The effects on anxiety and quality of life of breast cancer patients following completion of the first cycle of chemotherapy

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Abstract

Objectives: Breast cancer patients as part of their treatment need to undergo various forms of chemotherapy. This is considered as a burdensome experience for many patients often leading to significant levels of anxiety. The aim of the study was to explore the anxiety levels and any correlations to the quality of life of women with breast cancer that were undergoing chemotherapy.

Methods: This was a cross-sectional study utilizing an explanatory sequential design. Data were collected from 355 women with breast cancer with the Self Anxiety Scale, the EORTC QLQ-C30, the EORTC QLQ-BR23 and sociodemographic questionnaires. Further insight to patients' experiences was given through 12 in-depth interviews.

Results: Anxiety scores ranged between 24 and 75 (45.7 ± 10.11), with 44% reporting serious or/and intense anxiety. The results revealed statistically significant differences on patients' anxiety levels depending on their source of support. Overall, patients' global health-related quality of life was found to be low to average 55.91 ± 17.94. The results showed low emotional functioning (49.30 ± 29.12), low role functions (56.34 ± 27.50) and low sexual functioning (24.93 ± 20.75). Patients also reported experiencing problems with fatigue (49.04 ± 29.12), insomnia (44.32 ± 32.97), hair loss (48.25 ± 38.32) and arm symptoms (36.53 ± 23.71). Patients being solely supported by the family experienced higher anxiety levels ($p < 0.001$) and lower quality of life ($p < 0.001$). There was a statistically significant negative correlation between anxiety and quality of life ($r = -0.623$, $p < 0.001$). Statistically significant differences were also found in relation to demographics, anxiety and quality of life. The interviews provided further evidence on the impact of anxiety on patients' lives.

Conclusion: The time following the completion of the first cycle of chemotherapy is associated with anxiety and lower quality of life levels in breast cancer patients. Healthcare providers should consider the supportive healthcare needs from the beginning of chemotherapy in patients to optimize their conventional and supportive healthcare outcomes.

Introduction

In recent decades, measuring anxiety and quality of life (QoL) in breast cancer patients has received increased attention in clinical practice and research.[1] QoL is considered a focal assessment in cancer-related clinical studies,[2] and its assessment could contribute to the improvement of therapy as well as serve as a prognostic medical factor.[1] One of the reasons for the emphasis being placed on QoL and anxiety is the fact that breast cancer is considered to be the leading cause of death in women worldwide (14%) and the second

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type of cancer that causes death in women.[3] In 2016, it is expected that 40,890 breast cancer deaths will occur.[4]

The time of diagnosis, the chemotherapy treatment course and the months following the end of treatment are transition times of poor adjustment, fluctuating course of anxiety and decreased QoL in breast cancer patients.[5] However, breast cancer patients may experience anxiety at any other stage of the cancer continuum from pre-diagnosis to the terminal phase of the illness, and it is reported by 80% of women after breast cancer surgery and 73% of women completing adjuvant therapy.[6,7] Anxiety can be exacerbated by chemotherapy as a result of treatment-induced body image changes, limited social interaction and poor relationships with family members and significant others.[8] Anxiety can consequently lead to low QoL[9] and low overall well-being.[10]

Little is known about the course of anxiety in women with breast cancer at the end of the first cycle of chemotherapy. Emphasis has been mainly placed in examining the presence of anxiety prior, during (primarily following completion of the first two cycles) and after the treatment. This study aims to explore the presence of anxiety and its severity in women with breast cancer following completion of the first cycle of chemotherapy. The associations between anxiety and QoL in this group of patients will also be studied.

The study was guided by the following research questions:

1. How and to what extent do breast cancer patients experience anxiety when starting a new regimen of chemotherapy?
2. What are the medical and sociodemographic characteristics in women experiencing anxiety?
3. How and to what extend do patients' anxiety levels impact on their quality of life?

