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Predictors of Illness Perception Among Women With Breast Cancer Undergoing Chemotherapy and Radiotherapy

Masoumeh Safdari-Molan[1] , **Esmat Mehrabi[1]**, **Reza Eghdam Zamiri[2]**, **Roghaiyeh Nourizadeh[1*]** , **Sevil Hakimi[1]**

Abstract
Objectives: Breast cancer (BC) is identified as the most common type of cancer among women in the world. The illness perception is considered as an important and influential issue in cancer control. The present study aimed to determine the predictors of illness perception among women with BC undergoing chemotherapy and radiotherapy.
Materials and Methods: This cross-sectional study was conducted on 166 women with BC referring to private and public oncology centers in Tabriz using the convenience sampling method. Patients were assessed by demographic and disease characteristics questionnaire, brief illness perception questionnaire, social support questionnaire, cancer worry scale, international physical activity questionnaire-short form, and the EORTC-in-patsat32. The data were analyzed using SPSS 25, and ANOVA, independent *t* test, Pearson and Spearman correlation coefficient, and multivariate linear regression were applied for data analysis.
Results: In the present study, the mean score (SD) of the illness perception was 48.86 (17.61) out of the achievable range of 0-80. The results indicated that concerns about the recurrence, cancer stage, and place of treatment were the most important predictors of illness perception.
Conclusions: It seems that the early detection of BC through screening can be effective in the perceptions of BC. It is recommended that similar studies be conducted in other countries and cultures and after completing chemotherapy and radiotherapy courses.
Keywords: Breast cancer, Chemotherapy, Illness perception, Radiotherapy

Introduction

Breast cancer (BC) is recognized as the second leading cause of cancer-related mortality among women after lung cancer (1). One in six people in the world dies from cancer (2). The incidence of BC in Iran has significantly increased in the last two decades. The BC trend is expected to increase in the country due to its correlation with population aging (3,4).

When people are diagnosed with the disease, the beliefs about the condition generally form in their minds, which are directly influenced by the medical knowledge or their subjective experiences of similar symptoms in other involved family members (5). The illness perception varies by individual and culture, including religious beliefs and patients' attitudes toward cancer (6). In addition, illness perception plays a role in how patients behave, which can explain a significant proportion of mental disorders, coping behaviors, and consequences of the disease among women with BC (7). The quality of life is affected by the cognitive and emotional perceptions of the illness (8). The negative belief about the disease is associated with the development of disability and late improvement in the future (9).

Despite many advances in cancer treatment in recent years, the cancer diagnosis still entails extensive stress for patients and their families since nearly 60%-90% of women with BC declare the possibility of recurrence as one of the most common fears and concerns (10,11). Considering the relationship between illness perception and medical and behavioral consequences, quality of life, and cultural factors, the present study was designed to specify the predictors of illness perception among Iranian women with BC. It is necessary to determine the predictors of the patients' perception of BC in designing interventions related to how to cope with the disease.

Materials and Methods
Study Design and Sample Size
This cross-sectional study was performed on women with BC referring to public and private oncology centers in Tabriz for chemotherapy or radiotherapy from October to March 2019. The inclusion criteria included getting primary BC based on the medical record with each stage, announcing more than one month elapse from the diagnosis, and undergoing chemotherapy or radiotherapy. The exclusion criteria were having a history of chronic and systemic diseases, and mental disorders based on the medical record, having other concurrent cancers,

having chemotherapy or radiotherapy due to the disease recurrence, and experiencing other stressful events such as divorce, death of relatives, and losing job during the last six months.

Sample Size

The sample size was determined using the following formula:

$$n = \frac{z^2_{1-\frac{\alpha}{2}} \delta^2}{d^2}$$

which calculated based on the study of Mirzaei et al (12). Therefore, the sample size was calculated 166 subjects considering SD = 12, d = 0.05 around the mean (40.2), α = 0.05 with a 95% confidence coefficient.

