



Original article

An investigation into the reproductive concerns of young women with breast cancer

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ABSTRACT

Objective: Breast cancer has the highest incidence rate among malignant tumors in China, with a trend of affecting younger women. The survival rate of young patients with breast cancer has improved significantly, but the treatment to which they are subjected has short- and long-term adverse effects such as damage to the ovaries, which may result in infertility. Such consequences, in turn, increase patients' concerns over future reproduction and childrearing. At present, patients lack easy access to the informative consultations and accurate patient education. Nor do medical staff continuously assess their overall wellbeing, engage in mental health interventions, or ensure that they have the knowledge necessary to manage their reproductive concerns. This study sought to investigate the reproductive concerns of young female patients with breast cancer, identify the factors that influence those concerns, and provide a theoretical and practical scientific basis for the future fertility management of this specific population.

Methods: Our study is based on a cross-sectional survey of 112 young patients with breast cancer recruited by a convenience sampling method in the Shanghai Cancer Center, Fudan University, from October 2020 to January 2021. A self-designed questionnaire and the Chinese version of the Reproductive Concerns After Cancer were used for data collection. Multivariable linear regression was performed to analyze the data.

Results: The total score for reproductive concerns was 59.96 ± 9.91 , indicating that young women with breast cancer have relatively high levels of concern about reproduction. Multivariable linear regression analyses suggested that age, education level, and the desire for parenthood were the factors that influenced these concerns. The younger the patient, the higher the level of concern. Patients with a higher level of education and a greater desire for parenthood indicated greater levels of concern about reproductive issues.

Conclusions: The levels of concern about reproduction expressed by these young patients with breast cancer were high. The factors that influenced their concern were their age, education level, and desire to have children. We suggest that medical staff focus on young patients during treatment and develop effective intervention measures based on their desire for parenthood, disease condition, and psychological status to promote the patients' physical and mental health.

Introduction

Breast cancer has the highest incidence rate among all malignant tumor cases globally. In 2020, the number of new breast cancer cases reached 2.26 million, accounting for 24.5% of all female cancer cases worldwide.^{1,2} The number of new breast cancer cases in China reached 420,000 in the same year, and female breast cancer cases accounted for

19.9% of all malignant tumor cases,¹ ranking first in the number of new cancer cases among women in China. The number of new female breast cancer cases in the United States in 2022 is expected to account for 30.8% of female malignant tumor cases.³ Data from the Shanghai Cancer Center, Fudan University, suggest that female patients aged 35 and younger accounted for 7.6% of all cases, and those aged between 35 and 44 years accounted for 23.2%.⁴

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Breast cancer in young patients is highly invasive and is often accompanied by a poor clinical prognosis and a greater likelihood of metastasis and recurrence after treatment than in older patients.⁵ Ongoing developments in surgery, chemotherapy, radiotherapy, endocrine therapy, and other comprehensive treatments have improved the survival rate of young patients significantly. But these treatments have short- and long-term adverse effects on the patients' ability to conceive, particularly due to the damage incurred by the ovaries. Furthermore, socio-economic progress, the implementation of a universal two-child⁶ and three-child⁷ policy, and the postponement of childbearing in China have meant that more breast cancer patients are unmarried or still have childbearing plans at diagnosis.⁶ Meanwhile, patients' reproductive concerns may render them reluctant to start or unable to adhere to anti-tumor therapy. Studies from China have suggested that about 26% of young patients with breast cancer plan to have children after diagnosis and treatment.⁸ Although assisted reproductive technology increases the fertility rate in young patients, only 14% of patients are aware of the technology, and only 2% have ever used it.⁹

In China, the fertility management of patients with cancer focuses primarily on fertility preservation. There is a lack of informative consultations and accurate patient education and little continuous assessment or mental health intervention to promote patients' overall well-being. Young patients are often unsure about their reproductive potential and worried about their fertility status. Patients' concerns about reproduction and raising children include worries about their reproductive ability and health, their children's health, and childcare.¹⁰ Recently, fertility preservation in young patients with breast cancer has garnered increased attention worldwide.¹¹ But fertility management for young patients in China started late, and many young Chinese women feel pressured to have children after cancer diagnosis and treatment. Even with mature fertility preservation measures, women's concerns about fertility may still incur a greater and more lasting psychological burden than the tumor itself, and their concerns about reproductive issues may outweigh other health concerns.¹² Thus, this study aimed to investigate the reproductive concerns of young women with breast cancer, identify any influencing factors, and provide a theoretical and practical scientific basis for the future fertility management for this specific population.

