

## Original Article

# Body change stress, sexual function, and marital intimacy in Korean patients with breast cancer receiving adjuvant chemotherapy: A cross-sectional study

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## ARTICLE INFO

## Keywords:

Breast neoplasms  
Chemotherapy  
Sexuality  
Body dissatisfaction  
Spouses  
Marriage

## ABSTRACT

**Objective:** A crucial factor influencing the quality of life of patients with breast cancer is marital intimacy, which, along with emotional support, helps them overcome difficult treatments. This study aimed to elucidate and confirm the effects of body change stress and sexual function in marital intimacy.

**Methods:** We conducted a cross-sectional survey on 190 patients with breast cancer. They completed the breast-impact of treatment scale, female sexual function index, and revised dyadic adjustment scale.

**Results:** The patients' average age was 46.27 (6.84), and the age distribution ranged from 25 to 59 years. These variables showed statistically significant differences according to the chemotherapy period ( $P < 0.05$ ) and type of surgery ( $P < 0.05$ ). Body change stress negatively correlated with sexual function ( $r = -0.523$ ,  $P < 0.001$ ) and marital intimacy ( $r = -0.545$ ,  $P < 0.001$ ). Sexual function positively correlated with marital intimacy ( $r = 0.363$ ,  $P < 0.001$ ). Marital intimacy was affected by the changes in body stress ( $\beta = -0.473$ ,  $P < 0.001$ ). Sexual function did not affect marital intimacy ( $\beta = 0.084$ ,  $P = 0.289$ ).

**Conclusions:** Changes in body stress and chemotherapy treatment should be considered in patients with breast cancer for better marital intimacy. Intervention strategies that consider the characteristics discussed could improve marital intimacy for patients with breast cancer.

## Introduction

Breast cancer in Korea is characterized by high prevalence and low mortality due to early diagnosis and treatment development.<sup>1</sup> The incidence of solid cancers such as colon, lung, and stomach cancer increases with age, but breast cancer is more common among young people aged 45–49 years. The trend of breast cancer incidence in Korea in 2017 revealed that those in their 40s accounted for the most with 8,867, followed by 7944 and 4491 in their 50s and 60s, respectively. Breast cancer treatment is long-term and used in combination with several treatments. Surgical treatments such as breast conservation or breast resection are performed depending on the stage, whereas chemotherapy, radiation therapy, and endocrine therapy are performed depending on the pathological results.<sup>1,2</sup> Unlike other cancers, breast cancer negatively affects body image because it affects the breast, a symbol of femininity, and mastectomy leads to further changes in the body.<sup>3,4</sup> Hence, the worse the body image, the lower the quality of life of patients with breast cancer.<sup>5,6</sup> Particularly, among the treatments for breast cancer, chemotherapy is a long-term and repetitive treatment that damages normal cells in addition

to cancer cells, causing multiple physical and psychological side effects.<sup>7,8</sup> In patients with breast cancer, the lower the sexual function score, the lower the appearance satisfaction with breast cancer surgery,<sup>9</sup> and sexual function also affects their body image.

Marital intimacy is defined as the intimacy in their relationships with their spouse. Spousal support and quality of life are important factors that significantly affect the recovery process in patients with breast cancer.<sup>10,11</sup> However, in a 2017 survey of 358 patients with breast cancer, > 30% were dissatisfied with their family support, and 15.3% stated that they separated from or divorced their husbands during treatment.<sup>12</sup> This percentage is approximately three times higher than the 4.8% divorce rate in Korea, according to the National Statistical Office in 2016,<sup>13</sup> with most individuals getting divorced in their 40s.<sup>12</sup> Therefore, it is necessary to confirm the degree of spousal intimacy in Korean patients with breast cancer; they comprise a high proportion of young patients with breast cancer in their 40s and 50s and the factors affecting it. In a study examining the marital coping ability of Chinese patients diagnosed with breast cancer, marital coping style was related to cancer treatment, postoperative period, body image, and marriage

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<https://doi.org/10.1016/j.apjon.2023.100228>