Methods

Design

This is a cross-sectional study utilizing an explanatory sequential design. According to Plano Clark and Creswell,[11] an explanatory sequential design consists of collecting quantitative data and then collecting qualitative data to help elaborate on the quantitative results. The rational for this approach is that the quantitative data provide a general picture of the research problem; more analysis, specifically through qualitative data collection is needed to extend the general picture. For the purpose of this study, the quantitative part was designed to explore the anxiety levels and the QoL of breast cancer patients at the end of the first cycle of chemotherapy. The qualitative part of the study aimed to explore the ways that anxiety influenced the patients' QoL as these were perceived by breast cancer patients.

Sample/sampling

A random sampling was used to recruit women diagnosed with breast cancer and underwent mastectomy and chemotherapy during 2014–2015. For the selection of participants, specific inclusion and exclusion criteria were set. Inclusion criteria included the following: (a) women had to be 18 years and above, (b) to understand the purpose of the study and be in a position to give informed consent, (c) diagnosed with breast cancer (histopathological diagnosis), (d) to have had any kind of mastectomy, (e) to have completed the first cycle of chemotherapy and (f) have a good knowledge of Greek or English. Patients were excluded if they were (a) undergoing anxiolytic pharmacotherapy or taking antidepressants and (b) women who had interrupted their chemotherapy for any reason. The sample number consisted of 355 patients.

In order to provide a deeper interpretation of the quantitative data, patients from the quantitative sample were randomly selected to be individually interviewed. Participation in this part of the study was done face-to-face by the researches. Simple randomization was implemented by utilizing computer-generated random numbers to prospective participants. Interviews with consenting participants continued until data saturation was reached. The researchers decided that data saturation was attained when 12 participants were interviewed. The decision for data saturation or data redundancy had been reached through constant comparison of data.[12] The researchers reached the decision that the data had saturation "grounded in the empirical confidence attained from repeatedly comparing data to additional data."[13]

Ethical issues

The study protocol was approved by the Cyprus National Bioethics Committee (File number: 2010/06) and the Cyprus Ministry of Health (MH 5.04.019) according to National law. Participants were informed on the purpose and procedures of the study. Patients willing to take part in the study provided an informed consent.

For the protection of the patient's personal data, the questionnaires were coded and analyzed anonymously. Patients were informed on their right to withdraw from the study at any moment, without having to provide any justification to the research team. Patients were informed that the data collected as part of this study will be destroyed following the completion of data analysis and interpretation. The ethical principles for Medical research involving human subjects outlined in the World Medical Association Declaration of Helsinki[14] were applied throughout the study.

Instruments

Participants self-completed three questionnaires in addition to their demographic details during their stay in the hospitals for treatment. Patient's QoL was assessed by the European Organization for Research and Treatment of Cancer QoL Questionnaire–Core 30 (EORTC QLQ-C30).[15,16] The instrument consists of 30 items on QoL including five functional scales (physical, role, emotional, cognitive and social), nine

symptom scales (fatigue, nausea and vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea, financial difficulties) and a global health status/QoL scale. The first 28 questions are assessed on a 4-point Likert scale ranging from 1 (=not at all) to 4 (=very much). Questions 29 and 30 are assessed on a 7-point Likert scale ranging from 1 (=very poor) to 7 (=excellent). EORTC QLQ-C30[17,18] was found to have good psychometric properties, and it has been proven to be widely accepted in cancer populations. The aforementioned questionnaire was validated in Greek.[19]

The EORTC breast cancer–specific QoL questionnaire (EORTC QLQ-BR23) is a structured questionnaire that consists of 23 items relevant to breast cancer and its therapy adverse effects, body image, sexuality and future perspectives. It consists of a 4-point Likert scale ranging from 1 (=not at all) to 4 (=very much), two functional scales (body image and sexual functioning), three symptom scales (arm symptoms, breast symptoms and systematic therapy side effects), as well as items that assess sexual enjoyment and shock due to hair loss.[20] It has been validated in several languages including Greek.[21]

