Factors Associated with Health-Related Quality of Life among Breast Cancer Patients Receiving Postoperative Chemotherapy in Hangzhou, China

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Abstract

This cross-sectional correlational study aimed to describe health-related quality of life (HRQoL) and to examine the relationships between symptom experience, social support, and HRQoL among postoperative breast cancer patients receiving chemotherapy in Hangzhou, China. 130 participants were recruited through simple random sampling from the Cancer Daycare Center of Sir Run Run Shaw Hospital in Hangzhou, China. Data were collected using a demographic information questionnaire and three validated Chinese-language scales including the Memorial Symptom Assessment Scale, the Perceived Social Support Scale, and the Functional Assessment of Cancer Therapy–Breast (FACT-B). Data were analyzed by using descriptive statistics and Pearson's correlation.

Results showed that the mean HRQoL score was 93.45 (SD = 19.56). Symptom experience had a moderate negative correlation with HRQoL (r = -.558, p < .01). While social support had a moderate positive correlation with HRQoL (r = .556, p < .01)

The findings suggest that improving symptom management and enhancing social support may help promote better HRQoL among postoperative breast cancer patients undergoing chemotherapy.

Key words: Health-related quality of life, breast cancer, chemotherapy, symptom experience, social support

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Significance of the Problem

Breast cancer is one of the most common malignant tumors among women worldwide, and its incidence has risen steadily in recent decades. According to the Global Cancer Statistics Report, it ranks second globally, with approximately 2.3 million new cases annually, accounting for 11.6% of all new cancer diagnoses and 6.9% of cancer-related deaths (Bray et al., 2024). In China, breast cancer remains the most frequently diagnosed cancer among women, with an estimated 420,000 new cases each year (Chen et al., 2019). In Zhejiang Province, particularly in Hangzhou, the incidence is higher than the national average, especially among women aged 40 to 59 highlighting its public health significance in this region.

Despite advances in early detection and treatment, breast cancer management often includes surgery followed by chemotherapy. Surgical side effects, including pain, swelling, restricted arm mobility, and changes in body image, particularly after mastectomy, can significantly affect patients' functional status and emotional well-being (Cordova, Hunter-Smith, & Rozen, 2019; Jang, Seong, & Sok, 2023). Chemotherapy further contributes to a decline in health-related quality of life (HRQoL), with side effects including fatigue, nausea, neuropathy, and hair loss (M. D. Anderson Cancer Center, 2023). Psychological effects such as anxiety, depression, and fear of recurrence are also common, along with cognitive difficulties often referred to as "chemotherapy-related cognitive dysfunction" (Li et al., 2022; Onzi et al., 2022). In addition, breast cancer treatment, including surgery and chemotherapy, affects patients' health-related quality of life.

HRQoL, defined as an individual's perception of their physical, psychological, and social well-being (World Health Organization, 2024), has become a key outcome in cancer care (Barger, Broom, Esposito, & Lane, 2020). Previous studies show that breast cancer patients receiving chemotherapy generally have lower HRQoL than the general population (Binotto, Reinert, Werutsky, Zaffaroni, & Schwartsmann, 2020). However, limited research has focused on symptom experience and HRQoL among postoperative breast cancer patients undergoing chemotherapy in Chinese clinical contexts.

Within the Symptom Management Theory, symptom experience is conceptualized as the individual's perception, evaluation, and response to symptoms, encompassing their frequency, intensity, distress, and personal meaning (Dodd et al., 2001). Among postoperative breast cancer patients receiving chemotherapy, symptom experience is multifaceted, involving physical symptoms such as pain, fatigue, nausea, and chemotherapy-induced peripheral neuropathy, as well as psychological symptoms including anxiety, depression, and fear of cancer recurrence (Li et al., 2022; Onzi et al., 2022). These interconnected symptom experiences play a critical role in shaping patients' functional status, emotional and social well-being, and overall health-related quality of life (HRQoL), underscoring the importance of comprehensive symptom assessment and management among postoperative breast cancer patients receiving chemotherapy in China.

Social support is another important factor related to HRQoL. It refers to the perceived help and emotional support from family, friends, healthcare professionals, and the broader community (Zimet, Dahlem, Zimet, & Farley, 1988). Evidence indicates that social support promotes psychological

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adjustment, improves coping ability, and supports treatment adherence (Romeo et al., 2019). In a Chinese study, social support was significantly and positively correlated with HRQoL (r = .745, p < .01) (Zhang, Zhao, Cao, & Ren, 2017).