Received 8 December 2022; Accepted 27 March 2023

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adjustment.<sup>14</sup> Marital intimacy influences the quality of life of patients with breast cancer.<sup>15,16</sup> Additional factors such as type of surgery, level of anxiety, oncologic treatment, emotional satisfaction in their relationship, the degree of support, and emotional satisfaction of the spouse are also important in preventing the deterioration of satisfaction and physical image.<sup>17</sup> Marital intimacy with the spouses of patients with breast cancer was a considerably important factor in the treatment process. Furthermore, when marital intimacy was high, psychosocial adaptations also increased.<sup>18</sup> In patients with cancer, the higher the marital intimacy, the better the symptoms.<sup>19</sup> Spouse intimacy influenced rehabilitation motivation in stroke patients.<sup>20</sup> However, there are no studies on the relationship between body change stress, sexual function, and marital intimacy in patients with breast cancer during chemotherapy with severe side effects. Most of the studies were conducted on survivors of breast cancer to identify sexual and psychological problems and marital intimacy.<sup>6,9,21,22</sup>

In sexual function and body image studies,<sup>11,22</sup> marital intimacy has an effect on quality of life<sup>15</sup> and mediating effects<sup>16</sup> in survivors of breast cancer who have completed treatment. There are no studies examining the factors affecting marital intimacy during chemotherapy. Therefore, in this study, we aimed to identify body change stress, sexual function, and marital intimacy at the time of chemotherapy and factors affecting marital intimacy.

**Conceptual framework**

The main conceptual framework of this study was constructed through a review of previous studies and mainly based on the conceptual framework by Ganz et al.<sup>23</sup> In the conceptual framework by Jun et al.,<sup>24</sup> demographic characteristics precede cancer diagnosis, and as individual attributes, breast cancer treatment includes surgery, chemotherapy, and anti-hormonal therapy. Moreover, there are differences in symptoms depending on the treatment. These differences are related to psychological and relational physiological dimensions such as marital intimacy, body image, and sexual function.<sup>23,24</sup> Marital intimacy is an important factor in determining psychological adjustment during cancer treatment.<sup>25</sup> Marriage intimacy in patients with breast cancer is affected by sexual function and body change stress. The higher the marital satisfaction of patients with breast cancer, the lower the body change stress.<sup>26,27</sup> Sexual function affects marital intimacy,<sup>11</sup> and thus, the higher the marital intimacy, the higher the sexual satisfaction.<sup>22</sup> Sexual function correlates with marital intimacy and affects body image (Fig. 1).<sup>11,21</sup>

**Methods**

**Study design**

This descriptive correlation study investigates the relationship between body change stress, sexual function, and marital intimacy in

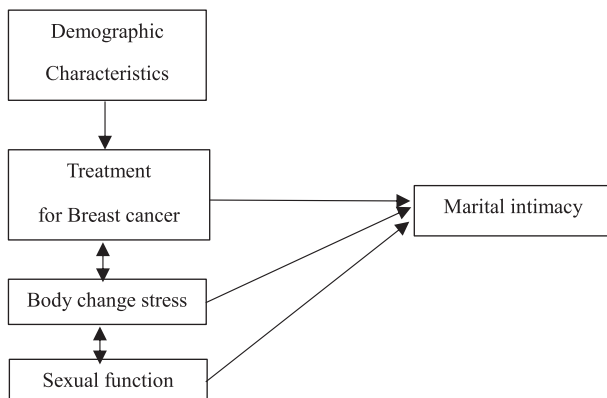


Fig. 1. Conceptual framework.

patients with breast cancer receiving adjuvant chemotherapy and confirms their effects on marital intimacy. Patients with breast cancer who visited the Breast Cancer Center of Ewha Women's University Hospital for chemotherapy from January to December 2019 were included in this study.

**Participants**

A convenience sample was recruited from an inpatient and outpatient breast care center in Seoul, South Korea. Data were collected from May 2, 2019 to December 31, 2019. The expected number of samples for this study was calculated using two-tailed analysis, referring to the study by Cho et al.<sup>18</sup>; marital intimacy was calculated as the primary endpoint, with a significance level ( $\alpha$ ) of 0.05, an effect size of 0.30, and power of 0.95, using the G-power 3.1.9.2 program. A total of 134 individuals were counted when these values were set for verification. Considering the dropout rate, 200 participants were sampled. The specific inclusion criteria were as follows: patients who (1) received adjuvant chemotherapy on a daily basis during the 12-month period from May to December 2019; (2) were aged 19 years or older; (3) were married; (4) received adjuvant chemotherapy at least one month after breast cancer surgery. However, among the collected data, some data were insufficient or insincere, did not meet the selection criteria, or included those who received chemotherapy on the first day, were divorced or separated, whose spouse had passed away, or whose cancer had metastasized to other organs. These patients were excluded. To reduce bias, participants who underwent neoadjuvant chemotherapy before surgery were also excluded; based on this criteria, 10 participants were excluded. Only participants who underwent adjuvant chemotherapy after surgery were included in this study; therefore, 190 patients were selected.

