



Associations between marital quality and the prognosis of breast cancer in young Chinese women: 10.3-year median follow-up

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Background: Some evidence has revealed that marital status is an important predictor of breast cancer (BC) prognosis. However, what role marital quality plays in the effect of marital status on BC prognosis remains unclear.

Methods: We conducted a prospective cohort study of women aged 20–50 years with stage I–III BC treated in accordance with a standard treatment protocol. The following three categories of marital quality were assessed: marital satisfaction, sexual relationship, and couple communication. The log-rank test was used to compare survival. Cox proportional hazards models were used to estimate hazard ratio (HR) and 95% confidence interval (CI) for recurrence and metastasis, BC-specific mortality, and overall mortality, adjusting for clinical variables.

Results: A total of 1,043 married women were initially recruited in the study. Forty-five (4.3%) patients refused to participate in this study and 141 (13.5%) were excluded from the analysis. Among 857 participants, there were 59 deaths, including 57 from BC. Multivariate Cox regression analysis showed that patients with poor marital satisfaction had significantly higher risks of recurrence and metastasis (HR 3.942, 95% CI: 1.903–8.167), BC-specific mortality (HR 3.931, 95% CI: 1.896–8.150), and overall mortality (HR 3.916, 95% CI: 1.936–7.924). Those with poor sexual relationship had significantly higher risks of recurrence and metastasis (HR 5.763, 95% CI: 3.012–11.027), BC-specific mortality (HR 5.724, 95% CI: 2.992–10.949), and overall mortality (HR 5.653, 95% CI: 2.993–10.680).

Conclusions: Our results identified a subset of BC patients who have a poor prognosis, namely, those with poor marital quality. Early screening for marital quality and applying necessary social support interventions are helpful in improving the prognosis of patients with poor marital quality.

Keywords: Breast cancer (BC); marital quality; mortality; recurrence; metastasis

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Introduction

Marriage provides several health benefits, including healthier lives and lower mortality (1), and the health benefits of marriage are stronger among those with better marital quality (2). A meta-analysis has reported that marital quality is a stronger predictor of health outcomes compared to health behaviors such as smoking (2). Married patients with cancer have a significantly lower risk of death than unmarried patients, including single, divorced/separated, or widowed patients (3–14). For breast, prostate, esophageal, colorectal, and head/neck cancers, the survival benefits associated with marriage are even greater than the published survival benefit of chemotherapy (14). However, whether all marriages promote the survival of cancer patients or whether marital quality affects cancer prognosis has not been well-established. Only one prospective study of 90 breast cancer (BC) women showed significant associations between confiding marriage and lower recurrence and mortality (15). BC is the leading cause of cancer death among women worldwide, and the mean age of BC diagnosis in China is 45–55 years, which is much younger than that in Western women (16,17). The purpose of this prospective cohort study was to assess the association between marital quality and BC prognosis in young Chinese women. We present this article in accordance with the STROBE reporting checklist (available at <https://ccco.amegroups.com/article/view/10.21037/ccco-23-63/rc>).

Highlight box

Key findings

- Our results found that poor marital quality was significantly associated with higher risks of recurrence, metastasis, and mortality among young women with breast cancer.

What is known and what is new?

- Some evidence has revealed that marital status is an important predictor of breast cancer prognosis. However, few studies have evaluated the relationship between marital quality and breast cancer prognosis.
- Our results support that marital quality was significantly associated with breast cancer prognosis.

What is the implication, and what should change now?

- Early screening for marital quality and applying necessary social support interventions for patients with poor marital quality may promote prognosis, especially for women with early-stage breast cancer.

Methods

Procedures

Study participants were recruited consecutively from the Harbin Medical University Cancer Hospital between April 2011 and April 2012. As previous studies have shown that marital satisfaction is relatively stable in BC patients (18,19), the marital quality of study patients was assessed using a structured questionnaire administered by trained interviewers after the diagnosis of BC and before the initiation of treatment in a separate room. The patient characteristics and relevant clinical information were collected by reviewing the inpatient medical charts. Censored data regarding the patients' recurrence, metastasis, and survival status were obtained each April through telephone follow-up and reviewing the inpatient medical charts, with the last follow-up conducted in April 2022. With a power of 80% and an alpha of 5%, the sample size was estimated to be 531. This study was performed in line with the principles of the Declaration of Helsinki (as revised in 2013) and was approved by the Ethics Committee of Harbin Medical University in Harbin, China. Written informed consent for participation in the study was obtained from all participants before the interviews were conducted.