In Hangzhou, China, where the incidence of breast cancer continues to increase, factors associated with health-related quality of life (HRQoL) among affected patients remain insufficiently understood. Given the region's distinctive healthcare delivery system and sociocultural context, this study aimed to describe HRQoL and to examine its relationships with symptom experience and social support among postoperative breast cancer patients undergoing chemotherapy in Hangzhou, China. The findings are expected to inform strategies to improve care quality and HRQoL in similar clinical and cultural contexts.

Objectives of the study

This study aimed to assess the HRQoL of postoperative breast cancer patients receiving chemotherapy in Hangzhou, China, and to examine the associations between symptom experience, social support, and HRQoL in this population.

Conceptual framework

The present study was guided by the revised Symptom Management Theory (SMT) (Dodd et al., 2001) and supported by existing literature. SMT outlines three interrelated components—symptom experience, symptom management strategies, and outcomes—shaped by individual and environmental factors (Lenz, Pugh, Milligan, Gift, & Suppe, 1997). In this study, symptom experience was categorized under the symptom domain. Social support, referring to perceived assistance from family, friends, and healthcare providers, was conceptualized as part of the environmental domain. HRQoL was examined as the outcome variable. This framework was used to explore the associations between symptom experience, social support, and HRQoL in postoperative breast cancer patients receiving chemotherapy. The relationships among all variables are presented in Figure 1.
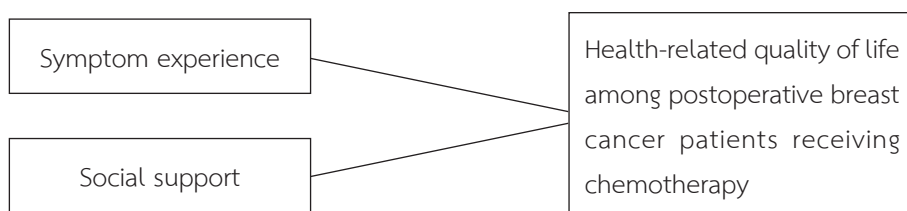

Figure 1 Research framework

Methods

Research Design

The cross-sectional correlational study was conducted to examine the association between symptom experience, social support, and HRQoL among postoperative breast cancer patients receiving chemotherapy in Hangzhou, China.

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Population

The population of this study consisted of breast cancer patients who had received at least one course of postoperative chemotherapy and were currently receiving chemotherapy at the Cancer Daycare Center of the Sir Run Run Shaw Hospital of Zhejiang University in Hangzhou, China.

Sample, sample size, and sample recruitment

The samples were postoperative breast cancer patients receiving at least one course of chemotherapy at the Cancer Daycare Center of Sir Run Run Shaw Hospital in Hangzhou, Zhejiang Province, China. The inclusion criteria for the sample were: 1) age $\geq$ 18 years; 2) first-time diagnosis of stage I, II, or IIIA breast cancer; 3) ability to understand, read, write, and speak Chinese; 4) good orientation to place and time; and 5) no history of mental illness, other malignancies, or serious physical illnesses.

The sample size was calculated using G*Power 3.1.9.7 for correlation designs. An effect size of .25, based on previous research (Matthies et al., 2019), was used, with an alpha level of .05 and power of .90. The minimum sample size required for the study was 130 participants.

Eligible participants (approached by a staff nurse) were selected using simple random sampling. Each morning, a slip bearing an odd or even number was randomly drawn from a box. Participants on the eligibility list with corresponding odd- or even-numbered assignments were selected for that day. This process was conducted Monday through Friday, with approximately 25–40 participants recruited each week, until the target sample size of 130 was reached.

Research instruments

The researcher obtained permission to use all the instruments from the researchers. The research instruments are as follows.

1. The demographic questionnaire

The demographic questionnaire was developed by the researcher and includes two parts: 1) General information: age, ethnicity, marital status, educational level, place of residence, current employment status, living arrangements, average monthly family income, type of medical insurance, religious beliefs, family history of breast cancer, and 2) Health information: body mass index (BMI), type of breast cancer, clinical stage (TNM), type of surgery, type of chemotherapy, and current medication cycle.

2. The Memorial Symptom Assessment Scale (MSAS)

The Chinese version of the Memorial Symptom Assessment Scale (MSAS) was used to assess symptom experience among postoperative breast cancer patients receiving chemotherapy (Cheng et al., 2009). The scale, developed by Portenoy et al. (1994), comprises 32 items assessing symptoms experienced in the past seven days. It comprises three subscales: physical symptoms (12 items), psychological symptoms (6 items), and the Global Distress Index (GDI; 10 items). Each symptom was first identified as present or absent and, if present, rated for frequency, severity, and associated distress using four- or five-point Likert scales. Scores range from 0 to 4, with higher scores indicating greater symptom experience. The Chinese version has demonstrated strong reliability, with reported

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Cronbach's alpha coefficients ranging from .79 to .97 (Cheng et al., 2009); in the present study, Cronbach's alpha was .95 (n = 130).