**Data collection procedure**

The study used a series of structured and validated questionnaires to collect data. Ewha Women's University Hospital institutional review board approved this study prior to its initiation. Only participants who read the description and agreed to participate in the study were enrolled in this study. This study's purpose was explained to all participants, and they provided written informed consent. The duration to complete the questionnaire was approximately 15–20 min. Each participant was provided with a packet of questionnaires, which they completed independently and returned to the researcher by mail or placed them in a box.

**Measurements**

**Body change stress**

The breast-impact of treatment scale (BITS) was used (total score range 0–65).<sup>28</sup> BITS was translated into Korean by Chang<sup>29</sup> and considers negative and painful thoughts, emotions, behaviors, and sexuality accompanying physical changes resulting from breast surgery to treat breast cancer. It is a 13-item, 4-point Likert scale, with higher scores indicating higher psychological stress due to changes in the body. In terms of reliability, Cronbach's  $\alpha$  of the original instrument was 0.91; it was 0.90 in Chang's study and 0.95 in this study.

**Sexual function**

This study used the Korean version of the female sexual function index (FSFI) tool,<sup>30</sup> originally developed by Rosen et al.<sup>31</sup> The tool comprises 19 items with six sub-domains: sexual desire (two items), sexual excitement (four items), vaginal lubrication (four items), orgasm (three items), satisfaction (three items), and pain during sexual intercourse (three items). Of the two items for sexual desire and three for satisfaction, two were measured on a 5-point scale, and the remaining items were measured on a 6-point scale. The lowest score was 4, and the highest score was 95; the lower the score, the worse the sexual function. Wiegel et al.<sup>32</sup> suggested an average FSFI score of 26.55 points as the

cut-off for sexual dysfunction. However, this study follows Song et al.,<sup>33</sup> who suggested 25.0 points as the sexual dysfunction score cut-off suitable for Korean women. At the time of development, the tool's reliability based on Cronbach's  $\alpha$  was 0.97, whereas Cronbach's  $\alpha$  of the Korean translated version was 0.96. In this study, Cronbach's  $\alpha$  was 0.96.

**Marital intimacy**

Marital intimacy was measured using the revised dyadic adjustment scale (RDAS), revised by Busby et al.<sup>34</sup> RDAS was translated into Korean by Choi.<sup>35</sup> It comprises 14 items measured on a 6-point scale, except item 11 (5-point scale), with six items for dyadic consensus and four each for dyadic satisfaction and dyadic cohesion. Furthermore, it comprises three sub-domains. The cut-off score according to the presence or absence of distress is 22 points for consensus, 14 satisfaction, and 11 cohesion, with a total cut-off score of 48 points. Total scores range from 0 to 69, with higher scores indicating greater marital quality. Cronbach's  $\alpha$  (reliability) of the original instrument was 0.87 and 0.97 in this study.

**Data analysis**

All analyses were conducted using SPSS V.26.0. Two-sided *P*-values < 0.05 were considered statistically significant. Descriptive statistics were used to analyze the demographic and disease-related characteristics of the participants, body change stress, sexual function, and marital intimacy. An independent *t*-test or one-way analysis of variance was used to score differences in body change stress, sexual function, and marital intimacy according to the participants' demographic and disease-related characteristics. The post-hoc test involved the Scheffe test. The relationship between body change stress, sexual function, and marital intimacy was analyzed using Pearson's correlation coefficients. Factors affecting marital intimacy were analyzed using hierarchical regression analysis.

**Results**

The 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 46.27 ( $\pm 6.84$ ). The age ranged from 25 to 59 years. Stage I or II early breast cancer was the primary diagnosis in 149 women (78.4%). Most women (*n* = 170, 89.4%) received < 12 months chemotherapy, and approximately half reported experiencing amenorrhea after receiving chemotherapy (*n* = 97, 51.1%). Of the sample, 137 women (72.1%) had undergone lumpectomy. Regarding satisfaction in terms of family support, 127 patients (66.8%) were satisfied. The person who provided the most support was their partner. Although there were sexual problems, 95.8% of the patients did not discuss them with the medical staff. Spouses accounted for the largest proportion (16.8%) of those with whom patients discussed sexual problems. In terms of intercourse, 58 patients (30.5%) reported "no intercourse within 6 months," whereas 66 patients (34.7%) stated "2–3 times a month."