The Self Anxiety Scale (SAS)[22] is a self-completed questionnaire. It consists of 20 items, developed on the criteria set in *Diagnostic and Statistical Manual of Mental Disorders* (2nd ed.; DSM-II) for anxiety disorders and criteria that are included on *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; DSM-IV-TR).[23] The questionnaire evaluates how often the patient has felt or behaved during the past several days. Five items relate to emotional reactions regarding anxiety, and the remaining items describe the somatic experience of anxiety. The patient responds on a 4-point Likert scale (1=a little of the time to 4=most of the time), based on which answer best suits her personal evaluation of the situation during the past several days. The total raw scores range from 20 to 80, where the highest possible score is 80. The SAS was validated in several studies including Greek.[24]

The qualitative part of this study was organized according to the consolidated criteria for reporting qualitative research (COREQ).[25] The qualitative data were collected with the use of interviews aiming to provide a deeper understanding on the ways that the patients perceived anxiety to influence their QoL. Interviews were conducted by M.C. who was an experienced researcher (PhD candidate at the time) in retrieving and interpreting qualitative data. This was decided in order to allow interviewer consistency. The interviewer was female. The interviewees were informed by the interviewer about the aims of the study, the processes involved as well as the expected results. The patients were familiar to the interviewer as she was also involved in retrieving the quantitative data. A room outside the ward was used for the interviews. The room provided the necessary quietness and privacy for the interviews to take place. The approach used during the interviews was informal, to allow the patients to express their experiences on the topic freely. Only the patient and

interviewer were present during the interviews. Patients were invited to provide their experiences in relation to one open-ended question: "In what way(s) do you feel that your QoL was mostly affected by anxiety?" The open-ended question was followed by facilitations according to patients' cues expressed in the interview. The facilitations were utilized by the researchers to encourage the participants to focus on specific aspects of their experiences or to go into more depth into their experiences. Interviews were digitally audio recorded and transcribed verbatim. Patients in the interviews were given the opportunity to read the transcripts and offered the option to provide their comments if something was not transferred correctly on paper. No repeated interviews were conducted. The duration of the interviews was on average 35 min.

The sociodemographic data recorded included age, place of residence, time of first diagnosis, educational level and source of support.

Data analysis

Descriptive statistics (frequencies, mean and standard deviations (SD)) were used for demographic characteristics. For the exploration of anxiety levels, the total score of the SAS[22] was used. In five questions (5, 9, 13, 17, 19), the codes were reversed in order for highest values to show highest anxiety levels.

The internal consistency of the SAS, EORTC QLQ-C30 and QLQ-BR23 was tested with Cronbach's alpha coefficient.

For the evaluation of the patients QoL, the EORTC QLQ-C30 and the QLQ-BR23 scoring manuals were used.[17] According to the manuals, the mean scores of every subsection questions (raw scores) were transformed to values from 0 to 100. Highest scores in functional scales, as well as the global quality scale, indicated patients' function as "good," while the highest values on the nine symptoms scales revealed worse symptoms level.

In order to explore if patients' demographics could determine anxiety levels, analysis of variance (ANOVA) was performed for each variable, and a multiple regression analysis was performed. Anxiety was set as the dependent variable and demographic variables as the independent variables (place of residence, age, time of diagnosis, education level and source of support).

In order to explore if patients' demographics could determine the quality of the patient's life, the global health status (questions 29 and 30) was used. ANOVA was performed in order to examine possible differences to QoL levels, separately for each variable. Then, multiple regression analysis was performed with "global health status" as the dependent variable and the demographic characteristics of the participants as independent variables.

Pearson correlation coefficient was used in order to examine the correlation between anxiety (SAS) and QoL (global

health status), and then, simple regression was used in order to explore if anxiety (criterion) can predict QoL (predictor). The analysis yields a predicted value for the criterion resulting from a linear combination of the predictors. For the purpose of this study, we explored whether a low score on the anxiety scale predicted a lower level on the global health status scale. Similarly, we also explored whether a higher score on the anxiety scale predicted a higher level (better) on the global health status scale. Multiple regression was performed in order to examine if the personal characteristics of the individuals, in combination with anxiety, could predict the patient's QoL.