3. The Perceived Social Support Scale (PSSS)

The Chinese version of the Perceived Social Support Scale (PSSS) was used to assess perceived social support among postoperative breast cancer patients undergoing chemotherapy (Huang et al., 1996). This 12-item scale measures support from family, friends, and significant others on a 7-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). Total scores range from 12 to 84, with higher scores indicating greater perceived social support. The Chinese version has demonstrated strong reliability, with a reported Cronbach's alpha of .91 (Yang et al., 2024). In the present study, Cronbach's alpha was .93 (n = 130).

4. The Functional Assessment of Cancer Therapy-Breast (FACT-B)

The Chinese version of the Functional Assessment of Cancer Therapy–Breast (FACT-B), translated by Wan et al. (2007), was used to assess health-related quality of life (HRQoL) among postoperative breast cancer patients receiving chemotherapy. This 36-item instrument comprises five domains: physical well-being (7 items), social/family well-being (7 items), emotional well-being (6 items), functional well-being (7 items), and breast cancer–specific concerns (9 items). Items are rated on a 5-point Likert scale ranging from 0 (not at all) to 4 (very much), with 19 items reverse-scored. Total scores range from 0 to 144, with higher scores indicating better HRQoL. The Chinese version has demonstrated acceptable reliability, with reported Cronbach's alpha coefficients ranging from .61 to .84 (Wan et al., 2007); in the present study, Cronbach's alpha was .92 (n = 130).

Data collection

The researcher collected the data. Participants were recruited through simple random sampling from the Cancer Daycare Center of Sir Run Run Shaw Hospital in Hangzhou, Zhejiang Province, China. Eligible postoperative breast cancer patients receiving chemotherapy who agreed to participate were asked to sign a consent form and complete the questionnaire independently in a private room. The researcher ensured confidentiality of all participant information and verified the completeness of each questionnaire on site. Data collection continued daily until the required sample size was reached.

Data analysis

Data were analyzed using a statistical software package, with the significance level set at α = .05. Descriptive statistics (frequencies, means, and standard deviations) were used to summarize participant characteristics and study variables. Pearson's product-moment correlation coefficients were analyzed to examine the relationships between symptom experience, social support, and health-related quality of life (HRQoL). All relevant statistical assumptions, including normality, linearity, multicollinearity, and homoscedasticity, were satisfied.

Ethical considerations

This study was approved by the IRB of Burapha University (G-HS036/2565) and the Ethics Committee of Sir Run Run Shaw Hospital (2023-833-01). Informed consent was obtained from all participants after explaining the study's purpose, procedures, and their rights. Participation was

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voluntary, and confidentiality was strictly maintained. Data were anonymized and securely stored, and will be destroyed one year after publication. Participants could withdraw at any time without consequences or request study results directly from the researcher.

Results

Part 1 Demographic characteristics of participants

Among the 130 participants, ages ranged from 28 to 68 years (M = 47.5, SD = 9.03). Educational attainment was as follows: 23.08% completed primary school, 40% completed secondary school, and 36.92% had tertiary or higher education. Most were married (88.46%) and lived with others (96.92%). Monthly family income distribution was as follows: less than 1000 RMB (1.54%), 1000 - 2999 RMB (10%), 3000 - 4999 RMB (23.08%), and 5000 - 9999 RMB (20.77%). Additionally, 25.38% reported religious beliefs, and 11.54% had a family history of breast cancer.

Regarding health status, 30.8% were overweight, and 4.6% were obese according to Asian BMI criteria (Gill, 2006). Invasive breast cancer was diagnosed with 91.54% of participants, with stages distributed as follows: Stage I (25.38%), Stage II (53.85%), and Stage III (20.77%). Surgical treatments included simple mastectomy (23.08%), breast-conserving surgery (19.23%), modified radical mastectomy (50.77%), and breast reconstruction (6.92%). Chemotherapy regimens consisted of Anthracycline-based (34.6%), Taxane-based (23.1%), and combined Anthracycline + Taxane (30.8%).

Part 2 Description of HRQoL, symptom experience, and social support among postoperative breast cancer patients receiving chemotherapy.