Sampling

The sampling was conducted using the convenience sampling method after obtaining the permission of the Ethics Committee of Tabriz University of Medical Sciences. In the same vein, the researcher referred to the public and private oncology centers in Tabriz, evaluated the individuals in terms of the inclusion and exclusion criteria, and provided the information about the research objectives and method and data confidentiality, and finally, asked the eligible individuals to participate in the study. Then, the written informed consent was obtained from all participants. Therefore, 166 women with BC undergoing chemotherapy and radiotherapy (100 and 90 subjects from public and private centers, respectively) completed the demographic and disease characteristics questionnaire, brief illness perception questionnaire (IPQ), social support questionnaire, cancer worry scale, and international physical activity questionnaire-short form, and the EORTC-in-patsat32 through interviews held in a quiet environment. Some important questions regarding the type and stage of cancer were completed from the patients' files.

Data Collection Tools

The demographic and disease characteristics questionnaire included data about age, spouse's age, family income levels, insurance coverage, place of residence, marital status, number of children, education, occupation, type and stage of BC, place of treatment, type of surgery, and elapsed time from the diagnosis of cancer.

The IPQ, which was designed by Broadbent and Petrie, was used to evaluate the illness perception of the participants. The brief IPQ with nine questions was designed to investigate the emotional and cognitive visualization, and ability to understand the disease and the cause of illness. The first eight questions are scored on a scale ranging from 1 to 10. Question nine is of open-ended type, questioning the three main causes of the disease. The scores are in the range of 0-80 and the high score indicates a great deal of perception and concern about the illness. The Cronbach's alpha coefficient of the designed tool was 0.80 and the test-retest reliability was reported 0.75 (13). This tool was localized by Afshar et al and the Cronbach's alpha of the Persian version was 0.80. In addition, the test-retest reliability coefficient was reported to be in the range of 0.42-0.75 at 6-week an interval for different domains (14).

In the present study, the eight-item cancer worry scale was used to assess the patient's concern about cancer recurrence. The responses are rated on a four-point Likert-type scale ranging from "never" (1) to "almost always" (4) and the scores are in the range of 8-32. Given that higher scores indicate more concern about cancer, the Cronbach's alpha of the scale was between 0.88 and 0.89 (15).

Further, the EORTC-in-patsat32 questionnaire with 32 questions, which was designed by Brédart et al, was applied to measure the patient's satisfaction with medical care. The responses are rated on a five-point Likert-type scale in the range of poor = 1, average = 2, good = 3, very good = 4, and excellent = 5, and the score of each area is between 0 and 100. A higher score represents more satisfaction. The Cronbach's alpha of this tool in different surgical and therapeutic wards was between 0.56 and 0.96 (16) and that of the Persian version of the questionnaire was 0.9 (17).

The social support questionnaire with 12 items, which was designed by Zimet et al, was used in the present study. The multidimensional scale of the perceived social support is a 7-point Likert-type scale from strongly disagree = 1 to strongly agree = 7. The total score can be from 12-84 and a higher score demonstrates the greater perceived social support (18). Bagherian-Sararoudi et al assessed the psychometric properties of the social support questionnaire among patients with myocardial infarction. The Cronbach's alpha of the tool was reported as 0.83 (19).

The international physical activity questionnaire-Short Form (IPAQ-SF) with seven questions was used in the present study, including questions about severe, moderate, and mild physical activity (each including 2 items) and sitting (1 item), measuring physical activity during the last seven days. The physical activity level is classified into mild (e.g., walking), moderate (e.g., carrying light loads, cycling at average speed, and playing volleyball), and severe (e.g., lifting heavy objects, digging, digging a garden, aerobic exercise, fast cycling, and running) physical activities.

First, the metabolic equivalents (MTEs) were calculated for the already mentioned physical activities. The MTE was considered to be 3.3, 4, and 8 for mild, moderate, and severe activity, respectively. Then, these numbers were multiplied by the duration of the already mentioned physical activity in minutes and the number of days of doing that activity (20).

$$MTE\ (min\ per\ week) = mild\ activity\ (MTE \times min \times day) + moderate\ activity\ (MTE \times min \times day) + vigorous\ activity\ (MTE \times min \times day).$$

The IPAQ-SF was psychometrically evaluated by Baghiani Moghaddam et al in Iran. The Cronbach's alpha was 0.7 and the test-retest reliability of the tool was reported 0.9 using the Spearman-Brown correlation coefficient (21).