The methodological orientation that underpinned the study was the inductive approach. This approach was used to analyze the qualitative data through thematic content analysis in order to achieve an understanding of meaning in complex data through the development of summary themes or categories from the raw data ("data reduction"). A.C., M.C., T.T. and C.K. were involved in the coding and interpreting the results. Inductive approaches to data analysis involved analyzing data with little or no predetermined theory, structure or framework.[26] The primary purpose for using the inductive approach within this study was to allow research findings to emerge from the frequent, dominant or significant themes inherent in raw data, without the restraints imposed by structured methodologies.

Results

Demographics

The sample consisted of n = 355 women, with a 75% response rate. Most of the patients lived in Nicosia (41%) and were aged between 40 and 60 years old (65%). The majority of the patients were first diagnosed within 1–3 years (74%). Most women had high school and university level education, and most of them indicated that their source of support was family and cancer patient associations (Table 1).

Internal consistency of the SAS, EORTC QLQ-C30 and QLQ-BR23

The internal consistency of the SAS was a = 0.85, for the EORTC QLQ-C30 was a = 0.83 and for the QLQ-BR23 was a = 087. The internal consistency of the three scales is comparable to that reported in previous studies.[19,24]

The identification and exploration of anxiety levels of breast cancer patients undergoing chemotherapy

In relation to the first objective, the SAS[22] scores were found to be between 24 and 75 (45.7 ± 10.1) which is interpreted as "low to medium anxiety" (Table 2). In addition, the validity of the scale was found to be a = 0.897, which shows high validity levels.

Table 1. Participant's demographic characteristics.

Variables	N	%
Place of residence		
Nicosia	144	40.6
Limassol	50	14.1
Paphos	99	27.9
Larnaca	54	15.2
Ammochostos	8	2.3
Age		
18–28	6	1.7
29–39	21	5.9
40–50	112	31.5
51–60	119	33.5
61–70	73	20.6
>70	24	6.8
Time since the first diagnosis (years)		
1–3	262	73.8
4–6	28	7.9
7–10	36	10.1
>10	29	8.2
Education level		
No education at all	28	7.9
Elementary level	72	20.3
High school	102	28.7
Higher education (college, polytechnic)	74	20.8
University undergraduate	79	22.3
Source of support		
Family	43	12.1
Anticancer society	17	4.8
Combination of family and anticancer society	295	83.1

Table 2. Participant's anxiety levels (Self Anxiety Scale—SAS).

Anxiety levels	N	%	Mean	Standard deviation (SD)
	355	100	45.7	10.11
Normal levels	65	100		
Little or medium anxiety	134	18.3		
Serious anxiety	129	37.7		
Intense anxiety	27	36.3		

QoL scales

The functional scales within the EORTC QLQ-C30 had the highest scores (good functional status). Patients were able to better perform their social functioning and physical functioning (69.53 ± 25.80 and 65.54 ± 22.36, respectively). On the contrary, their emotional functioning was found average to poor (49.30 ± 29.12; Table 3). Patients reported satisfactory scores on the symptoms' scales. Patients coped better with symptoms such as diarrhea (11.55 ± 25.57) and constipation (23.76 ± 27.48). Patients reported fatigue as their

Table 3. Descriptive statistics for EORTC QLQ-C30 and EORTC QLQ-BR23 (N = 355).

