**A mixed method study on Reproductivity concerns among young women with breast cancer**

**Abstract:**

**introduction**: reproductivity concern can be an important problem among young women with breast cancer. familiarity with the type, severity and causal roots of these problems in any community can be effective in providing proper advice to patients and their families. Because these problems can be influenced by the culture of the studied society.

**Methods:** A descriptive analytical cross-sectional study was followed by a qualitative study performed in the 2021 in the Northwest of Iran.

 The number of patients under 45 years of age was 139 in the quantitative section of the study, and 30 in the qualitative section.

 Data were analyzed using SPSS 25 software at a significance level of 95% in quantitative section and content analysis used in qualitative section of study.

**results:** The mean age of participants was 37.55±5.95 years. The mean total score of the perceived reproductivity concern in patients was 48.5± 6. Those who had undergone complementary therapy had a higher level of total concern. The highest level of Reproductive Concerns related to the "personal health", and the casual roots of this major Concern were categorized into two main group by qualitative study : Physical and psychological.

**Conclusions:** Young women had some degree of concern in all areas, especially in the area of ​​personal health. According to study results it is recommended that patients and their families receive appropriate support and educational programs.

**Introduction**

 Breast cancer is the most common non-skin malignancy among women([1](#_ENREF_1), [2](#_ENREF_2)). Although the prevalence of breast cancer in Europe and North America has had a steady or negative trend; there has been a growing incline in the developing countries ([2](#_ENREF_2)). Breast cancer can account for 12.5% ​​of all cancers in Iran ([3](#_ENREF_3)). The average age of breast cancer in the Middle East is 5 to 10 years lower than other countries ([4](#_ENREF_4), [5](#_ENREF_5)). Breast cancer is the most common cancer among women of childbearing age, explaining 45% of cancers in women aged 25-49 years. Over 15% of all breast cancer cases are under the age of 40. ([6](#_ENREF_6)) Its prevalence is increasing among young women of reproductive age that may intend to become pregnant in the future ([5](#_ENREF_5)).

As per statistics, breast cancer in Iranian women is of the first place regarding the woman's cancers in the country and most of them are at their reproductive age when diagnosed with the cancer ([4](#_ENREF_4), [5](#_ENREF_5" \o "Jazayeri, 2015 #5)). Moreover, long-term survival rate following breast cancer treatment is much higher than other types of malignancies. With the advancement of systemic therapies, the 5-year survival rate of breast cancer has increased to more than 91% ([4](#_ENREF_4), [7](#_ENREF_7" \o "Bodai, 2015 #7)). The percentage of women who survive 10 years after breast cancer treatment is 71 to 84([6](#_ENREF_6)). Therefore, it is of high value to address the post-treatment needs of the cancer survivors ([7](#_ENREF_7)). With the development of treatment methods and increasing patients' survival rate, reproductivity takes on considerable significance among breast cancer survivors ([6](#_ENREF_6)). About two-thirds of young women of childbearing age experience the effects of the disease and its treatment on their reproductivity and sexual health ([4](#_ENREF_4), [8](#_ENREF_8" \o "Gorman, 2021 #8)). Infertility as a problem in young women who do not have children can be a stressful issue ([4](#_ENREF_4)). The ability to conceive, form a family and have a safe pregnancy in the future are some of the issues that are raised for survivors of breast cancer in their reproductive age ([9](#_ENREF_9)). In addition to the patient herself, living with breast cancer puts stress on those around her. Problems such as reproductivity, the health of the patient and the risk of the disease to be inherited by children, the ability to become pregnant in the future following breast cancer are some of the concerns that affect women's lives. Taking the increasing growth of the disease in the communities, the control of these unmet needs should not be treated negligently. Therefore, familiarity with the type and severity of these problems in any community can be effective in providing proper advice to patients and their families.

 **Methods**

A descriptive analytical cross-sectional study was conducted to determine the reproductivity concerns in young women with breast cancer. Then study continued qualitatively.

Phase 1: Methods of quantitative study:

The participants of quantitative section of the study were 139 women with breast cancer under the age of 45.

