancer survivors, the two variables had a statistically significant negative correlation; thus, it was possible to understand the implication of the results in connection with the menopausal symptoms, which were a part of the physical symptoms [42]. The subjects of the study conducted by Park et al. were breast cancer survivors whose treatment was completed. However, this study involved patients with breast cancer who were receiving chemotherapy. Therefore, comparing these two studies might be limited. Nonetheless, the physical symptoms of the patients with breast cancer were related to QOL not only during the treatment period but also when treatment concluded. Therefore, it is important to provide information and interventions to alleviate physical symptoms.

The sexual function of the participants was shown to have a statistically significant correlation with depression and QOL. In a study that was conducted with 191 patients with breast cancer in the U.S., a statistically significant correlation of sexual function to sub-domains of QOL, such as the physical and psychological aspects [43], was reported which was consistent with the results of this study. However, it should be noted that this study did not use the same instruments as those used in the present study. Also, in a study conducted among 40 patients with breast cancer receiving chemotherapy in Turkey, depression and sexual function showed an inverse-correlation [44]. Based on these results, it is safe to say that improved sexual function helps lower depression while increasing QOL thus interventions that support these domains are appropriate. Specifically, the majority of participants in this study were young women in their 40s, thus it is necessary to provide consistent counseling and support to solve issues related to sexual function, a new issue for these women that occurs in the course of medical treatment.

This study showed that depression among participants had statistically significant correlations with QOL. Such result was consistent with a study conducted among 150 patients with breast cancer in Taiwan [45]. According to the standard classification of the correlation coefficient by Munro [46], it showed that depression and QOL had a high inverse-correlation. Moreover, a study that was conducted for 120 breast cancer survivors in Turkey reported statistically significant positive correlations with depression in terms of positive thinking over the disease and QOL [47]. Therefore, psychosocial interventions for positive thinking would be an appropriate intervention to lower depression and improve QOL.

When taking a look at the correlation of menopausal symptoms, sexual function, depression, and QOL, the severe menopausal symptoms among participants resulted in increased depression and decreased sexual function. In contrast, the level of depression decreased and overall QOL improved with enhanced sexual function. Each symptom realized a statistically significant correlation. Thus, nursing interventions should be implemented to decrease the problems brought on by menopausal symptoms, sexual dysfunction, and depression among patients with breast cancer while improving their QOL; early intervention by paying attention to the patients' physical and emotional signs when providing care in the clinical setting will should improve the QOL of patients with breast cancer.

## Conclusion

In conclusion, participants in this study were women with breast cancer who were receiving chemotherapy. They experienced disturbances in menopausal symptoms, sexual function, were depressed, and had decreased QOL, which correspond with the results of previous studies. These factors have been found to be related to satisfaction with family support and sexual life. Stress was reduced as family support and perceived health improved [32, 40]. Participants who received individual psychosocial support from nurses tended to experience less physical symptoms than those who did not receive the afore-mentioned support [48]. In these patients, nurses could educate patients with breast cancer on their sexual function, encourage them to attend family support programs, and encourage family members to be proactive in order to prevent menopausal and depressive symptoms in these patients and enhance their sexual function and QOL.

**Conflict of interest** The authors declare that they have full control of all primary data, and they agree to allow the journal to review their data if requested.

## References

1. National Cancer Information Center (2008) National cancer information, [http://www.cancer.gov/cancer/cis/cis\\_b/01/013/1268116\\_5873.html](http://www.cancer.gov/cancer/cis/cis_b/01/013/1268116_5873.html). Accessed 10 January 2012
2. National Cancer Information Center (2009) National cancer information. [http://www.cancer.gov/cancer/cis/cis\\_b/01/013/1268116\\_5873.html](http://www.cancer.gov/cancer/cis/cis_b/01/013/1268116_5873.html). Accessed 25 January 2012
3. Brem S, Kumar NB (2011) Management of treatment-related symptoms in patients with breast cancer: current strategies and future directions. *Clin J Oncol Nurs* 15(1):63–71
4. Epplein M, Zheng Y, Zheng W et al (2011) Quality of life after breast cancer diagnosis and survival. *J Clin Oncol* 29(4):406–412
5. Choi BJ, Park JH, Choe BM, Han SH, Kin SH (2011) Factors influencing anxiety and depression in patients with breast cancer treated with surgery. *J Korean Soc Bio Ther Psychiatry* 17(1):87–95