Table 2 presents the mean and standard deviation for BITS, FSFI, and RDAS. The overall average body change stress score was 28.17  $\pm$  15.76. The average sexual function score was 24.88  $\pm$  20.81 points, which is < 25.0. According to the results derived by examining the sexual dysfunction group based on 25.0 points, 108 patients (56.8%) with breast cancer belonged to the sexual dysfunction group, showing an average of 7.72  $\pm$  3.22, whereas 82 patients (43.2%) belonged to the non-risk group, with an average of 47.50  $\pm$  9.28. The overall average score on the RDAS was 35.46  $\pm$  16.25. RDAS comprises three sub-domains, and according to the average scores of each domain, dyadic cohesion had the lowest score of 9.52  $\pm$  4.45, followed by 10.34  $\pm$  5.16 for dyadic satisfaction and 15.59  $\pm$  7.56 for dyadic consensus. The RDAS cut-off score was < 48 points. A total of 128 patients (67.4%) had < 48 points, indicating that more than half of them experienced a high degree of marital distress. The mean score of the distressed group was 26.57  $\pm$  11.89 and that of the non-distressed group (62 patients, 32.6%) 53.80  $\pm$  4.11.

**Table 1**  
Demographic and clinical characteristics (*n* = 190).

Characteristics	Number	Percentage
Age, Mean (SD), years	46.27 (6.84)	
< 40	26	13.7
40–50	109	57.4
> 50	55	28.9
Length of chemotherapy (months)		
< 6	108	56.8
6–12	62	32.6
$\geq$ 13	20	10.5
Period of marriage (years)		
< 5	10	5.3
5–10	35	18.4
> 10	145	76.3
Perceived economic status		
Rich	11	5.8
Moderate	149	78.4
Poor	30	15.8
Occupation		
Yes	81	42.6
No	109	57.4
Person providing the most support		
Husband (partner)	141	74.2
Offspring	22	11.6
Others (sister, parent, etc.)	27	14.2
Satisfaction with family support		
Satisfaction	127	66.8
Moderation	54	28.4
Dissatisfaction	9	4.7
Chronic disease		
Yes	32	16.8
No	158	83.2
Status of menstruation after chemotherapy		
Regular	28	14.7
Irregular	17	8.9
Amenorrhea	97	51.1
Menopause	48	25.3
Frequency of sexual activity		
$\geq$ 1 per week	32	16.8
2–3 per month	66	34.7
$\leq$ 3 per six months	34	17.9
None within six months	58	30.5
Person consulted for sexual function problems		
Spouse	32	16.8
Medical staff (nurse, doctor, etc.)	8	4.2
Friend	1	0.5
None	149	78.4
Counseling experience with sexual function problems		
Yes	8	4.2
No	182	95.8
Cycle of chemotherapy		
1–2	54	28.4
3–4	64	33.7
5–6	36	18.9
7–8	12	6.3
$\geq$ 9	24	12.6
Stage		
Early (I, II)	149	78.4
Advanced (III, IV)	36	18.9
Unknown	5	2.6
Type of surgery		
Mastectomy	32	16.8
Lumpectomy	137	72.1
MRM + breast reconstruction	21	11.1
Chemotherapy drug		
CMF	57	30.0
AC	55	28.9
AT	39	20.5
Others	39	20.5

MRM, modified radical mastectomy; CMF, cyclophosphamide, methotrexate, and fluorouracil; AC, adriamycin and cyclophosphamide; AT, adriamycin and taxotere.

Table 3 shows the differences between body change stress, sexual function, and marital intimacy according to participants' characteristics. Body change stress was related to the length of chemotherapy (*F* = 4.416, *P* = 0.013), marital period (*F* = 3.839, *P* = 0.023), economic status (*F* =

**Table 2**  
Score of body change stress, sexual function, and marital intimacy.

Variables	Possible range	Min	Max	Mean±SD
Body change stress	0–65	2	61	28.17 ± 15.76
Sexual function	4–95	4	80	24.88 ± 20.81
Desire	2–10	2	8	3.24 ± 1.29
Arousal	0–20	0	16	3.87 ± 4.58
Lubrication	0–20	0	16	4.35 ± 5.20
Orgasm	0–15	0	15	2.88 ± 3.72
Satisfaction	2–15	0	15	5.83 ± 3.03
Pain	0–15	0	15	4.37 ± 5.33
Marital intimacy	0–70	7	63	35.46 ± 16.25
Dyadic consensus	0–30	2	29	15.59 ± 7.56
Dyadic satisfaction	0–20	0	20	10.34 ± 5.16
Dyadic cohesion	0–20	1	19	9.52 ± 4.45