Methods

Design, sample, and setting

A descriptive research was developed. We conducted a cross-sectional survey in the Shanghai Cancer Center, Fudan University, from October 2020 to January 2021. Participants were selected by a convenience sampling method when they were admitted to the Cancer Center. The inclusion criteria were as follows: (1) patients were females aged 18–40 years, with pathologically diagnosed breast cancer; and (2) patients had full mental faculties, with the capacity to complete the questionnaire independently and voluntarily participate in this study. The exclusion criteria were as follows: (1) patients had tumors in other parts of their body, and (2) patients had mental disorders. Of the 132 young women with breast cancer invited to take part in this study, 112 (84.8%) agreed to participate. Of the 20 patients who refused to participate, 16 had family members who did not want them to attend, and 4 were transferred to another hospital.

Data collection

The data were collected using questionnaires by primary researchers. Before collecting the data, the researchers provided the eligible participants with information about the study's purpose, methods, and data collection. Written informed consent was obtained from all the study's participants.

Measures

Two research tools were used. A survey was conducted to collect participants' demographic determinants, which consisted of their socio-economic characteristics (age, education level, per capita household income, marital status, fertility status, desire to become a parent, occupation, and religious beliefs) and medical data (pathological type, cancer stages, and treatment details). Meanwhile, the main variable in this study, reproductive concerns, was measured using the Chinese version of the Reproductive Concerns After Cancer (RCAC) scale.¹³ The scale included 18 items, comprising 6 dimensions, each with 3 items and included aspects such as spouse consent, infertility acceptance, personal health, the ability to conceive, preparation for pregnancy, and children's health. The Likert 5-level scoring method was used, with 1 point for 'strongly disagree' and 5 points for 'strongly agree'. The higher the patient's score, the greater their reproductive concern. This scale was first used among patients with gynecological cancer in China and showed good reliability and validity with a Cronbach's α coefficient of 0.792 and a retest reliability coefficient of 0.956.¹³

Data analysis

SPSS 21.0 software (IBM Corp., Armonk, NY, USA) was used for data analyses. Descriptive statistics including percentages, frequencies, and mean \pm standard deviation (Mean \pm SD) were selected to represent the general data and the level of reproductive concerns of participants. T-tests and analysis of variance tests were performed to analyze single factors and develop a statistical argument. Multivariable linear regression analysis was used to analyze multiple factors and evaluate those factors that influenced the reproductive concerns of young patients with breast cancer. A *P*-value < 0.05 was considered statistically significant.

Results

Participants' demographic information

The mean age of the participants was 34 years old (ranging from 21 to 40 years), with 17 participants (15.2%) under the age of 30 years. Of the 112 participants, 17.8% had obtained a high school education or lower, and 82.2% had a college education or higher. The monthly per capita household income for 41.1% of the participants was between RMB 5000 and 10,000 RMB, while 34.8% had a monthly per capita household income of over 10,000 RMB. Married participants made up 75% of the cohort, while unmarried or divorced women made up 23.2% and 1.8%, respectively. Over half (54.5%) of the participants already had children, 55.4% professed a desire for parenthood, 70.5% were employed, and 83% had no religious beliefs. Of the participants, 84.8% had received surgical treatment, including a mastectomy (47.3%), while 87.5% had received chemotherapy and 65.2% radiotherapy. Further details are shown in [Table 1](#).

Levels of reproductive concerns in young women with breast cancer

The present study found that the average total score of reproductive concerns reported by the participants was 59.96 ± 9.91 , indicating relatively high levels of reproductive concerns. The concerns about their health and their children's health were 12.23 ± 2.16 and 12.35 ± 2.45 , respectively, which also reflected relatively high levels of concern ([Table 2](#)).

The influence of general information on the reproductive concerns of young women with breast cancer

The results of the single-factor analyses suggested that differences in reproductive concern scores caused by differences in age, education level, fertility status, and the desire for parenthood were statistically

Table 1
Basic information of young women with breast cancer (n = 112).