Data collection

The patients' demographic, pathological and clinical data was collected through a researcher-made questionnaire, and the information on their concerns about reproductivity after breast cancer was gathered using the Reproductive Concerns After Cancer (RCAC) questionnaire (10). The reliability of the questionnaire was estimated to be more than 75% using Cronbach's alpha test and the validity of the questionnaire was assessed via asking experts' opinions.

All study participants took part in the study getting completely informed about the study objectives and ascertained about privacy of their information, and giving their consent. Inclusion criteria in this study were breast cancer, age below 45 years, and the patient's consent to participate in the study. Patients with metastasis, polycystic ovary syndrome, endometriosis, history of infectious abortion, sexually transmitted infections, Pelvic surgery, pelvic and uterine surgeries or fallopian tubes, uterine leiomyoma primary or secondary infertility , and dissatisfaction with participating in the study were excluded.

The Reproductive Concerns after Cancer Questionnaire (RCAC) scale measured women's reproductive challenges in 6 dimensions.

The dimension of "reproductivity potential" assesses the patient's concern about the possibility of not being able to have children in the future; the dimension of "disclosing the problem" is related to the patient's concern about revealing reproductivity problems to the spouse, the "child health" dimension deals with the patient's concern about the possible impact of their illness on the children's health, the "personal health" dimension is related to the patient's concern about their ability to take care of children, the "acceptance" dimension is the patient's concern about accepting their inability to get pregnant; and the dimension of "becoming pregnant" measured the patient's concern about the potential risks of pregnancy.

Each question was answered on a 5-point Likert scale anchored at five points. Scores in each dimension could be at least 3 and at most 15, and higher scores reported more concern in patients. For the entire questionnaire, a minimum score of 18 indicated the absence of concern and a maximum score of 90 indicated the highest level of concern.

Independent t-Test, logistic regression and Fisher's exact test in SPSS software version 25 used and p value ​​less than 0.05 were considered as the level of significance.

Phase 2 : Methods of qualitative study:

The hidden and non-obvious causes of major reproductivity concern (personal health) which were the main causes of reproductivity concerns in young women with breast cancer in northwest of iran were investigated through qualitative study because these causes can be influenced by the culture of the studied society and it can have reasons beyond what was obtained in the quantitative section of study.

Data collection:

Using purposive sampling, 30 women under 45 years of age, with breast cancer having completed adjuvant treatment without cancer recurrence were included in this section of study.

For data collection, in-depth, open and semi-structured interviews were employed.

The respondents' answers directed the interview and triggered other questions. Interview lasted for 45-90 minutes depending on the survivor's condition. Individual interviews were conducted at a time and in a location convenient to each woman. Only one of the researchers conducted all the interviews, and continued them until obtaining sufficient amount of information. All interviews were audio recorded to ensure accuracy of data collection. Audio interviews were transcribed word by word.

**Ethical considerations:**

The present study was conducted under the ethics code IR.ARUMS.REC 2019.098. Participants took part in the study voluntarily based on their personal consent. All the participants had the choice of giving up at any stage of the study.

**Results:**

**quantitative section results:**

The average age of the participants was 37.55 ± 5.95years, ranging from 18 to 45 years of age. The majority of the patients (67.6%) had 1 child or 2 children, and 9.4% didn't have any child. The mean age of the last child in the patients who had children was 5.31± 9.93 years. In terms of the sufficiency level of income, the income was insufficient to meet the living needs of more than 50% of patients. The self-assessment of 47.5% of the patients of their health level was poor (Table 1).

The mean age of the patients was 34.90 ±6.05 years at the time of diagnosis of cancer. The percentage of the patients undergoing lumpectomy was %65.5. Among other treatments, chemotherapy accompanied by radiotherapy (28.1%) had the highest frequency in complementary therapies received by patients (Table 2).

The mean total score of perceived reproductivity concern of patients was 48.5 ± 6, with the minimum score of 37 and the maximum score of 75.

Also, people who received complementary therapy had higher levels of total concern. The employed people were less concerned (Table 3).