3.217,  $P = 0.042$ ), job status ( $t = 5.672$ ,  $P = 0.018$ ), frequency of sexual activity ( $F = 4.705$ ,  $P = 0.003$ ), and type of surgery ( $F = 13.91$ ,  $P < 0.001$ ). Sexual function was significant and statistically related to the length of chemotherapy ( $F = 3.706$ ,  $P = 0.026$ ) and type of chemotherapy drug ( $F = 3.484$ ,  $P = 0.017$ ). Based on the Scheffe test, the sexual function score was higher in the group ( $41.40 \pm 20.19$ ) who had sex more than once a week than the group who did not have sex in six months ( $8.89 \pm 6.46$ ). Marital intimacy was statistically significant in terms of economic status ( $F = 3.461$ ,  $P = 0.033$ ) and breast cancer surgery type ( $F = 6.802$ ,  $P = 0.001$ ).

Table 4 shows the analytical results of the correlations between body change stress, sexual function, and marital intimacy in patients with breast cancer receiving adjuvant chemotherapy. Body change stress in patients with breast cancer significantly correlated with sexual function ( $r = -0.523$ ,  $P < 0.001$ ) and marital intimacy ( $r = -0.545$ ,  $P < 0.001$ ). The correlation between sexual function and marital intimacy ( $r = 0.363$ ,  $P < 0.001$ ) was statistically significant.

Multiple regression analysis was conducted according to the hierarchical regression method to confirm marital intimacy factors. Among the general characteristics, the economic status of the subject and type of chemotherapy were included in the influencing factors and analyzed. In model 1, the type of chemotherapy drug of the participants CMF ( $\beta = 0.250$ ,  $P = 0.015$ ), At ( $\beta = 0.231$ ,  $P = 0.025$ ) affected marital intimacy. In model 2 with BITS added, BITS ( $\beta = -0.516$ ,  $P < 0.001$ ) had an effect on marital intimacy. In model 3, including FSFI, FSFI did not appear significantly, and BITS ( $\beta = -0.473$ ,  $P < 0.001$ ) appeared to affect marital intimacy. The explanatory power of the BIT variable in the marital intimacy of patients with breast cancer was 30.5%. Alternatively, the lower the body change stress, the higher the marital intimacy. For the goodness of fit of the regression model, the multicollinearity test showed that the tolerance limit was 0.546–0.994, which was  $> 0.1$ , and the variance inflation factor was 1.006–1.817, below the standard value of 10. Therefore, there was no problem with multicollinearity between independent variables. Additionally, testing the normality of the model and autocorrelation of the residuals, the Durbin–Watson statistic measured 1.825, indicating no autocorrelation (Table 5).

## Discussion

This study confirmed the effects of physical change stress and sexual function on marital intimacy in patients with breast cancer undergoing chemotherapy. Consequently, body change stress affected marital intimacy not sexual function. This study's findings were similar to that of another study<sup>11</sup>—the higher the body image satisfaction of patients with breast cancer, the higher the marital intimacy. The body change stress (BITS) score was 28.17, with mastectomy associated as the highest stress, followed by a lumpectomy, which was higher than that (18.38 points) measured with the same tool in another study, 18 months after surgery, for 63 patients with breast cancer.<sup>3</sup> However, our score was lower than 30.63 measured in a study on Egyptian patients who underwent modified radical mastectomy.<sup>4</sup> This supports our findings that there is a difference

in body transformation stress based on the surgical method. Body change stress was higher in those who had mastectomies as the duration of chemotherapy was longer, and the marital intimacy score lower. The body image is affected by the treatment method,<sup>27</sup> and concurs with previous studies that there is a difference in body change stress according to the breast cancer surgery method.<sup>4,36</sup> Therefore, when developing a program to relieve body change stress, it is necessary to consider the chemotherapy duration and type of surgery. To date, body change stress or body image studies in patients with breast cancer have been conducted on breast cancer survivors who have undergone a total mastectomy<sup>4,6,36</sup> or completed treatment.<sup>5,17</sup> No existing study confirms the effect on marital intimacy during chemotherapy. As patients with breast cancer receiving adjuvant chemotherapy undergo chemotherapy after surgery, it is necessary to check the degree of body change stress during the treatment period and implement an intervention program for subjects with severe stress. As body change stress affects marital intimacy and is an important factor in the quality of life,<sup>18,21</sup> it is assumed that support and encouragement for couples to participate together are required when developing a program to relieve body change stress during chemotherapy.