Variables	n (%)
Age	
18–29 years old	17 (15.2)
30–40 years old	95 (84.8)
Education level	
Middle school and below	8 (7.1)
High school/secondary technical school	12 (10.7)
Junior college/bachelor	72 (64.3)
Master and above	20 (17.9)
Monthly household income per capita	
≤ 5000 RMB	27 (24.1)
5001–10,000 RMB	46 (41.1)
10,001–15,000 RMB	14 (12.5)
> 15,000 RMB	25 (22.3)
Marriage status	
Unmarried	26 (23.2)
Married	84 (75.0)
Divorced	2 (1.8)
Fertility status	
Childless	51 (45.5)
One child	49 (43.8)
2 children and above	12 (10.7)
Have parenthood desire or not	
Yes	62 (55.4)
No	50 (44.6)
Employment status	
Employed	79 (70.5)
Unemployed	33 (29.5)
Have religious belief or not	
Yes	19 (17.0)
No	93 (83.0)
Have had operative treatment or not	
Yes	95 (84.8)
No	17 (15.2)
Have had adjuvant radiotherapy or not (breast and/or axilla)	
Yes	73 (65.2)
No	79 (34.8)
Have had adjuvant chemotherapy or not	
Yes	98 (87.5)
No	14 (12.5)
The type of performed surgery	
Modified radical mastectomy	26 (23.2)
Radical mastectomy	10 (8.9)
Simple mastectomy + sentinel lymph node biopsy	15 (13.4)
Simple mastectomy	2 (1.8)
Breast conserving surgery	16 (14.3)
Breast conserving surgery + sentinel lymph node biopsy	18 (16.1)
Breast reconstructive surgery	16 (4.3)
Sentinel lymph node biopsy	1 (0.9)
Others	8 (7.1)
Pathologic types	
DCIS (ductal carcinoma <i>in situ</i>)	10 (8.9)
LCIS (lobular carcinoma <i>in situ</i>)	1 (0.9)
IDC (invasive ductal carcinoma)	96 (85.7)
Others	5 (4.5)
Clinical stages	
Stage I	29 (25.9)
Stage II	64 (57.1)
Stage III	16 (14.3)
Stage IV	3 (2.7)
Whether lymphatic metastasis is present	
Yes	46 (41.1)
No	66 (58.9)
Whether there is distant metastasis	
Yes	5 (4.5)
No	107 (95.5)

significant $P < 0.05$ (Table 3).

Multifactorial analysis of factors influencing reproductive concerns of young women with breast cancer

The results of the multivariable linear regression analyses suggested that age, education level, and the desire for parenthood were the factors

Table 2
The score of reproductive concerns of young women with breast cancer.

Dimensions	Mean score (Range)	SD score
Total score	59.96 (18–90)	9.91
Consent of spouse	8.91 (3–15)	3.38
Pregnancy preparation status	9.67 (3–15)	2.89
Infertility acceptance degree	7.04 (3–15)	2.73
Ability to conceive	9.66 (3–15)	3.00
Own health	12.23 (3–15)	2.16
Children's health	12.35 (3–15)	2.45

that influenced the reproductive concerns of young women with breast cancer (Table 4).

Discussion

High levels of reproductive concerns in young women with breast cancer

In this study, patients had higher reproductive concern scores regarding three aspects: their children's health, their health, and their ability to conceive. Among these, the score for the patients' concern for their children's health was the highest, followed by that for their health, indicating that patients are most worried about the adverse effects of the disease on their children's health, which corroborates the results of Wang et al.¹⁴ Maternal affection can be a powerful force, with the mother's concern for her children's safety sometimes being much greater than that for herself. Prospective mothers naturally want to bear healthy children but measures such as chemotherapy and endocrine therapy can have teratogenic effects on reproductive cells¹⁵ and lead to adverse effects in the fetus, which has been shown to cause high levels of concern in young women with breast cancer. Meanwhile, certain genetic factors in breast cancer can result in genetic mutations in a small number of patients,¹⁶ whose children would be at a high risk of developing breast cancer. This, in turn, causes patients to worry about passing the disease on to their children.