6. Partridge A, Gelber S, Gelber RD et al (2007) Age of menopause among women who remain premenopausal following treatment for early breast cancer: long term results from international breast cancer study group trials V and VI. *Eur J Cancer* 43:1646–1653
7. Chang SB, Lee KH, Chung CW (2008) Factors of occurrence of amenorrhea and climacteric symptoms in patients with breast cancer underwent chemotherapy. *Korean J Women Health Nurs* 14(3):189–195
8. Bauld R, Brown RF (2009) Stress, psychological distress, psychosocial factors, menopause symptoms and physical health in women. *Maturitas* 62(2):160–165
9. The Korean Society Menopause (2011) Hormone replacement therapy and breast cancer in postmenopausal women. *J Korean Soc Menopause* 17(3):125–126
10. Deecher DC, Dorries K (2007) Understanding the pathophysiology of vasomotor symptoms (hot flushes and night sweats) that occur in perimenopause, menopause, and postmenopause life stages. *Arch Womens Ment Health* 10(6):247–257
11. Dizon DS (2009) Quality of life after breast cancer: survivalship and sexuality. *Breast J* 15(5):500–504
12. Manganiello A, Hoga LAK, Reberte LM et al (2011) Sexuality and quality of life of patients with breast cancer post mastectomy. *Eur J Oncol Nurs* 15(2):165–172
13. Saevarsdottir T, Fridriksdottir N, Gunnarsdottir S (2010) Quality of life and symptoms of anxiety and depression of patients receiving cancer chemotherapy. *Cancer Nurs* 33(1):1–10
14. Kim HY, So HS, Chae MJ (2009) Sexual function of breast cancer survivors and healthy women: a comparative study. *J Korean Oncol Nurs* 9(1):60–66
15. Breen SJ, Baravelli CM, Schofield PE et al (2009) Is symptom burden a predictor of anxiety and depression in patients with cancer about to commence chemotherapy? *Med J Aust* 190(7):99–104
16. Gwede CK, Small BJ, Munster PN, Andrykowski MA, Jacobsen PB (2008) Exploring the differential experience of breast cancer treatment related symptoms: a cluster analytic approach. *Support Care Cancer* 16:925–933
17. Knobf MT (2008) “Coming to grips” with chemotherapy-induced premature menopause. *Health Care Women Int* 29(4):384–399
18. So WKW, Marsh G, Ling WM et al (2010) Anxiety, depression and quality of life among Chinese patients with breast cancer during adjuvant therapy. *Eur J Oncol Nurs* 14(1):17–22
19. Gupta P, Sturdee DW, Palin SL et al (2006) Menopausal symptoms in women treated for breast cancer: the prevalence and severity of symptoms and their perceived effects on quality of life. *Climacteric* 9(1):49–58
20. Winnie KW, Marsh G, Ling WM et al (2009) The symptom cluster of fatigue, pain, anxiety, and depression and the effect on the quality of life of women receiving treatment for breast cancer: a multicenter study. *Oncol Nurs Forum* 36(4):205–214
21. World Health Organization (2009) Pharmacological treatment of mental disorders in primary health care. Author, Geneva
22. Reyno LM, Levine MN, Skingley P et al (1993) Chemotherapy induced amenorrhea in a randomised trial of adjuvant chemotherapy duration in breast cancer. *Eur J Cancer* 29A:21–23
23. Heinemann LAJ, Potthoff P, Schneider HPG (2003) International versions of the Menopause Rating Scale (MRS). *Health Qual Life Outcomes* 1(1):28–31
24. Rosen R, Brown C, Heiman J et al (2000) The Female Sexual Function Index (FSFI): a multidimensional self-reported instrument for the assessment of female sexual function. *J Sex Marital Ther* 26(2):191–208
25. Kim H, So H, Park K et al (2002) Development of the Korean-version of Female Sexual Function Index (FSFI). *Kor J Androl* 20(1):50–56
26. Beck AT, Steer RA, Ball R, Ranieri WF (1996) Comparison of the Beck Depression Inventories-I A and II in psychiatric outpatients. *J Pers Assess* 67:588–797