Sexual function did not affect marital intimacy in Yoon's study. The mediating effect of body image between sexual function and marital intimacy was confirmed in 118 Pakistani patients with breast cancer; the better the sexual function, the higher the marital intimacy.<sup>11</sup> Sexual dysfunction significantly influences a negative body image post-breast cancer treatment. Furthermore, marital satisfaction, body stigma, and vaginal dryness were predictors of sexual function.<sup>22</sup> In the study by Boquiren et al., sexual function did not influence the degree of marital intimacy. Moreover, in women of childbearing age undergoing chemotherapy and chemotherapy-induced amenorrhea, sexual dysfunction, and vaginal dryness, compared to natural menopause.<sup>37</sup> This study showed that 51.1% of the patients had amenorrhea, and the average FSFI score was 24.88, indicating sexual dysfunction. Sexual function influenced body image and marital intimacy in patients with breast cancer.<sup>11,21,22</sup> In Boquiren and Tahir's study,<sup>11,22</sup> patients who had already completed chemotherapy and radiotherapy were included, and the side effects of chemotherapy did not affect them, suggesting that sexual function affected marital intimacy. Additionally, young women have high sexual intimacy and satisfaction.<sup>38,39</sup> Participants' average age was 46.27 in this respective study. However, Tahir studied younger women with an average age of 39.58.<sup>11</sup> Thus, sexual function seems to have an effect on marital intimacy. Chemotherapy is a factor that influences sexual dysfunction.<sup>38</sup> This study is significant as it can be applicable in monitoring the type of drug treatment for patients with breast cancer undergoing adriamycin and cyclophosphamide chemotherapy. The higher the marital intimacy of patients with breast cancer, the more positive their appearance<sup>26</sup> and the lower the caring burden.<sup>40</sup> As these patients undergo various types of treatment, such as chemotherapy after breast cancer surgery, with long treatment periods,<sup>1,2,17</sup> the factors affecting marital intimacy according to the type of treatment should be identified. Furthermore, because of the side effects of chemotherapy, sexual function in patients with breast cancer decreases, this should be considered.

This study is meaningful as it identified the factors affecting marital intimacy in patients with breast cancer undergoing chemotherapy and suggested the need for differentiated nursing interventions according to the type of treatment. Particularly, during the chemotherapy period, sexual function deteriorated due to the drugs' side effects. Therefore, it is important to provide a basis for developing nursing interventions to improve psychological factors to increase spousal support and relieve body change stress in these patients than sexual function itself.

## Limitations

This study has a limitation as it conducted a one-time measurement of patients with breast cancer receiving chemotherapy. Therefore, a longitudinal study is necessary to confirm the degree of change from the start

**Table 3**  
Differences in body change stress, sexual function and marital intimacy based on participants' characteristics.