The highest level of concern was related to the "personal health" subscale and the lowest level of concern was related to the "partner disclosure" subscale (Table 4).

Investigating the relationship between demographic variables and the type of patients' perceived concerns, as well, showed that the level of patients and their spouses' education was related to patients' concern pertaining personal health, respectively (P = 0.049) (p = 0.048), so that perceived concern in the personal health subscale fell significantly as the level of education rose. The results also displayed a significant relationship between the number of children with the reproductivity potential (P = 0.033) and acceptance (P <0.001) decreased significantly (Table 3).

Patients having received all three complementary treatments following surgery, including chemotherapy, radiotherapy, and hormone therapy, had greater and significant concerns about their children's health (P = 0.008) and personal health (P = 0.001).

As the economic situation improved, the perceived challenge in the personal health subscale decreased significantly (P = 0.025).

The ability to conceive was one of the most important concerns in patients according to as 85 patients' report (61.6%). The inability to take care of children was one of the major challenges in 65 patients (47.4%).

Regression analysis also showed that the women's age, the age of the last child of patient and the women's age at the time of diagnosis were the predictors of women's productivity concerns (table 5).

**Qualitative section results:**

After completion of quantitative study a qualitative study was done on the major cause of reproductivity concern .

the results showed that the roots of personal health concern were placed in two main categories including: psychological and physical causes.

**Psychological causes**:

These psychological factors include women's fears and worries. Fear of an indefinite future for themselves and their children, feeling unable to protect their children from social harms due to illness, fear of probable physical separation from their child due to their illness or their death, concern about neglecting children's needs. All these factors lead to the creation or the increase of personal concern of women with cancer. Examples of what the patients said are given bellow.

 *"I am always worried that I will be busy with my own illness and I will not be able to raise my children well and they will grow up on their own".*

*"If I were healthy, I could meet their needs, but since I've got sick, I've been physically and mentally unable to take care of them".*

 *"My daughter really liked to tell me all the events at school because she is at an age that she needs to have a close relationship with me, but my impatience after being sick has deprived her of this opportunity".*

*"I could never go back to my pre-cancer days and do the things I used to do for my children".*

*"I couldn't take my daughter out very much, my daughter was not socialized, my hair and eyelashes were falling out... I couldn't take my daughter to a party, I couldn't take her out either... We didn't have any contact with anyone at all".*

*"My children are boys and I feel that due to my illness I cannot manage them well and protect them from the dangers in society".*

*"I am no longer preoccupied with taking care of my children, and this situation that I am involved in can cause problems in raising children, and this issue has made me feel guilty".*

*"I am afraid that I might die and the children will be in the hands of a stepmother".*

These factors cause women to feel bad motherhood, inadequacy in playing an educational role, inability to protect their children, inability to monitor their children's social activities, and cause the inability to provide quality maternal care and inefficient care by mothers.

**Physical causes:**

Physical restrictions caused by the disease and its treatment, such as movement restrictions, fatigue and disability, and pain, as well as the shift of family financial resources to the treatment of the disease, are other causes that affect personal concerns of patients. Examples of what the patients said are given bellow.

*"I would like to hug my daughter and take her outside, but my inability to use my hands does not allow me to do so. I can't even hug my daughter and carry her up the stairs".*

*"Although my children are young (5 and 6 years old) and need to go out and have fun and play with children of their own age, but I can't take them out and I rest at home most of the time".*

*"I used to take the kids to school, cook whatever food they wanted, but now I get tired quickly and have little ability to do things".*

*"My frequent visits by doctor to get my follow-up treatment wastes a lot of my time and I can't spend much time with my children and talk with them".*

*"My husband pays for my medical expenses and tries to give priority to my treatment, so most of his income is spent on my treatment".*

These factors in women lead to inefficient care of children and inability to Establishing a balance between taking care of oneself and children causes and increases personal concerns in women.

 **Discussion**:

In addition to the many problems that the breast cancer causes in young women, it may also disrupt the normal course of life in women with breast cancer who are at a young age in terms of reproductivity, leaving the patient with challenges regarding menopausal symptoms, contraception, and the possibility of facing loss of fertility ([11](#_ENREF_11)). The aim of this study was to investigate the perceived reproductivity challenges and related factors in young women with breast cancer in northwest of Iran.