Statistical Analysis

The data were analyzed using SPSS software (version 25) and the normality of data distribution was measured by the Kolmogorov-Smirnov test. The data were analyzed using descriptive and analytical statistics, including frequency, percentage, mean and standard deviation (SD), median and quarter 25-75, ANOVA, independent *t* test, Pearson and Spearman correlation coefficient. Then, independent variables with a *P* value of less than 0.2 in the bivariate test entered into the multivariate linear regression model through the backward strategy to control the confounding variables and estimate the effect of independent variables. Demographic and disease characteristics, social support, physical activity, fear of recurrence, and satisfaction with medical care on the dependent variable (illness perception) were considered as independent variables.

Results

The average age and the average number of children were 51.28 (11.85) years and 3.1 (1.39), respectively, and most participants (92.8%) had insurance. In addition, 74.6% and 85.5% of patients were married and housewives, respectively. The family income level of half of the patients (51.8%) was reported to be insufficient. Among women with BC, 44.5% and 55.4% were treated with radiotherapy and chemotherapy, respectively. Most participants (55.4%) underwent lobectomy. Further, the most common type of disease was carcinoma in situ (62.0%) and in stage one (46.9%). Tables 1 and 2 provide related data.

In the present study, the mean score (SD) of the illness perception was 48.86 (17.61) from the achievable range of 0-80, which was divided by chemotherapy and radiotherapy groups as 53.51 (12.25) and 43.47 (13.82), respectively. There was a significant difference between the two groups regarding the illness perception score (*P*< 0.001). Further, a significant difference was found between the two groups in terms of the subscales of the perception of consequences (*P* = 0.001), individual

Table 1. Demographic Characteristics of Participants and its Relationship With Illness Perception (n = 166)

Demographic Characteristics	No. (%)	Illness Perception Mean (SD)	P Value
Age/mean (SD)	51.28 (11.85)	48.86 (17.61)	0.477[a]
No. of children, mean (SD)	3.1 (1.39)	48.86 (17.61)	0.937[a]
Husband's age, mean (SD)	57.75 (11.14)	48.86 (17.61)	0.342[a]
Insurance			
Yes	92.8 (154)	42.8 (17.68)	0.871[b]
No	12 (7.2)	43.66 (17.37)	
Job			
Housewife	142 (85.5)	42.6 (17.71)	
Employee	7 (4.2)	53.0 (11.66)	0.363[c]
Retired	12 (7.2)	38.66 (19.69)	
Others	5 (3.0)	46.2 (14.46)	
Education			
Illiterate	68 (40.9)	39.3 (17.37)	
Elementary	42 (25.3)	40.59 (17.13)	0.014[c]
High school	37 (22.2)	47.83 (18.9)	
Academic	19 (11.4)	50.94 (12.45)	
Income			
Relatively sufficient	59 (35.5)	45.96 (17.14)	
Sufficient	21 (12.6)	46.85 (14.81)	0.061[c]
Insufficient	86 (51.8)	39.76 (18.15)	
Marital status			
Married	124 (74.6)	43.22 (17.68)	
Unmarried	20 (12.0)	46.05 (16.3)	0.297[c]
Divorced	2 (1.2)	24.5 (16.6)	
Widow	20 (12.0)	39.3 (17.72)	
Husband's education			
Illiterate	44 (26.5)	39.05 (17.94)	
Elementary/Guidance	56 (33.7)	45.07 (18.43)	0.158[c]
High school/Diploma	39 (23.4)	43.89 (18.81)	
Academic	17 (10.2)	49.35 (13.08)	
Address			
Town	124 (74.6)	53.51 (12.25)	0.264[b]
Village	42 (25.3)	43.47 (13.82)	

[a] Pearson correlation; [b] Independent t test; [c] ANOVA: Analysis of variance; SD: Standard deviation

control over the illness (*P* = 0.005), treatability (*P* = 0.001), recognizing the symptoms (*P* = 0.001), understanding of the illness (*P* = 0.001), and the emotions about the illness (*P* = 0.001). The highest mean (7.77 ± 2.46 and 5.3 ± 2.82) was related to the subscale of treatability in both groups of chemotherapy and radiotherapy, respectively. On the other hand, the lowest mean (4. 4.97 ± 3.49 and 4.56 ± 2.76) belonged to the subscale of the disease duration in the two groups of chemotherapy and radiotherapy (Table 3).