Study cohort

A total of 1,043 married women between 20 and 50 years of age with newly diagnosed BC were initially recruited in the study. Among these, 45 (4.3%) patients refused to participate in this study and 141 (13.5%) were excluded from the analysis because of carcinoma-*in-situ*, stage-IV BC, and treatment that was not in accordance with the standard practice guidelines (i.e., surgery, radiation, chemotherapy, hormonal therapy). The final study cohort comprised of 857 patients (82.2%) with complete demographic characteristics and relevant clinical information.

Exposure measures

The Chinese version of the Evaluating & Nurturing Relationship Issues, Communication, Happiness (ENRICH) marital inventory, created by Fowers and Olson (20), was used to assess marital quality. ENRICH scales have shown high levels of reliability (69–97%) and validity (85–95%) (20,21). This questionnaire consists of 124 items divided into 12 categories. The large number of items in the

original version was tiring for participants. Three of the 12 categories—marital satisfaction, sexual relationship, and couple communication—are widely used in China (22–24). In the current study, we used the short form of this questionnaire, which includes these three categories. Each category has 10 items, each of which is scored from 1 to 5. The five possible responses for each item range from “in total agreement” to “do not agree at all”. Higher scores indicated better marital satisfaction, couple communication, and sexual relationship. The average scores for these three items were 35.1 [standard error of the mean (SEM) =0.296, range, 11–50], 35.9 (SEM =0.235, range, 17–47), and 35.7 (SEM =0.249, range, 19–50), respectively. The participants were allocated to subgroups according to their marital satisfaction (<35.1 *vs.* ≥35.1), sexual relationship (<35.9 *vs.* ≥35.9), and couple communication (<35.7 *vs.* ≥35.7) scores.

Outcome measures

In the recurrence, metastasis, and BC-specific mortality analysis, recurrence, metastasis, and death attributed to BC were regarded as events. The censored observations included survival status missing, death resulting from other causes, or being alive at the time of the last follow-up in April 2022, with survival status missing accounting for 6.5%. In the overall mortality analysis, death was regarded as events. The censored observations included survival status missing or being alive at the time of the last follow-up. Survival time was calculated by subtracting the date of diagnosis from the date of recurrence, metastasis, death, or censoring.

Covariates

We studied the following five covariates: age at diagnosis (<45, ≥45 years), Grade (Grade I/II, Grade III), tumor-node-metastasis (TNM) stage (I/II, III) [sixth American Joint Committee on Cancer (AJCC)], human epidermal growth factor receptor 2 (HER2) status (negative, positive), and hormone receptors status (negative, positive). The mean age of the included patients was 44.7 years (SEM =0.170, range, 28–50 years). The hormone receptors status of the tumor was stratified into hormone receptors negative [estrogen receptor (ER)⁻/progesterone receptor (PR)⁻] and hormone receptors positive (ER⁺/PR⁺, ER⁻/PR⁺, and ER⁺/PR⁻).

Statistical analyses

Bivariate analyses were conducted using the χ^2 test. Kaplan-Meier analyses were used to estimate survival. After adjusting for age, TNM stage, Grade, HER2, and hormone receptors status, Cox proportional hazards regression analyses were employed to evaluate the associations between recurrence and metastasis, BC-specific mortality, and overall mortality and marital quality (marital satisfaction, couple communication, and sexual relationship). Statistical significance was set as a two-sided $P < 0.05$. Statistical analyses were conducted with IBM SPSS Statistics Version 21.0 (IBM Corp., Armonk, NY, USA).

Results

During a median follow-up of 124 months (range, 19–132 months) from the diagnosis of BC, 59 deaths occurred among the 857 young women with early-stage BC, including 57 deaths that were related to BC. The 45 women who refused to participate in the study were generally similar to the 857 women who agreed to participate but were on average 1.1 years older at diagnosis ($\chi^2 = 4.545$, $P = 0.033$) (Table 1). No significant differences in the relevant biomedical variables were observed between those who agreed and those who refused to participate (all $P > 0.05$) (Table 1).