 The mean total score of perceived reproductivity concern of patients was 48.5 ± 6 .

The results of the present study uncovered that the young women with breast cancer had some degree of concern in all areas related to reproductivity, namely personal health, reproductivity potential, child health, becoming pregnant, acceptance, and partner disclosure. The highest level of the perceived challenges were in the area of ​​"personal health", and the dimensions of reproductive potential and child health were in the subsequent levels .

The results of study by Anandavadivelan et al. (2020) in Sweden ([12](#_ENREF_12)) and the study by Bártoloa et al. (2020) in Portugal ([11](#_ENREF_11)) were in line with those of the present study, i.e., the highest perceived reproductivity challenge in young women with breast cancer was in these three dimensions. However, the order of concerns in these two studies varied from the present study, i.e., the child's health was in the first place and the personal health was in the second place, while the reproductivity potential was the third concern as in our study. The results of our study were also consistent with the study of Ljungman et al.([13](#_ENREF_13)) and the studies of Howard and Peate's([14](#_ENREF_14), [15](#_ENREF_15)). The results of a study by Villarreal-Garza et al. had also reported that almost half of young women with breast cancer had some degree of concern about reducing or losing reproductivity ([16](#_ENREF_16)). These concerns have also reflected the possibility of other serious problems, since they have been shown to increase the risk of depression ([17](#_ENREF_17)) and significantly reduce the quality of life ([18](#_ENREF_18)) in patients.

The level of patients' education and their spouses in this study was significantly related to the perceived challenge in the dimension of "personal health" and with increasing the level of education from undergraduate to diploma, and university, these concerns significantly reduced. It seems that one of the reasons for the lower level of perceived challenge in the dimension of "personal health" in couples with academic education can be due to their higher level of education and their awareness of existing treatments for maintaining reproductivity and safe pregnancy after breast cancer ([19](#_ENREF_19), [20](#_ENREF_20)). In addition, it has been shown that factors such as social support, self-efficacy, self-care, quality of life are higher in cancer patients with higher education (especially those with university education) ([21](#_ENREF_21)). The aggregate of these factors might have indirectly reduced the concern of this group of patients in the dimension of personal health.

The results of the present study revealed that the number of children was significantly related to the perceived challenge in the dimensions of acceptance and reproductivity potential. Thus, the perceived challenge in this dimension was the highest in women without children while the perceived challenge in women shrank as the number of their children rose. This finding was similar to that Bártolo et al.'s([11](#_ENREF_11)). This may be ascribed to the instinct tendency of a women to become a mother, and of course this tendency is more intense in women who have not yet completed their family and have no children; Therefore, the majority of them incline to have children after completing the treatment period ([22](#_ENREF_22)) and as a result, they are more concerned about the reproductivity reduction during cancer treatment and it is more difficult for them to accept infertility. Women who do not have children or women who have fewer children than they would like are more concerned about the possibility of infertility after treatment and the possibility of not having more children. Then they are more likely to find it difficult or even impossible to suppress their desire and accept a childless future ([11](#_ENREF_11)). In this regard, it has been shown that the unfulfilled desire to become a parent is associated with mental health disorders ([23](#_ENREF_23)). Furthermore, the desire to have children in the future has been suggested as one of the main predictors of reproductive concerns in women with breast cancer ([13](#_ENREF_13)). In addition, the unfulfilled desire to become a parent has been identified as a determinant of concern, anxiety and distress in breast cancer survivors ([24](#_ENREF_24)). The results of a study by Villarreal-Garza et al., in similar vein, found that women with breast cancer who had children were significantly less concerned about reproductivity issues than those without children ([16](#_ENREF_16)).

The results of the present study illustrated that the menstrual status of patients was significantly pertinent to the perceived challenge in the dimension of personal health and the perceived challenge in this regard in women experiencing menopause was significantly higher than women with menstrual cycles. As the examined women in the present study were of childbearing age, early termination of the menstrual cycle, these factors may cause additional concerns and thus increase their perceived challenge in this group of patients.