The score of the perceived support in the radiotherapy group (64.05 ±10.89) was significantly higher than that of the chemotherapy group (47.51 ± 13.74, *P* < 0.001). There was a significant relationship between the scores of the perceived support and illness perception by the Pearson test (*P* < 0.032, r = -0.167).

The score of the concern about the recurrence in the chemotherapy group (20.02 ± 7.42) was significantly

Table 2. The Disease Characteristics of the Participants and its Relationship With Illness Perception (n=166)

Characteristics of Disease	No. (%)	Illness Perception Mean (SD)	P Value
Type of breast disease			
Carcinoma in situ	103 (62.0)	42.12 (17.62)	0.032[a]
Invasive	63 (37.9)	54.4 (13.38)	
Stage of cancer			
Stage 1	78 (46.9)	36.80 (18.66)	
Stage 2	70 (42.1)	48.02 (14.41)	0.001[b]
Stage 3	18 (10.8)	49.05 (16.43)	
How to know about the disease			
Directly	139 (83.7)	42.89 (17.67)	0.958[a]
Indirectly	27 (16.2)	42.70 (17.61)	
Type of surgery			
Mastectomy	74 (44.5)	46.93 (15.66)	0.001[a]
Lumpectomy	92 (55.4)	37.59 (18.85)	
Past time of diagnosis (month)/mean (SD)	6.9 (2.8)	48.86 (17.61)	0.525[c]
Past time of surgery (month)/mean (SD)	5.4 (2.9)	48.86 (17.61)	0.002[c]
Treatment center			
Private	74 (44.5)	49.86 (13.46)	0.001[a]
Public	92 (55.42)	37.23 (18.57)	
Type of treatment			
Chemotherapy	92 (55.4)	53.51 (12.25)	0.001[a]
Radiotherapy	74 (44.5)	43.47 (13.82)	

[a] Independent t test; [b] ANOVA: Analysis of variance; [c] Pearson correlation; SD: Standard deviation.

Table 3. The Mean Score of Illness Perception and its Dimensions in Women With Breast Cancer Under Chemotherapy and Radiotherapy

Variables	Chemotherapy	Radiotherapy	Total, Mean (SD)	Range of Row Scores	Number of Questions	P Value[a]
Illness perception	53.51 (12.25)	43.47 (13.82)	48.86 (17.61)	0-80	8	0.001
Consequences	7 (3.19)	5.01 (3.14)	5.51 (3.25)	0-10	1	0.001
Timeline	4.97 (3.49)	4.56 (2.76)	4.49 (2.97)	0-10	1	0.530
Personal control	6.26 (2.44)	4.79 (2.67)	5.14 (2.70)	0-10	1	0.005
Treatment control	7.77 (2.46)	5.3 (2.82)	6.05 (2.81)	0-10	1	0.001
Identity	6.74 (2.79)	4.58 (2.60)	5.03 (2.82)	0-10	1	0.001
Concerns	6.26 (3.22)	5.13 (2.89)	5.39 (3.39)	0-10	1	0.053
Illness coherence	7.43 (2.33)	4.96 (2.74)	5.66 (2.82)	0-10	1	0.001
Emotion representation	7.09 (2.88)	5.1 (2.84)	5.60 (2.97)	0-10	1	0.001

[a] Independent t test; SD: Standard deviation.

higher compared to the radiotherapy group (16.43 ± 8.05, $P = 0.013$). A significant relationship was observed between the scores of the concern about the recurrence and illness perception using the Pearson test ($P < 0.001$, r = 0.418).

The score of satisfaction with medical care in the radiotherapy group (57.26 ± 13.84) was significantly higher than that of the chemotherapy group (40.14 ± 10.11, $P = 0.001$). There was no significant relationship between medical care satisfaction and illness perception using the Pearson test ($P = 0.261$, r = -0.088).

The physical activity in the radiotherapy group (28.89 ±66.58) was significantly lower in comparison with the chemotherapy group (96.75 ± 238.74, $P < 0.001$). No

significant relationship was detected between physical activity and illness perception based on Spearman test ($P = 0.446$, r = - 0.060).