The incidence of breast cancer is closely related to estrogen levels. During pregnancy, increased estrogen levels lead to the deterioration, recurrence, and metastasis of breast cancer, all of which work against recovery.¹⁵ As a result, patients fear that becoming pregnant might increase the probability of a recurrence of the disease and that they might not be healthy enough to raise their children. Young patients usually undergo postoperative adjuvant chemotherapy, which is harmful to their reproductive organs and can cause harmful side effects such as premature ovarian failure and menopause,¹⁵ and patients worry about not being able to have children as a result.

Greater attention should be paid to young patients with breast cancer

The results of this study showed that the younger the patient, the higher their level of concern about reproductivity. These findings align with those of Wang et al.¹⁷ suggesting that younger patients, who often lack life experience and psychological resources, need more attention than do their older counterparts. When diagnosed with breast cancer, they are often at a loss, and prone to negative emotions such as fear, anxiety, and pessimism. At the same time, younger patients are often unaware of the connection between breast cancer and fertility and pay more attention to the diagnosis and treatment of their cancer. They do not know that cancer treatments can result in the loss of their fertility and do not realize the importance of fertility-related issues. They are unaware of the fact that their fertility is at risk and thus often fail to take measures to preserve it; that is, they do not address their reproductive concerns.¹⁸

Wang et al.¹⁴ showed that patients with breast cancer who failed to ensure fertility preservation had higher levels of reproductive concerns. Nowadays, a variety of assisted reproductive technologies can be used to protect the fertility of female patients with cancer. Standard technologies include the cryopreservation of embryos, egg cells, and ovarian tissue,

Table 3
Single factor analysis of reproductive concerns of young women with breast cancer.

Variables	n (%)	Mean score (RCAC)	SD score	P
Age				
18–29 years old	17 (15.2)	66.88	13.73	0.027 ^a
30–40 years old	95 (84.8)	58.60	8.57	
Education level				
Middle school and below	8 (7.1)	56.25	10.98	0.005 ^b
High school/secondary technical school	12 (10.7)	65.58	9.38	
Junior college/bachelor	72 (64.3)	58.00	9.12	
Master and above	20 (17.9)	64.60	12.85	
Monthly household income per capita				
≤ 5000 RMB	27 (24.1)	60.30	8.07	0.889
5001-10,000 RMB	46 (41.1)	60.37	9.96	
10,001-15,000 RMB	14 (12.5)	60.64	13.70	
> 15,000 RMB	25 (22.3)	58.00	9.91	
Marriage status				
Unmarried	26 (23.2)	62.73	10.62	0.155
Married	84 (75.0)	58.83	9.51	
Divorced	2 (1.8)	65.50	14.85	
Fertility status				
Childless	51 (45.5)	63.27	10.40	0.002 ^b
One child	49 (43.8)	57.60	8.41	
2 children and above	12 (10.7)	54.58	9.21	
Have parenthood desire or not				
Yes	62 (55.4)	63.44	10.18	<0.001 ^b
No	50 (44.6)	55.42	7.58	
Employment status				
Employed	79 (70.5)	59.95	10.32	0.880
Unemployed	33 (29.5)	59.64	10.02	
Have religious belief or not				
Yes	19 (17.0)	63.58	8.13	0.072
No	93 (83.0)	59.10	10.11	
Have had operative treatment or not				
Yes	95 (84.8)	59.35	9.94	0.200
No	17 (15.2)	62.71	9.56	
Have had adjuvant radiotherapy or not (breast and/or axilla)				
Yes	73 (65.2)	59.66	9.65	0.772
No	79 (34.8)	60.23	10.51	
Have had adjuvant chemotherapy or not				
Yes	98 (87.5)	60.01	10.14	0.668
No	14 (12.5)	58.79	8.40	
The type of performed surgery				
Modified radical mastectomy	26 (23.2)	60.46	6.46	0.710
Radical mastectomy	10 (8.9)	60.90	9.50	
Simple mastectomy + sentinel lymph node biopsy	15 (13.4)	56.87	9.69	
Simple mastectomy	2 (1.8)	50.50	4.95	

Table 3 (continued)