Scale	Mean	Standard deviation
QLQ-C30		
Global health status/QoL	55.91	17.94
Functions		
Physical function	65.54	22.36
Role function	56.34	27.50
Emotional function	49.30	29.12
Cognitive function	62.06	26.97
Social function	69.53	25.80
Symptoms		
Fatigue	49.04	29.12
Nausea/vomiting	28.26	30.26
Pain	40.47	28.02
Dyspnea	37.84	25.27
Insomnia	44.32	32.97
Appetite loss	38.50	29.88
Constipation	23.76	27.48
Diarrhea	11.55	25.57
Financial problems	41.78	31.95
QLQ-BR23		
Functions		
Body image	48.33	29.31
Sexual functioning	24.93	20.75
Sexual enjoyment[a]	31.82	23.34
Future perspective	32.49	33.56
Symptoms		
Systemic therapy adverse effects	33.28	19.85
Breast symptoms	25.26	20.77
Arm symptoms	36.53	23.71
Hair loss[b]	48.25	38.32

EORTC QLQ-C30: European Organization for Research and Treatment of Cancer QoL Questionnaire–Core 30; EORTC QLQ-BR23: EORTC breast cancer–specific QoL questionnaire; QoL: quality of life.
[a]N = 198.
[b]N = 353.

Table 4. ANOVA for the evaluation of differences in anxiety levels in relation to demographics.

Demographics	F	p
Place of residence	2.383	0.051[a]
Age	1.049	0.388
Time of first diagnosis	2.211	0.087
Education level	0.330	0.858
Source of support	9.274	<0.001[b]

ANOVA: analysis of variance.
[a]Statistical significance at 10% level.
[b]Statistical significance.

their concerns about the future, the mean was 32.49 ± 33.56 which shows a poor perspective on the future and reflects on the patient's insecurity about the outcomes of the chemotherapy and his or her prognosis.

Patients reported that hair loss (48.25 ± 38.32) was the most significant problem they were experiencing followed by the arm symptoms (36.53, SD = ±23.71) and the systemic therapy adverse effects (33.28, SD = ±33.28). This finding shows that early treatment side effects can also have a negative impact on one's QoL. The results showed that breast symptoms (25.26, SD = ±20.77) received the lowest score, meaning that patients were not experiencing serious problems in relation to this aspect (Table 3).

Exploration of the possibility if different sociodemographic data can determine patient's anxiety levels

Table 4 shows that there were statistically significant differences on anxiety levels only for the variable "source of support." Explicitly, results of post hoc tests revealed significant differences on anxiety levels of patients whose only source of support was their family. These patients also expressed higher anxiety levels (p < 0.001), compared to patients that reported their family and an anticancer society as their source of support. Results showed that the combination of various types of support reduced patient's anxiety levels. Additionally, noteworthy differences (at a significant level of 10%) were also found for the variables "place of residence" and "time of first diagnosis" (p = 0.051 and p = 0.087, respectively).

A multiple regression analysis was performed, with "anxiety" as the dependent variable and demographics as the independent variable, in order to predict whether demographics affect anxiety. Multiple regression analysis showed that source of support and time of first diagnosis were found to be statistically significant. Explicitly, the results showed (p = 0.061 < 10%, β = −2.123) that those relying only on their family as a source of support experienced higher anxiety levels when compared to patients that were relying on several sources of support (i.e. on anticancer society and family). The time of first diagnosis was also found to affect anxiety

worst symptom (49.04 ± 29.12) followed by insomnia (44.32 ± 32.97) and pain (40.47 ± 28.02). It is noteworthy that the mean score of the Global QoL was 55.91 ± 17.94 which is considered average by breast cancer women. The distribution of Global QoL is normally distributed with mean = 55.91 and SD = 17.94. This corresponds to 68% of the sample scoring between the values of 37.97 (low QoL) and 73.85 (satisfactory QoL).

In relation to EORTC QLQ-BR23, results showed that the patients' functioning had been average to poor. Patients' sexual functioning and sexual enjoyment were mostly affected (24.93 ± 20.75 and 31.82 ± 23.34, respectively). The scores on the body image (48.33 ± 29.31), although better compared to sexual functioning and sexual enjoyment, revealed that the patients were already experiencing changes on their body by the end of the first cycle of chemotherapy. In relation to

Table 5. Multiple regression analysis for demographics and anxiety.