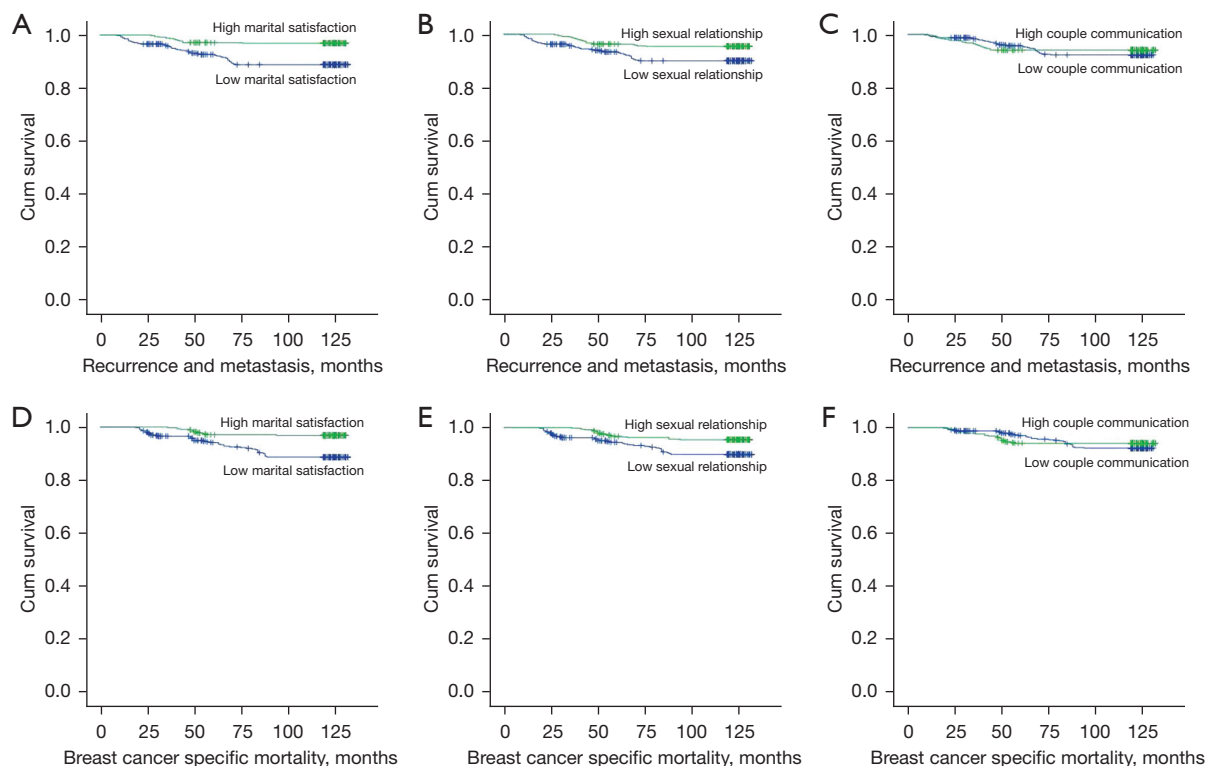
Kaplan-Meier curves were generated to estimate the risk of recurrence and metastasis, BC-specific mortality, and overall mortality according to marital satisfaction, couple communication, and sexual relationship. Couple communication was not significantly associated with recurrence and metastasis, BC-specific mortality, or overall mortality (log-rank test, all $P > 0.05$) (Figure 1). However, women with poor marital satisfaction and sexual relationship had higher risks of recurrence and metastasis, BC-specific mortality, and overall mortality (log-rank test, all $P < 0.05$) (Figure 1).

We then conducted multivariate Cox regression analyses which showed that, after adjusting for age, TNM stage, Grade, HER2, and hormone receptors status, patients with poor marital satisfaction had higher risks of recurrence and metastasis [hazard ratio (HR) 3.942, 95% confidence interval (CI): 1.903–8.167], BC-specific mortality (HR 3.931, 95% CI: 1.896–8.150), and overall mortality (HR 3.916, 95% CI: 1.936–7.924) (Table 2). Patients with poor sexual relationship had a higher risk of recurrence and