Variables	n (%)	Mean score (RCAC)	SD score	P
Breast conserving surgery	16 (14.3)	59.63	11.08	
Breast conserving surgery + sentinel lymph node biopsy	18 (16.1)	62.83	10.74	
Breast reconstructive surgery	16 (4.3)	58.50	12.85	
Sentinel lymph node biopsy	1 (0.9)	58.35	8.65	
Others	8 (7.1)	61.38	11.25	
Pathologic types				
DCIS (ductal carcinoma <i>in situ</i>)	10 (8.9)	60.00	13.69	0.506
LCIS (lobular carcinoma <i>in situ</i>)	1 (0.9)	75.00	9.98	
IDC (invasive ductal carcinoma)	96 (85.7)	59.69	9.57	
others	5 (4.5)	59.80	8.64	
Clinical stages				
Stage I	29 (25.9)	60.14	9.25	0.310
Stage II	64 (57.1)	60.88	9.70	
Stage III	16 (14.3)	55.81	6.64	
Stage IV	3 (2.7)	12.00	6.93	
Whether lymphatic metastasis is present				
Yes	46 (41.1)	59.83	10.40	0.978
No	66 (58.9)	59.88	9.65	
Whether there is distant metastasis				
Yes	5 (4.5)	57.20	9.34	0.542
No	107 (95.5)	59.98	9.96	

^a $P < 0.05$.

^b $P < 0.01$.

Table 4

Multiple linear regression analysis of influencing factors of reproductive concerns of young women with breast cancer.

Independent variable	Partial regression coefficient	SE	t	P
Constant term	84.937	8.104	10.481	<0.001 ^b
Age	-6.131	2.104	-2.914	0.004 ^b
Education level	2.080	0.977	2.128	0.036 ^a
Fertility status	0.666	1.457	0.457	0.649
Have parenthood desire or not	-4.070	1.972	-2.064	0.041 ^a

^a $P < 0.05$.

^b $P < 0.01$.

which should be performed before chemotherapy. These fertility preservation strategies should be provided to younger patients prior to treatment. Research has shown that young women with cancer require more information about reproduction.¹⁹ Younger patients with breast cancer have difficulty accessing disease-and fertility-related information sources, which increases the likelihood that they will regret their decisions in the future, and this increases their level of concern about their reproductive abilities. Patients with cancer who receive professional fertility counseling have been shown to have a lower rate of regret about fertility decisions than those who only receive cancer-related counseling.²⁰ So professional information-based support for these younger patients is also needed.

Younger patients with breast cancer experience increased psychological pressure and are prone to anxiety and depression. Knowing that their cancer treatment could generate adverse consequences such as infertility may lead to greater levels of reproductive concerns. At this juncture in their lives, young women need support from their families. Women from Asian cultures are often introverted and inhibited when it comes to expressing emotions. Most patients have feelings of inferiority

and fear the stigma associated with mental health issues and are thus unwilling to seek emotional support. Studies have shown that adequate emotional support can help patients alleviate negative emotions and psychological pressures²¹ and lower the level of their concerns about reproductive issues. Family members should be encouraged to provide emotional support to the patients to reduce their reproductive concerns. A sense of self-efficacy refers to an individual's capacity to speculate upon and judge their own ability to attain specific behavioral goals. It can affect an individual's choice of behavior, adherence to behavioral patterns, behavioral efficiency, and effort levels. Therefore, self-efficacy can affect the health-related behaviors patterns of patients with breast cancer. Wang et al.¹⁷ pointed out that a good sense of self-efficacy can reduce levels of reproductive concerns in patients with breast cancer. It can also increase the degree of self-management in patients with malignant tumors, enhance patients' confidence in cancer treatments, reduce psychological pressure, and make them more optimistic about the disease, contributing to better treatment effects and rehabilitation. So helping younger patients to promote a sense of self-efficacy and relieve their reproductive concerns deserves our consideration.