Table 1 shows that the mean HRQoL score was 93.45 (SD = 19.56) out of 144. The subscale means were physical well-being 20.07 (SD = 4.69), social/family well-being 17.44 (SD = 6.20), emotional well-being 18.59 (SD = 4.31), and functional well-being 14.52 (SD = 5.92). The mean BCS additional concerns score was 22.83 (SD = 5.07) out of 36. Additionally, the lowest scores were observed in the functional well-being and social well-being domains.

Table 1 Range, mean, standard deviation of health-related quality of life (n = 130)

Variables	Range		*M*	*SD*
	Possible	Actual		
Overall HRQoL	0-144	44-135	93.45	19.56
Physical well-being	0-28	6-28	20.07	4.69
Social/family well-being	0-28	0-28	17.44	6.20
Emotional well-being	0-24	4-24	18.59	4.31
Functional well-being	0-28	0-28	14.52	5.92
Additional concerns	0-36	7-31	22.83	5.07

Table 2 shows symptom experience and social support scores. The total symptom experience (MSAS) score was 0.57 (SD = 0.38), with subscale scores of 0.35 (SD = 0.32) for physical symptoms,

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0.70 (SD = 0.63) for psychological symptoms, and 0.64 (SD = 0.54) for the Global Distress Index (GDI). The total social support score was 64.84 (SD = 11.56), with subscale scores of 23.06 (SD = 4.23) for family, 20.65 (SD = 4.92) for friends, and M = 21.12 (SD = 4.29) for significant others.

Table 2 Description of variables (n = 130)

Scale/subscale	Range		M	SD
	Possible	Actual		
Symptom experience	0-4	0-1.61	0.57	0.38
PHYS	0-4	0-2.13	0.35	0.32
PSYCH	0-4	0-3.3	0.70	0.63
GDI	0-4	0-2.2	0.64	0.54
Social support	12-84	37-84	64.84	11.56
Family support	4-28	10-28	23.06	4.23
Friends support	4-28	5-28	20.65	4.92
Significant other	4-28	10-28	21.12	4.29

Part 3 Relationship between symptom experience, social support with health-related quality of life among breast cancer patients

Before examining the relationships between all variables and HRQOL, the assumptions of the Pearson correlation coefficient were assessed, including normality, linearity, homoscedasticity, and absence of outliers. All assumptions were satisfied. Table 3 shows symptom experience was moderate negatively correlated with HRQoL (r = -.558, p < .01). Physical symptoms showed moderate negative correlation (r = -.396, p < .01), while psychological symptoms (r = -.593, p < .01) and GDI (r = -.642, p < .01) showed strong negative correlation with HRQoL. Social support was strongly positively correlated with HRQoL (r = .556, p <.01).

Table 3 Relationships between Symptom experience, Social Support, and Health-Related Quality of Life (n =130)

Variables	Pearson's correlation coefficients of HRQOL
Symptom experience	-.558**
- PHYS	-.396**
- PSYCH	-.593**
- GDI	-.642**
Social support	.556**

* p < .05, ** p < .01

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Discussion

1. Health-related quality of life in postoperative breast cancer patients receiving chemotherapy in Hangzhou, China

The mean HRQoL score among participants was 93.45 out of 144 (SD = 19.56), which was neither too low nor too high. However, this score was lower than those reported in higher-income countries such as the United States (Milbury et al., 2017) and Germany (Matthies et al., 2019), but comparable to findings from other Asian populations: South Korea (M = 91.26, SD = 20.08) (Park, Jung, Jung, & Bae, 2019) and Chinese breast cancer patients (M = 96.05, SD = 18.70) Cui, Wang, and Wang (2021). These findings are discussed in the following section.

Participants' mean age was 47.5 years (SD = 9.03), with 16.15% under 40, consistent with China's younger age at breast cancer onset trend (Esteva, Hubbard-Lucey, Tang, & Pusztai, 2019), compared with older ages at diagnosis in high-income countries (DeSantis et al., 2019). Younger women experience poorer HRQoL, which may be due to body image concerns, early menopause, and fertility issues, contributing to increased psychological distress (Paterson, Lengacher, Donovan, Kip, & Tofthagen, 2016).

Regarding BMI, 30.8% were overweight, and 4.6% were obese, slightly exceeding national averages for Chinese women (28.1% and 5.2%, respectively) (Zhang et al., 2020). Elevated BMI may worsen HRQoL by increasing fatigue, limiting physical function, and intensifying chemotherapy side effects through weight-based dose adjustments (Griggs et al., 2012; Nyrop et al., 2023).