Table 1 Personal and clinical characteristics of women with breast cancer

Variable	All (N=902)		Agreed to participate (N=857)		Refused to participate (N=45)		P value
	n	%	n	%	n	%	
Age (years)							0.033
<45	420	46.6	406	47.4	14	31.1	
≥45	482	53.4	451	52.6	31	68.9	
TNM stage							0.166
I/II	715	79.3	683	79.7	32	71.1	
III	187	20.7	174	20.3	13	28.9	
Grade							0.076
I/II	765	84.8	731	85.3	34	75.6	
III	137	15.2	126	14.7	11	24.4	
HER2							0.415
Negative	414	45.9	396	46.2	18	40.0	
Positive	488	54.1	461	53.8	27	60.0	
HRs							0.091
Negative	225	24.9	209	24.4	16	35.6	
Positive	677	75.1	648	75.6	29	64.4	

HRs-negative: ER⁻/PR⁻; HRs-positive: ER⁺/PR⁺, ER⁻/PR⁺, or ER⁺/PR⁻. TNM, tumor-node-metastasis; HER2, human epidermal growth factor receptor 2; HRs, hormone receptors; ER, estrogen receptor; PR, progesterone receptor.



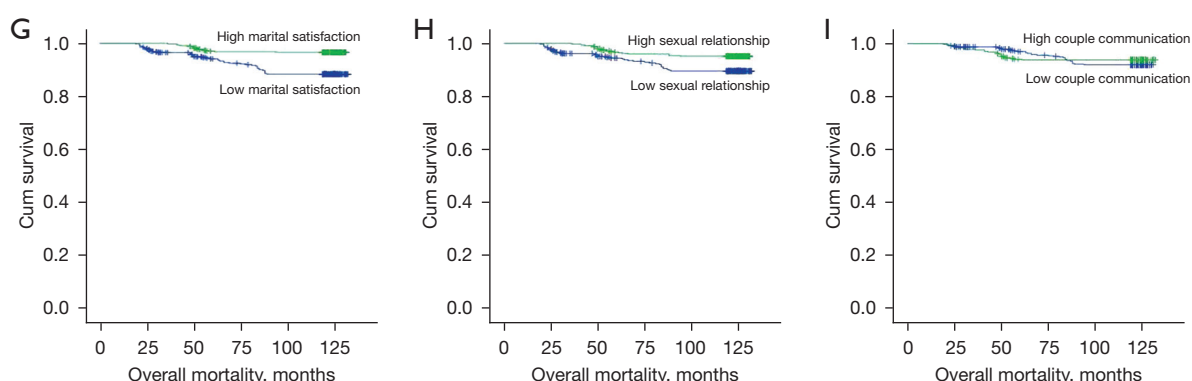


Figure 1 K-M analysis for R&M, BC-specific mortality, and overall mortality. K-M analysis of R&M based on marital satisfaction ($P<0.001$) (A), sexual relationship ($P=0.002$) (B) and couple communication ($P=0.401$) (C); K-M analysis of BC-specific mortality based on marital satisfaction ($P<0.001$) (D), sexual relationship ($P=0.002$) (E) and couple communication ($P=0.395$) (F); K-M analysis of overall mortality based on marital satisfaction ($P<0.001$) (G), sexual relationship ($P=0.002$) (H) and couple communication ($P=0.420$) (I). K-M, Kaplan-Meier; R&M, recurrence and metastasis; BC, breast cancer.

Table 2 Multivariate Cox regression analysis of marital satisfaction with recurrence and metastasis, breast cancer-specific mortality, and overall mortality in women with breast cancer ($N=857$)

Variable	Recurrence and metastasis (n=57)			Breast cancer-specific mortality (n=57)			Overall mortality (n=59)		
	Hazard ratio	95% CI	P	Hazard ratio	95% CI	P	Hazard ratio	95% CI	P
Marital satisfaction									
≥35.1	1.000			1.000			1.000		
<35.1	3.942	1.903–8.167	<0.001	3.931	1.896–8.150	<0.001	3.916	1.936–7.924	<0.001
Age (years)									
≥45	1.000			1.000			1.000		
<45	3.177	1.704–5.922	<0.001	3.131	1.678–5.840	<0.001	2.717	1.498–4.928	0.001
TNM stage									
I/II	1.000			1.000			1.000		
III	7.278	3.854–13.744	<0.001	7.211	3.823–13.601	<0.001	7.184	3.865–13.352	<0.001
Grade									
I/II	1.000			1.000			1.000		
III	0.990	0.530–1.851	0.976	0.985	0.527–1.844	0.963	1.020	0.546–1.903	0.951
HER2									
Negative	1.000			1.000			1.000		
Positive	2.912	1.512–5.606	0.001	2.916	1.516–5.609	0.001	2.825	1.491–5.353	0.001
HRs									
Negative	1.000			1.000			1.000		
Positive	2.761	1.535–4.965	0.001	2.747	1.527–4.941	0.001	2.503	1.407–4.454	0.002

HRs-negative: ER⁻/PR⁻; HRs-positive: ER⁺/PR⁺, ER⁻/PR⁺, or ER⁺/PR⁻. CI, confidence interval; TNM, tumor-node-metastasis; HER2, human epidermal growth factor receptor 2; HRs, hormone receptors; ER, estrogen receptor; PR, progesterone receptor.