Highly educated patients who hope to have children require more professional information-based support

The present study showed that the levels of reproductive concern in young women with breast cancer positively correlated with their education level and desire to have children. Patients with a higher level of education and a greater desire for parenthood had higher levels of reproductive concerns. This result was consistent with several previous studies.^{14,22–24} Research has shown that 21% of young patients with breast cancer wanted to have their first child after their cancer diagnosis and treatment, and 14.2% wanted to have their second child.²⁵ Another study indicated that only 1.9% received fertility preservation treatment,²⁶ and only 23.4% received fertility counseling during treatment.²⁶ Medical staff do not pay sufficient attention to this kind of information and there is a lack of active communication and patient education. In the early stages of diagnosis and treatment, patients tend to pay more attention to treatment plans and rarely seek information about fertility. However, highly educated patients are more likely to accept and adapt to change and integrate new information. They may also be more proactive in talking with medical staff about their condition, treatment plan, and prognosis. They are also more eager to acquire comprehensive information about breast cancer, fertility, treatment processes, and the pros and cons of their treatment plan. For such patients, we suggest that medical staff take the initiative in providing more professional information-based support. Clinicians can refer these patients to the appropriate fertility experts for professional and authoritative fertility advice and timely fertility preservation measures. The salient breast cancer information required by patients should be provided and their understanding of the importance of fertility preservation should be ensured.

Implication for nursing practice

Nursing staff could provide personalized assessment and consultation. Nurses could assess the basic information regarding a patient's condition, psychology, and symptoms, and understand the patient's need to develop targeted care plan. For example, when facing young, childless patients, a nurse should take note of the patient's fertility situation during the evaluation stage, and actively ask whether they hope to have children, if they have received fertility counseling, and so on. A personalized nursing evaluation helps to reduce the probability and levels of reproductive concerns in young patients with breast cancer.

Also, nursing staff could promote peer support care. Peer support is a relatively new clinical care mode, in which a group of people of similar

age, behavioral patterns, life experience, and cultural background share information, experiences, emotions, and ideas to provide social, emotional, and information-based support for the target population. This type of social and psychological support can help with disease prevention and health promotion.²⁷ The peer support model has a positive impact on patients with breast cancer and can improve their quality of life and sense of self-efficacy, providing them with social and emotional support. Given that it has proven to be beneficial to patients' physical and mental health, the peer support care mode is worth promoting in clinical practice. Forms of peer support may vary. For example, clinical nurses could select peer-support candidates according to a patients' situation. They could organize online, offline, and blended environment support groups to improve the patients' quality of life.

Limitations

Several limitations to this study should be noted. First, the sample size of the study was not large. Data collection was conducted in a specialized hospital and did not capture the concerns of young women in general hospitals or hospitals in suburban areas. This is noteworthy as the type of hospital may have predetermined the socioeconomic status of the participants. Thus, the extent to which our sample can be generalized is reduced. A qualitative study to explore more about the patients' experience of reproductive concerns, as well as experimental trials to examine and alleviate reproductive concerns, are recommended for future research.

Conclusions

Young women with breast cancer have exceptionally high levels of concern about reproductive issues and their concerns are directly influenced by their age, education level, and desire to have children. We suggest that medical staff focus on young patients during treatment. More specifically, we recommend that they develop effective intervention measures to promote the physical and mental health of young female patients with breast cancer based on their desire for parenthood, disease condition, and psychological status.

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Ethics 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. This study was approved by the Scientific and Ethical Committee of the Shanghai Cancer Center, Fudan University. And it was conducted in accordance with the Declaration of Helsinki (as revised in 2013). All methods were performed in accordance with the relevant guidelines and regulations. Written informed consent was obtained from all participants before data collection. The individuals discussed in this manuscript have given written informed consent to publish their data.

Declaration of competing interest

None declared.