27. Sung HM, Kim JB, Park YN et al (2008) A study on the reliability and the validity of Korean version of the Beck Depression Inventory-II (BDI-II). *J Korean Soc Ther Psychiatry* 14(2):201–212
28. Brady MJ, Cella DF, Mo F et al (1997) Reliability and validity of the Functional Assessment of Cancer Therapy—Breast quality of life instrument. *J Clin Oncol* 15:974–986
29. Wiegel M, Meston C, Rosen R (2005) The Female Sexual Function Index (FSFI): cross-validation and development of clinical cutoff scores. *J Sex Marital Ther* 31(1):1–20
30. Song SH, Jeon H, Kim SW, Paick JS, Son H (2008) The prevalence and risk factors of female sexual dysfunction in young Korean women: an internet-based survey. *J Sex Med* 5:1694–1701
31. Heinemann K, Ruebig A, Potthoff P et al (2004) The Menopause Rating Scale (MRS) scale: a methodological review. *Health Qual Life Outcomes* 45(2):1–8
32. Cheon SS, Chio SY (2010) A study on the relationship among family support, stress and quality of life on according to the phases of illness in patients with breast cancer. *Korean J Women Health Nurs* 16(1):9–19
33. Fobair P, Spiegel D (2009) Concerns about sexuality after breast cancer. *Cancer* 15(1):19–26
34. Shell JA, Carolan M, Zhang Y, Meneses KD (2008) The longitudinal effects of cancer treatment on sexuality in individuals with lung cancer. *Oncol Nurs Forum* 35(1):73–79
35. Kim HY, So HS, Chae MJ, Kim KM (2008) Comparisons of quality of life, sexual function, and depression in sexually active or inactive groups of women with mastectomy. *J Korean Oncol Nurs* 8(2):77–85
36. Kim KH, Kwon HJ, Choi MH, Kim JA, Kim KS (2009) The relationship of sexual satisfaction and daily stress in the patients with breast cancer. *J Korean Adult Nurs* 21:529–537
37. Hoga LAK, Mello DS, Dias AF (2008) Psychosocial perspectives of the partners of patients with breast cancer treated with a mastectomy: an analysis of personal narratives. *Cancer Nurs* 31(4):318–325
38. Chun N (2010) Predictors of sexual desire, arousal, lubrication, orgasm, satisfaction, and pain in women with gynecologic cancer. *J Korean Acad Nurs* 40(1):24–32
39. Rabin EG, Heldt E, Hirakata VN et al (2009) Depression and perceptions of quality of life of breast cancer survivors and their male partners. *Oncol Nurs Forum* 36(3):153–158
40. Tae YS, Kim MY (2011) Relationships between family support, perceived health status, and self-esteem in Korean women breast cancer. *J Korean Onco Nurs* 11(1):41–48
41. Nho JH, Park YS (2012) Descriptive study on sexuality for women with gynecological cancer. *Korean J Women Health Nurs* 18(1):17–27
42. Park JH, Jun EH, Kang MY, Joung YS, Kim GS (2009) Symptom experience and quality of life in breast cancer survivors. *J Korean Acad Nurs* 39(5):613–621
43. Beckjord E, Campas BE (2007) Sexual quality of life in women with newly diagnosed breast cancer. *J Psychosoc Oncol* 25(2):19–36
44. Can G, Oskay U, Durna Z et al (2008) Evaluation of sexual function of Turkish women with breast cancer receiving systemic treatment. *Oncol Nurs Forum* 35:471–476
45. Huang CY, Guo SE, Huang CM et al (2010) Learned resourcefulness, quality of life, and depressive symptoms for patients with breast cancer. *Oncol Nurs Forum* 37(4):E280–287
46. Munro BH (2005) Statistical methods for health care research, 4th edn. Lippincott, Williams & Wilkins, Philadelphia
47. Karakoyun-Celik O, Gorken I, Sahin S et al (2010) Depression and anxiety levels in women under follow-up for breast cancer: relationship to coping with cancer and quality of life. *Med Oncol* 27(1):108–113
48. Arving C, Sjode'n P, Bergh J et al (2007) Individual psychosocial support for breast cancer patients: a randomized study of nurse versus psychologist interventions and standard care. *Cancer Nurs* 39(3):E10–19