Table 3 Multivariate Cox regression analysis of sexual relationship with recurrence and metastasis, breast cancer specific mortality and overall mortality in women with breast cancer (N=857)

Variable	Recurrence and metastasis (n=57)			Breast cancer-specific mortality (n=57)			Overall mortality (n=59)		
	Hazard ratio	95% CI	P	Hazard ratio	95% CI	P	Hazard ratio	95% CI	P
Sexual relationship									
≥35.9	1.000			1.000			1.000		
<35.9	5.763	3.012–11.027	<0.001	5.724	2.992–10.949	<0.001	5.653	2.993–10.680	<0.001
Age (years)									
≥45	1.000			1.000			1.000		
<45	4.826	2.555–9.114	<0.001	4.764	2.520–9.007	<0.001	4.027	2.188–7.412	<0.001
TNM stage									
I/II	1.000			1.000			1.000		
III	12.000	6.229–23.119	<0.001	11.859	6.161–22.826	<0.001	11.681	6.152–22.179	<0.001
Grade									
I/II	1.000			1.000			1.000		
III	1.302	0.644–2.632	0.463	1.294	0.640–2.619	0.473	1.333	0.661–2.685	0.422
HER2									
Negative	1.000			1.000			1.000		
Positive	1.834	1.031–3.261	0.039	1.835	1.032–3.264	0.039	1.816	1.032–3.197	0.039
HRs									
Negative	1.000			1.000			1.000		
Positive	3.454	1.851–6.446	<0.001	3.422	1.834–6.385	<0.001	3.082	1.664–5.709	<0.001

HRs-negative: ER⁻/PR⁻; HRs-positive: ER⁺/PR⁺, ER⁻/PR⁺, or ER⁺/PR⁻. CI, confidence interval; TNM, tumor-node-metastasis; HER2, human epidermal growth factor receptor 2; HRs, hormone receptors; ER, estrogen receptor; PR, progesterone receptor.

metastasis (HR 5.763, 95% CI: 3.012–11.027), BC-specific mortality (HR 5.724, 95% CI: 2.992–10.949), and overall mortality (HR 5.653, 95% CI: 2.993–10.680) (*Table 3*). Couple communication was not significantly associated with recurrence and metastasis (HR 0.946, 95% CI: 0.576–1.735), BC-specific mortality (HR 0.932, 95% CI: 0.507–1.716), or overall mortality (HR 0.946, 95% CI: 0.523–1.711) (*Table 4*).

Discussion

Our study showed that better marital satisfaction and sexual relationship were significantly associated with lower risks of recurrence and metastasis, BC-specific mortality, and overall mortality among married women, after controlling

for clinical variables. This study supports the conclusion that marital quality is an independent prognostic predictor for BC patients.

Some reports on the association between marital status and BC survival have been published, and these studies have consistently found that the risk of death in married patients with BC is lower than that in unmarried patients (including single, divorced/separated, or widowed patients) (6–14). At present, what role marital quality plays in the effect of marital status on BC prognosis remains unclear. However, few studies have evaluated the relationship between marital quality and BC prognosis, with only one previous prospective study of 90 patients showing a significant association between confiding marriage and lower recurrence and mortality, after controlling for disease

Table 4 Multivariate Cox regression analysis of couple communication with recurrence and metastasis, breast cancer-specific mortality, and overall mortality in women with breast cancer (N=857)