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References

1. <https://www.iarc.fr/faq/latest-global-cancer-data-2020-qa/>.
2. Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries[J]. *CA Cancer J Clin*. 2021;1-41.
3. Siegel RL, Miller KD, Fuchs HE, et al. Cancer statistics, 2022[J]. *CA Cancer J Clin*. 2022;72(1):7-33.
4. Mo M, Yuan J, Zhou CM, et al. Changing long-term survival of Chinese breast cancer patients-experience from a large single institution hospital based cancer registry with 35 thousand patients[J]. *China Oncol*. 2020;30(2):90-97.
5. Liao XM. *Factors Affecting the Attention and Prognosis of Fertility-Related Problems in Very Young Breast cancer*[D]. Hebei Medical University; 2019.
6. Wang W, Wang X, Liu J, et al. Breast cancer in young women of Chinese Han population: a retrospective study of patients under 25 years[J]. *Pathol Res Pract*. 2016;212(11):1015-1020.
7. Chen W. China's low fertility and the three-child policy: analysis based on the data of the seventh national census[J]. *Popul Econ*. 2021;(5):25-35.
8. Ju J, Zhang LX, Yue J, et al. An investigation of the fertility needs of young patients with breast cancer[J]. *Chin J Oncol*. 2020;42(5):408-412.
9. Armuand GM, Rodriguez-Wallberg KA, Wettergren L, et al. Sex differences in fertility-related information received by young adult cancer survivors[J]. *J Clin Oncol*. 2012;30(17):2147-2153.
10. Murphy D, Klosky JL, Reed DR, et al. The importance of assessing priorities of reproductive health concerns among adolescent and young adult patients with cancer [J]. *Cancer*. 2015;121(15):2529-2536.
11. Ma F. Chinese consensus guidelines for breast cancer in young women: clinical practice and fertility preservation[J]. *Clin J Oncol*. 2019;41(7):486-495.
12. Qiao TT. *Development and Preliminary Application of the Chinese Version of the Reproductive Concerns after Cancer Scale*[D]. Zhengzhou University; 2017.
13. Qiao TT, Chen DD, Zheng W, et al. Translation and reliability and validity of the Chinese version of the Reproductive Concerns after Cancer scale (RCAC) [J]. *Chin J Nurs*. 2016;51(12):1509-1514.
14. Wang R, Cheng R, Wang JX. Analysis on the status quo of influencing factors of reproductive anxiety in fertile patients with breast cancer[J]. *Chin Nurs Res*. 2019; 33(13):2258-2261.
15. Bajpai J, Majumdar A, Satwik R, et al. Practical consensus recommendations on fertility preservation in patients with breast cancer[J]. *South Asian J Cancer*. 2018; 7(2):110-114.
16. Yang LC. *The Research of BRCA1 and BRCA2 Pathogenic Mutations of the 140 Chinese Breast Cancer Patients with Genetic High-risk*[D]. Anhui Medical University; 2017.
17. Wang L, Li X, Li Y, et al. Status quo of reproductive concerns in patients with breast cancer receiving postoperative chemotherapy and its influencing factors[J]. *Chin J Modern Nurs*. 2019;25(1):58-62.
18. Ruggeri M, Pagan E, Bagnardi V, et al. Fertility concerns, preservation strategies and quality of life in young women with breast cancer: baseline results from an ongoing prospective cohort study in selected European Centers[J]. *Breast*. 2019:4785-4792.
19. Wang XY, Wang Y, Pang JM, et al. A qualitative study on the experience of fertility concerns in breast cancer patients of reproductive age[J]. *J Nurses Train*. 2021;36(4): 332-338, 329.
20. An XH, Zhao WT, Zhang Y, et al. Research progress on fertility concerns in young breast cancer patients[J]. *Chin J Modern Nurs*. 2020;(7):972-976.
21. Huang XY, Hu Y, Lu ZQ, et al. Analysis of qualitative contents of message on professional support website forum of breast cancer patients[J]. *Chin Nurs Res*. 2011; 25(22):2010-2013.
22. Zheng DP, Dong X, Wang XJ. Fertility plan, knowledge and decision-making preferences in young breast cancer women[J]. *J Nurs Sci*. 2015;30(22):31-34.
23. Ruddy KJ, Gelber SI, Tamimi RM, et al. Prospective study of fertility concerns and preservation strategies in young women with breast cancer [J]. *J Clin Oncol*. 2014; 11(32):1151-1156.
24. Kim J, Mersereau E, Su I, et al. Young female cancer survivors' use of fertility care after completing cancer treatment[J]. *Support Care Cancer*. 2016;24(7):3191-3199.
25. Zhang LX. *A Survey of the Reproductive Needs of Young Women with Breast cancer*[D]. Peking Union Medical College; 2015.
26. Ju J, Zhang LX, Yue J, et al. A survey of the reproductive needs of young women with breast cancer[J]. *Chin J Oncol*. 2020;42(5):408-412.
27. Shi YJ, Liu Y, Shi TY. Research progress of peer support for breast cancer patients[J]. *Chin J Modern Nurs*. 2020;26(11):1532-1536.