Variables	Categories	Body change stress		Sexual function		Marital intimacy		
		Mean ± SD	F/t(p)	Mean±SD	F/t(p)	Mean±SD	F/t(p)	
Age (years)	≤ 39	33.42 ± 19.10	1.548 (0.215)	28.11 ± 19.81	2.891 (0.058)	35.53 ± 16.09	0.004 (0.996)	
		27.99 ± 15.56		26.94 ± 21.51		35.53 ± 16.72		
	40–49	27.10 ± 14.21		19.29 ± 19.05		35.29 ± 15.67		
		50–59		26.20 ± 15.75		28.37 ± 22.30		36.96 ± 17.09
				33.27 ± 16.00		19.75 ± 17.55		33.32 ± 14.90
Length of chemotherapy (months)	< 6 <sup>a</sup>	25.90 ± 11.83	4.416 (0.013*) a < b	21.95 ± 18.78	3.706 (0.026*) a > b	34.00 ± 15.50	1.079 (0.342)	
	6–12 <sup>b</sup>	20.63 ± 11.33		31.00 ± 25.75		42.45 ± 16.65		
		16.12 ± 33.80 ± 13.90		19.26 ± 19.18		29.23 ± 15.99		
	≥ 13 <sup>c</sup>	25.35 ± 15.99		27.09 ± 21.95		36.55 ± 16.61		
Period of marriage (year)	< 5	26.83 ± 26.05	3.839 (0.023*)	31.30 ± 21.41	2.616 (0.076*)	33.90 ± 15.60	0.667 (0.515)	
		16.21 ± 21.66		31.08 ± 23.18		38.40 ± 16.38		
	5–10	11.26 ± 15.91		23.06 ± 19.94		35.02 ± 16.24		
		> 10		20.63 ± 11.33		31.00 ± 25.75		42.45 ± 16.65
Perceived economic status	Rich <sup>a</sup>		27.98 ± 16.12	3.217 (0.042*)	25.57 ± 20.65	1.661 (0.193)	36.20 ± 16.02	3.461 (0.033*)
	Moderate <sup>b</sup>	33.80 ± 13.90	19.26 ± 19.18		29.23 ± 15.99			
		Poor <sup>c</sup>	25.35 ± 15.99		27.09 ± 21.95		36.55 ± 16.61	
Occupation	Yes	3079 ± 15.25	5.672 (0.018*)	23.24 ± 19.86	1.263 (0.208)	34.65 ± 16.01	0.798 (0.426)	
	No	23.18 ± 13.25		31.43 ± 22.85		41.06 ± 13.69		
Chronic disease	Yes	29.55 ± 16.04	4.415	23.56 ± 20.19	1.811 (0.077*)	34.32 ± 16.53	2.157 (0.032*)	
	No	29.36 ± 16.86		32.50 ± 23.68		41.42 ± 16.29		
Status of menstruation after chemotherapy	Regular	26.33 ± 13.86	1.728 (0.146)	31.52 ± 21.88	3.288 (0.022*)	37.47 ± 15.64	1.714 (0.166)	
		26.43 ± 13.39		24.50 ± 20.35		34.07 ± 16.17		
	Irregular	33.08 ± 6.19		18.87 ± 17.95		34.08 ± 16.25		
		Amenorrhea		21.18 ± 14.00		41.40 ± 20.19		37.40 ± 15.00
	Menopause			26.92 ± 17.21		32.04 ± 20.42		37.83 ± 15.63
None within six months <sup>d</sup>		20.08 ± 15.06	22.73 ± 19.57	36.35 ± 17.54				
		33.32 ± 13.77	8.89 ± 6.46	31.17 ± 16.40				
Frequency of sexual activity	≥ 1 per week <sup>a</sup>	23.42 ± 14.88	4.705 (0.003*) a < d	32.59 ± 22.43	30.69 (<0.001**) a > b > c > d	38.00 ± 16.14	2.033 (0.111)	
	2–3 per month <sup>b</sup>	27.10 ± 15.90		24.76 ± 20.27		37.60 ± 16.13		
		≤ 3 per six months <sup>c</sup>		32.77 ± 14.66		18.50 ± 18.51		32.19 ± 16.41
	7–8 <sup>d</sup>			39.33 ± 15.92		24.08 ± 19.53		28.66 ± 12.82
		≥ 9 <sup>e</sup>		31.62 ± 14.95		17.87 ± 17.72		32.33 ± 17.02
Cycle of chemotherapy	1–2 <sup>a</sup>	40.84 ± 12.13	4.090 (0.003*) a < d	17.93 ± 18.94	3.569 (0.008*) a > c	26.09 ± 12.66	1.745 (0.142)	
		26.41 ± 15.49		26.31 ± 21.26		37.45 ± 16.72		
	3–4 <sup>b</sup>	23.09 ± 13.51		26.19 ± 19.18		36.71 ± 13.31		
		5–6 <sup>c</sup>		25.34 ± 15.44		27.94 ± 21.49		38.96 ± 15.90
	7–8 <sup>d</sup>			30.51 ± 15.04		22.05 ± 19.99		30.53 ± 16.50
≥ 9 <sup>e</sup>		29.71 ± 16.23	29.28 ± 21.81	38.45 ± 16.11				
		Others <sup>d</sup>	33.43 ± 15.28	17.00 ± 16.77	31.07 ± 14.96			
Type of surgery	Mastectomy <sup>a</sup>	40.84 ± 12.13	13.91 (< 0.001**) a > b > c	17.93 ± 18.94	2.174 (0.117)	26.09 ± 12.66	6.802 (0.001*) a < b	
		26.41 ± 15.49		26.31 ± 21.26		37.45 ± 16.72		
	Lumpectomy <sup>b</sup>	23.09 ± 13.51		26.19 ± 19.18		36.71 ± 13.31		
		MRM + breast reconstruction <sup>c</sup>		25.34 ± 15.44		27.94 ± 21.49		38.96 ± 15.90
Chemotherapy drug	CMF <sup>a</sup>		30.51 ± 15.04	2.523 (0.059)	22.05 ± 19.99	3.484 (0.017*) c > d	30.53 ± 16.50	3.794 (0.011*)
	AC <sup>b</sup>	29.71 ± 16.23	29.28 ± 21.81		38.45 ± 16.11			
		AT <sup>c</sup>	33.43 ± 15.28		17.00 ± 16.77		31.07 ± 14.96	
	Others <sup>d</sup>							

\*P < 0.05, \*\*P < 0.01. MRM, modified radical mastectomy; CMF, cyclophosphamide, methotrexate, and fluorouracil; AC, adriamycin and cyclophosphamide; AT, adriamycin and taxotere.