The results of the present study show that the use of complementary therapies is significantly related to the perceived challenge in the dimensions of child health and personal health. Additionally, the level of perceived challenge related to these areas is the highest in women using all three methods of the treatment mentioned above and the lowest in women not using any of those methods. The cytotoxic effect of chemotherapy and radiotherapy ([11](#_ENREF_11)) causes germinal tissue damage in the gonads and premature ovarian failure ([25](#_ENREF_25)).

The economic status in the present study is significantly and negatively related to the perceived challenge in the personal health, in other words the perceived challenge decreased with increasing economic status. Perhaps patients with higher economic status are more hopeful and optimistic and use more advanced ways of therapy to treat their current illness as well as their probable reproductivity problems in future, and therefore feel less worried in this area.

The inconsistency of our findings in this study with Villarreal-Garza et al.'s ([16](#_ENREF_16)) can be attributed to the different tools used for assessing reproductivity concerns in the two studies.

**Conclusion:**

Taking into account some degree of concern in women related to various areas of reproductivity especially personal health,it is recommended that patients and their families receive appropriate support and consultation and educational programs.

**Conflict of interest:**

 The authors declare no conflict of interest.

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Table1 : Distribution of demographic and reproductivity variables in patients

|  |  |  |
| --- | --- | --- |
|  |  |  |
| age |  | 37.5±5.9 |
| Level of education |  |  |
|  | Elementary and secondary | 84(60.4%) |
|  | High school | 38 (27.3%) |
|  | university | 17(12.2%) |
| job |  |  |
|  | housekeeper | 128(92.1%) |
|  | occupied | 11(7.9%) |
| Partner level of education |  |  |
|  | Elementary and secondary | 59(42.4%) |
|  | High school | 46(33.1%) |
|  | university | 20(14.4%) |
| Number of children |  |  |
|  | 0 | 13(9.4%) |
|  | 1-2 | 94(67.6%) |
|  | 3-4 | 27(19.4%) |
|  | No response | 5(3.6%) |
| Menstrual status |  |  |
|  | Has menstrual cycle | 73(52.5%) |
|  | menopause | 66(47.5%) |
| Method of contraception |  |  |
|  | Natural prevention | 46(33.1%) |
|  | Oral contraception | 9(6.5%) |
|  | IUD | 16(11.5%) |
|  | condom | 2(1.4%) |
|  | No prevention | 34(24.5%) |
|  | No response | 32(23.5%) |
| Adequacy of income |  |  |
|  | Inadequate | 72(51.8%) |
|  | enough | 51(36.7%) |
|  | Too much need | 16(11.5%) |

Table2 : Distribution of patients in terms of disease-related variables

|  |  |  |
| --- | --- | --- |
|  |  | mean±SD/no(%) |
| Age at the time of diagnosis  |  | 34.9±6 |
| Diagnosis stage  |  |  |
| Local  | 104(74.8%) |
| Advanced localization  | 29(20.9%) |
| Metastatic  | 3(2.2%) |
| unknown | 3(2.2%) |
| Type of surgery  |  |  |
| lumpectomy | 91(65.5%) |
| unilateral mastectomy  | 34(24.5%) |
| Non-surgical  | 10(7.2%) |
| No response  | 4(2.9%) |
| Adjuvant therapies  |  |  |
| chemotherapy | 37(26.6%) |
| Hormone therapy  | 6(4.3%) |
| Chemotherapy +radiotherapy | 39(28.1%) |
| Chemotherapy +radiotherapy+ hormonotherapy | 15(10.8%) |
| Chemotherapy+ hormonotherapy | 3(2.2%) |
| No adjuvant therapy | 35(25.2%) |
| No response  | 4(2.9%) |
| Patients' self-assessment of their level of health |  |  |
| good | 36(25.9%) |
| medium | 37(26.6%) |
| weak | 66(47.5%) |

Table 3: Mean score of perceived reproductivity concerns in terms of demographic variables and disease-related variables in patients with breast cancer