Variable	Recurrence and metastasis (n=57)			Breast cancer-specific mortality (n=57)			Overall mortality (n=59)		
	Hazard ratio	95% CI	P	Hazard ratio	95% CI	P	Hazard ratio	95% CI	P
Couple communication									
≥35.7	1.000			1.000			1.000		
<35.7	0.946	0.576–1.735	0.857	0.932	0.507–1.716	0.822	0.946	0.523–1.711	0.854
Age (years)									
≥45	1.000			1.000			1.000		
<45	4.710	2.523–8.791	<0.001	4.631	2.480–8.648	<0.001	3.935	2.162–7.160	<0.001
TNM stage									
I/II	1.000			1.000			1.000		
III	5.024	2.921–8.641	<0.001	4.985	2.899–8.572	<0.001	4.952	2.916–8.409	<0.001
Grade									
I/II	1.000			1.000			1.000		
III	0.826	0.439–1.555	0.554	0.813	0.432–1.530	0.521	0.823	0.440–1.539	0.541
HER2									
Negative	1.000			1.000			1.000		
Positive	1.940	1.113–3.381	0.019	1.960	1.124–3.419	0.018	1.907	1.105–3.290	0.020
HRs									
Negative	1.000			1.000			1.000		
Positive	4.187	2.152–8.144	<0.001	4.208	2.159–8.203	<0.001	3.720	1.940–7.135	<0.001

HRs-negative: ER⁻/PR⁻; HRs-positive: ER⁺/PR⁺, ER⁻/PR⁺, or ER⁺/PR⁻. CI, confidence interval; TNM, tumor-node-metastasis; HER2, human epidermal growth factor receptor 2; HRs, hormone receptors; ER, estrogen receptor; PR, progesterone receptor.

severity at diagnosis (15). These findings are consistent with our results, which found that poor marital satisfaction and sexual relationship were significantly associated with higher risks of recurrence, metastasis, and mortality. These results have important implications for BC prognosis, suggesting the need to assess marital quality upon treatment initiation, link patients with poor marital quality with social support interventions to optimize their prognosis, and conduct further studies on the underlying reasons why marital quality affects BC prognosis. Some cross-sectional studies have shown that poor marital quality is related to greater immune dysregulation (25,26). A longitudinal study also demonstrated that spouses in more distressed marriages had larger declines in cellular immune function over a 2-year period compared to those in less distressed marriages (27).

However, whether the higher risks of recurrence, metastasis, and mortality in patients with poor marital quality are attributed to immune dysregulation needs to be further studied.

Married women often identify their spouses as their most important source of social support (28), and marital quality can be considered a proxy for the quality of social support from spouses. Some studies focusing on the number of social supports have shown that patients with greater social networks (friends, relatives, and adult children) had lower risks of recurrence, BC-specific mortality, and overall mortality (29,30). However, other studies have demonstrated that the quality of close relationships is a better predictor of prognosis than the number of close relationships among patients with BC (6,24,31). A recent

study showed that the family quality of BC patients was linked to lower pain (32). Another study found that BC patients who were satisfied with their marriages had fewer psychological and physical health symptoms after treatment than those who were unmarried or unsatisfied (33). The present findings showed that patients with poor marital quality had higher risks of recurrence, metastasis, and mortality, supporting the contention that the quality of social support is an important prognosis predictor for BC patients.

The major limitation of this study is its small sample size. However, the length of follow-up was substantial (approximately 10 years), and the participants were treated according to a standard treatment protocol, resulting in a relatively high uniformity of treatment characteristics. Yet, a larger study is still needed to draw firm conclusions. In this study, we only assessed marital quality at the time of diagnosis. However, previous studies have indicated that BC patients' marital satisfaction is relatively stable in both the short and long term (12,13). Furthermore, although the sample age, TNM stage, Grade, HER2, and hormone receptors status, and treatments received were assessed, no data were collected regarding psychological status, socioeconomic status, and other comorbidities. Despite these limitations, the findings have important clinical implications to optimize BC prognosis.

Conclusions

Our study showed that patients with poor marital quality had higher risks of recurrence, metastasis, and mortality. Screening for marital quality upon treatment initiation, encouraging patients with poor marital quality to seek help from non-marital support systems, and providing them with necessary social support interventions may help to promote BC prognosis. Given that the quality of social support is an important predictor of BC prognosis, satisfaction with such interventions should also be assessed regularly.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at <https://cco.amegroups.com/article/view/10.21037/cco-23-63/rc>

Data Sharing Statement: Available at <https://cco.amegroups.com/article/view/10.21037/cco-23-63/dss>

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://cco.amegroups.com/article/view/10.21037/cco-23-63/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Ethics Committee of Harbin Medical University in Harbin and informed consent was taken from all the patients.

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