**Table 4**  
Correlation among body change stress, sexual function, and marital intimacy.

Variables	Sexual function	Marital intimacy (RDAS)			
		Consensus	Satisfaction	Cohesion	Total
Body change stress	-0.523**(< 0.001)	-0.538**(< 0.001)	-0.532**(< 0.001)	-0.460**(< 0.001)	-0.545**(< 0.001)
Sexual function		0.340**(< 0.001)	0.332**(< 0.001)	0.362**(< 0.001)	0.363**(< 0.001)

\*P < 0.05, \*\*P < 0.01; RDAS, Revised Dyadic Adjustment Scale.

**Table 5**  
Influential factors of marital intimacy in patients with breast cancer undergoing adjuvant chemotherapy.

Factor	Model 1				Model 2				Model 3			
	B	SE	β	t (P)	B	SE	β	t(p)	B	SE	β	t(p)
(Constant)	36.423	5.486		6.640 (< 0.001)	50.674	5.064		10.007 (< 0.001)	48.178	5.579		8.636 (< 0.001)
Perceived economic status	-5.217	4.909	-0.082	-1.063 (0.290)	-1.927	4.228	-0.030	-0.456 (0.649)	-1.947	4.226	-0.031	-0.461 (0.646)
Chemotherapy												
CMF	8.735	3.551	0.250	2.460 (0.015)	4.023	3.106	0.115	1.295 (0.197)	3.579	3.132	0.102	1.143 (0.255)
AC	-0.289	3.991	-0.007	-0.073 (0.942)	-2.301	3.430	-0.055	-0.671 (0.503)	-2.735	3.452	-0.066	-0.792 (0.429)
AT	7.997	3.521	0.231	2.271 (0.025)	4.085	3.061	0.118	1.335 (0.184)	3.675	3.084	0.106	1.192 (0.235)
BITS					-0.521	0.069	-0.516	-7.560 (< 0.001)	-0.478	0.080	-0.473	-5.982 (< 0.001)
FSFI									0.064	0.061	0.084	1.064 (0.289)
F(p)	3.204 (0.015)				14.924 (< 0.001)				12.636 (< 0.001)			
R <sup>2</sup>	0.076				0.326				0.331			
adj. R <sup>2</sup>	0.053				0.305				0.305			

Reference group: perceive economic status\*poor, chemotherapy\*others. BITS, Breast-Impact of Treatment Scale; FSFI, Female Sexual Function Index.

of chemotherapy to the end of the course of treatment. Additionally, this is a cross-sectional study, and it is difficult to reveal the causal relationship between variables. For an in-depth understanding of marital sexuality and intimacy, we recommend that future studies identify differences by engaging patients with breast cancer and their partners together to determine variables.

**Conclusions**

This study verified the relationship between body change stress, sexual function, and marital intimacy in patients with breast cancer receiving adjuvant chemotherapy after breast cancer surgery. Factors such as change in body stress and chemotherapy treatment should be considered in patients with breast cancer for better marital intimacy. During the chemotherapy period, sexual function deteriorates due to the drugs' side effects. To increase marital intimacy, an intervention program should be developed to relieve body change stress rather than sexual function alone.

**Acknowledgments**

We thank the participants of this study for their time and dedication, as well as the hospitals.

**Credit author statement**

**Hyeon Gyeong Yoon:** Conceptualization, formal analysis, writing original draft preparation, reviewing, editing, and supervision. **Hyesoon Lee:** Investigation, formal analysis, and original draft preparation.

All authors had full access to all the data in the study, and the corresponding author had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

**Declaration of competing interest**

The authors declare no conflict of interest.

**Funding**

This study received no external funding.

**Ethics statement**

This study was approved by the IRB (IRB No. 2018-05-024-001) in Eulji University Hospital. Informed consent was obtained from each patient.

**Data availability statement**

The data for the results of this study are available at the authors' request. Data are not made public due to privacy and ethical restrictions.

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