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **number** | **Mean±SD** | **p- value** |
| **Number of children**  |  |  |  |  |
| **Without child** | **13** | **52.46±6.6** | **0.028** |
| **1-2 child** | **94** | **48.55±5.9** |
| **>3 child**  | **27** | **47.07±5.5** |
| **Job** |  |  |  | **0.57** |
| **housekeeper** | **128** | **48.59±6** |
| **occupying** | **11** | **47.45±6.1** |
| **Adjuvant therapy** |  |  |  | **<0.001** |
| **yes** | **35** | **45.26±4.5** |
| **no** | **100** | **49.7±6.1** |
| **Patients' self-assessment of their level of health** |  |  |  | **0.031** |
| **good** | **36** | **46.22±5.9** |
| **medium** | **37** | **49.27±6.4** |
| **Weak**  | **66** | **49.30±5.6** |

Table 4 : Comparison of patients' scores in the six dimensions of perceived reproductivity concerns in terms of some variables

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | reproductivity potential | disclosing the problem | child health | Personal health | acceptance | Becoming pregnant  |
|  |  |  **Mean±SD** |
| Total score in subscales  |  | 57/1‏±‏60/8 | 58/1‏±‏22/7 | 63/2‏±‏55/8 | 95/1‏±‏97/8 | 72/1‏±‏57/7 | 48/1‏±‏59/7 |
| Number of children  |  |  |  |  |  |  |  |
| 0 | 8.92±1.7 | 7.6±2.1 | 9.3±2.2 | 8.4±1 | 9.6±1.6 | 8.3±1.9 |
| 1-2 | 8.7±1.6 | 7.2±1.5 | 8.4±2.6 | 9.1±1.8 | 7.4±1.6 | 7.5±1.4 |
| ≥3 | 7.8±1.1 | 6.9±1.3 | 8.8±2.8 | 8.8±2.4 | 7.2±1.5 | 7.3±1.3 |
| p-value |  | 0.03 | 0.4 | 0.42 | 0.35 | 0.001 | 0.12 |
| Adjuvant therapy |  |  |  |  |  |  |  |
| yes | 8.69±1.5 | 7.4±1.7 | 8.9±2.8 | 9.34±1.8 | 7.4±1.7 | 7.8±1.4 |
| no | 8.31±1.6 | 6.6±0.87 | 7.6±1.8 | 7.9±1.8 | 7.6±1.6 | 7.1±1.3 |
| p-value |  | 0.24 | 0.001 | 0.01 | 0.001 | 0.64 | 0.01 |
| Adequacy of income |  |  |  |  |  |  |  |
| Inadequate | 8.6±1.5 | 7.4±1.7 | 8.7±2.7 | 9.4±1.9 | 7.5±1.6 | 7.5±1.3 |
| enough | 8.6±1.6 | 6.9±1.4 | 8.3±2.6 | 8.3±1.8 | 7.4±1.6 | 7.6±1.7 |
| Too much of need  | 8.3±1.7 | 7±1.1 | 8.2±2.4 | 9.1±1.4 | 8.2±2.2 | 7.8±1.2 |
| p-value |  | 0.74 | 0.15 | 0.67 | 0.008 | 0.23 | 0.67 |

Table5: predictive factors of reproductivity concerns in patients with breast cancer

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | B | Sig. | Exp(B) |
|  | age | -.483 | .004 | .617 |
| Level of education | 1.349 | .086 | 3.855 |
| Occupation | -.233 | .894 | .792 |
| husband\_education | -.687 | .204 | .503 |
| Menstrual\_status | -.269 | .665 | .764 |
| \_number of children | -.384 | .523 | .681 |
| Last\_child\_age | .152 | .042 | 1.164 |
| Breastfeeding\_history | .271 | .346 | 1.311 |
| Age at\_diagnosis | .367 | .010 | 1.444 |
| Cancer\_stage | .769 | .321 | 2.157 |
| Type\_of\_surgery | .133 | .762 | 1.143 |
| other\_treatment | .101 | .589 | 1.106 |
|  |  |  |  |