In subscale analysis, physical well-being showed the highest score (M = 20.07, SD = 4.69), suggesting moderate physical functioning during chemotherapy, likely due to supportive care strategies such as pain management, antiemetic regimens, physical rehabilitation, and nutritional counselling, which are commonly employed to mitigate treatment-related side effects (Henry et al., 2008; Jones, Eves, Haykowsky, Joy, & Douglas, 2008). Emotional well-being was relatively preserved (M = 18.59, SD = 4.31), possibly reflecting psychological resilience and family support. However, social/family well-being (M = 17.44, SD = 6.20) and functional well-being (M = 14.52, SD = 5.92) were lower, suggesting disruptions in social roles and daily functioning. The reduced functional well-being may be attributable to postoperative limitations and chemotherapy-related fatigue, underscoring the need for targeted interventions to support their activities of daily living. In addition, the breast cancer-specific subscale (M = 22.83, SD = 5.07) reflected ongoing concerns related to body image, arm morbidity, and sexual health.

2. Factors associated with health-related quality of life among breast cancer patients receiving postoperative chemotherapy

The results indicated moderate negative associations between symptom experience and HRQoL (r = -.558, p < .01). Among symptom dimensions, the Global Distress Index (GDI) showed a strong negative correlation with HRQoL (r = -.642, p < .01), followed by psychological symptoms (r = -593, p < .01) and physical symptoms (r = -.396, p < .01). In contrast, social support was moderately and positively correlated with HRQoL (r = .556, p < .01). These findings are discussed below.

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Symptom experience

A moderate negative association was found between symptom experience and HRQoL (r = -558, p < .01), supporting the premise of SMT, which posits that symptom experience, such as frequency, severity, and distress, is closely linked to patient outcomes (Dodd et al., 2001). Although this was a correlational study, the findings offer valuable insight into the impact of symptoms on HRQoL in this population.

Psychological symptoms such as worry, irritability, and sleep disturbances showed a moderate negative correlation with HRQoL (r = -.593, p < .01) than physical symptoms (r = -.396, p < .01), aligning with previous findings (Whisenant et al., 2022). These emotional symptoms may intensify physical discomfort, further lowering HRQoL.

The Global Distress Index (GDI) showed the strongest negative correlation with HRQoL (r = -642, p < .01), underscoring the impact of overall distress. Overall distress encompasses both psychological symptoms (such as feeling sad, worrying, feeling irritable) and physical symptoms (such as lack of appetite, lack of energy, pain, feeling drowsy, constipation, dry mouth), which limit patients' functioning (Li et al., 2022; Onzi et al., 2022). These findings underscore the need for comprehensive symptom assessment and integrated physical and psychological care to enhance HRQoL during chemotherapy.

Social Support

This study found a moderate positive correlation between social support and HRQoL (r = .556, p < .01), indicating that participants who perceived greater support also reported better HRQoL. Among the dimensions, family support had the highest scores, while friend support was the lowest. Given the hospital's policy allowing families to stay during treatment, this pattern reflects Chinese cultural values, in which family plays a central role in caregiving, especially during hospitalization and recovery (Li & Loke, 2014). Furthermore, most participants were married and engaged in fewer social activities, resulting in reduced interaction with friends. In addition, they perceived higher support from families than from friends.

All participants received outpatient chemotherapy, which limited their contact with healthcare professionals and access to symptom guidance. According to Symptom Management Theory, inadequate support for symptom management may negatively affect health outcomes. In such situations, social support serves as an environmental resource, providing emotional comfort, practical assistance, and encouragement that may ease the challenges of treatment and contribute to improved HRQoL (Miaskowski et al., 2017). Enhancing support systems, particularly within families, may benefit patients undergoing chemotherapy.

Implications for Nursing and Recommendations

These findings inform nursing care by identifying factors associated with HRQoL among postoperative breast cancer patients receiving chemotherapy, particularly in Hangzhou, China. The study found significant associations between symptom experience, social support, and HRQoL.

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Specifically, higher levels of psychological symptoms and the global distress index were linked to lower HRQoL, whereas greater perceived social support was associated with higher HRQoL. To support HRQoL among postoperative breast cancer patients, healthcare professionals should prioritize managing psychological symptoms and promoting access to supportive care resources, such as psychological counseling, patient education, and peer or family support systems.

There are some limitations to this study. As a cross-sectional design, it does not capture changes in symptom experience, social support, or HRQoL over time. Therefore, ongoing assessments during treatment and follow-up care are recommended to more effectively monitor patient well-being. Additionally, the study was conducted in a single hospital, which may limit the generalizability of the findings. Future research should replicate this study in other regions with larger, more diverse samples and consider longitudinal designs to explore changes in HRQoL across different stages of care.

Acknowledgments

Conflict of Interests

The authors have no conflict of interest to disclose.

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