The results of the bivariate test (Tables 1 and 2) revealed a significant relationship between illness perception and type of BC ($P = 0.032$), type of treatment ($P = 0.001$), stage of cancer ($P = 0.001$), level of education ($P = 0.014$), type of surgery ($P = 0.001$), elapsed time from the surgery ($P = 0.002$), and place of treatment ($P = 0.001$).

After entering variables with $P < 0.2$ in the multivariate linear regression model, the predictors of the illness perception included concerns about recurrence, cancer stage, and place of treatment, which generally explained 44% of the observed variance (Table 4).

Table 4. Predictors of Illness Perception in Women With Breast Cancer

Variable	β (95% CI)	P Value
Worry of cancer recurrence	0.607 (0.138 to 1.076)	0.013
Place of treatment (reference: private)	-18.070 (-30.709 to -6.062)	0.004
Public		
Stage of cancer (Reference: stages 1 & 2)	4.72 (-0.803 to 10.243)	0.092
Stages 3 & 4		
Adjusted R²		0.443

CI: Confidence interval.

Discussion

The present study mainly aimed to determine the predictors of the illness perception among women with BC undergoing chemotherapy and radiotherapy. In the same vein, the mean score (SD) of the illness perception was (48.86 ± 17.61), which was divided by the chemotherapy group (53.51 ± 12.25) and radiotherapy group (43.47 ± 13.82). Iskandarsyah et al (22) conducted a study on Indonesian women with BC, in which the total score of the illness perception was 46.67, which is consistent with the findings of the present study. The results of the present study indicated a significant relationship between the type of treatment and illness perception since the women who underwent chemotherapy had a higher degree of illness perception compared to those undergoing radiotherapy. Based on the findings of Buick et al (23), patients undergoing chemotherapy thought that their disease was long lasting with more serious complications and thus they had higher illness perception compared to patients who underwent radiotherapy.

In the present study, the highest and lowest means of illness perception were related to treatability and illness duration, respectively. However, in their study on patients with BC referring for chemotherapy after surgery in Mashhad, Shabahang et al (24) reported that the highest mean was related to personal control whereas the lowest mean score belonged to symptom recognition. The results of another study conducted on women with BC in Indonesia demonstrated lower scores on the subscales of personal and treatment control (25). The difference in the results may be due to different illness perceptions from person to person, as well as different psychosocial responses to various diseases in different cultures. Further, the level of social support can create a different illness perception (12).

Based on the results of this study, the fear of recurrence was considered as one of the predictors of illness perception among women with BC. The findings of a systematic review conducted in 2015 indicated that the illness perception was correlated with the fear of recurrence and illness symptoms (6). The findings of the present study are in line with those of Corter et al and Shim et al, implying that the fear of recurrence was significantly associated with the illness perception (26, 27).

In the present study, the stage of cancer was another predictor of illness perception among women with BC. In other words, as the stage of BC progressed, the perceived severity of the disease represented an increase. In a study on Chinese women with BC, the stage of disease was reported as a predictor of illness perception (28), which is consistent with the result of this study.

In the current study, the place of treatment was proposed as another predictor of the illness perception, indicating that women referring to private oncology centers had a higher perceived severity of the disease, which could probably be due to their higher levels of education. In their study on Chinese women with BC, Ma et al indicated that women with a higher level of education had higher scores on the illness perception (28). Similarly, Seyed-Rasouli et al reported a significant relationship between illness perception and level of education (29). The difference in providing training and supportive programs in private and public centers can be another reason for the difference in the perceived severity of the disease among those who refer to these centers.

One of the strengths of this study is the use of standard questionnaires and large sample sizes. However, the design of the study is considered as one of the limitations of the present study. Given that this is a cross-sectional study, it does not necessarily indicate a causal relationship between the aforementioned variables. Other limitations include the focus of this study on a geographical area and the specific impact of culture on illness perceptions, which limit the generalizability of the results.

Conclusions

It seems that the early detection of BC through screening and training coping strategies among individuals with high perceived severity of the disease can be effective in adapting to BC. Thus, it is recommended that similar studies be conducted in other countries and cultures in order to investigate the predictor factors of illness perceptions among women with BC after completing chemotherapy and radiotherapy courses to design interventions so that to improve the illness perception.

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