Variable	B	Standard error	p value
Place of residence	−0.357	0.578	0.537
Age	0.518	0.764	0.499
Time of first diagnosis	1.354	0.740	0.068[a]
Educational level	0.578	0.698	0.408
Source of support	−2.123	1.128	0.061[a]

[a]Significance at 10% level.

Table 6. ANOVA for sociodemographic data and QoL.

Demographics	F	p value
Place of residence	5.574	<0.001[a]
Age	1.656	0.145
Time of first diagnosis	3.915	0.009[a]
Education level	0.728	0.573
Source of support	15.398	<0.001[a]

ANOVA: analysis of variance; QoL: quality of life.
[a]Statistical significance at 1% level.

(p=0.068<10%, 1.354), with greater time from first diagnosis, correlating to higher anxiety (Table 5).

Exploration if sociodemographic data can determine patients' QoL

Table 6 shows statistically significant differences on QoL for variables "place of residence," "time of first diagnosis" and "source of support." Tukey post hoc test[27] was performed in order to explore any significant differences. In relation to "place of residence," Limassol has been shown to have the lowest QoL levels in relation to other places of residence. In relation to "time of diagnosis," results showed that patients who have been diagnosed for more than 10 years (mean=47.7) showed lower QoL levels than patients who have been diagnosed for 1–3 years (mean=57.3).

Statistically significant differences were found in patients whose only source of support was their family (p<0.001), compared to patients whose source of support was an anticancer society or a combination of family and an anticancer society (mean=42.4, 61.8 and 57.5, respectively). It seems that anticancer support or a combination of family support and an anticancer support generally increases the QoL of breast cancer patients.

Multiple regression analysis was performed at a significant level 5%. A statistically significant difference was found in terms of the "source of support" (p<0.001), while "time of first diagnosis" had an effect at level 10% (p=0.074). For the "source of support" (p<0.001), the positive coefficient (6.19) showed that patients whose only source of support was family had lower QoL compared to patients whose source of

Table 7. Multiple regression analysis for demographics and QoL.

Variable	B	Standard error	p value
Place of residence	0.090	0.803	0.911
Age	−0.531	1.062	0.617
Time of first diagnosis	−1.842	1.028	0.068[a]
Education level	−0.948	0.969	0.328
Source of support	6.190	1.566	<0.001[b]

QoL: quality of life.
[a]Statistical significance at 10% level.
[b]Statistical significance at 1% level.

Table 8. Multiple regression analysis for demographics, anxiety and QoL.

Variable	β	Standard error	p value
Anxiety	−0.846	0.059	<0.001[a]
Place of residence	−0.212	0.638	0.740
Age	−0.093	0.844	0.913
Time of first diagnosis	−0.696	0.820	0.396
Education level	−0.460	0.770	0.551
Source of support	4.394	1.250	<0.001[a]

QoL: quality of life.
[a]Statistical significance at 1% level.

support was an anticancer society or both. The results showed that time of first diagnosis had a statistically significant influence on QoL (p=0.068<10%), whereas a negative coefficient (−1.842) showed that if the time of first diagnosis is greater, then a lower QoL was reported (Table 7).

Correlation between anxiety and QoL: can anxiety predict the patient's QoL?

There was a statistically significant correlation between anxiety and QoL (r=−0.623, p<0.001). In particular, a negative correlation was found that indicated that the greater the anxiety level, the lower the QoL. Anxiety had a statistically significant effect on QoL (p<0.001), where the negative coefficient showed that higher anxiety was collated with lower QoL. When anxiety level was increased by 1 point, then the QoL decreases (0.884 points). R-squared was found to be equal to 0.388, which shows medium adjustment to the model.

Exploration of the patient's sociodemographic data in combination with anxiety can affect the QoL

Table 8 shows that anxiety had a significant effect on the QoL, especially in combination with the source of support. According to the multiple regression model, a patient who

experiences severe anxiety levels, and her source of support was only her family, would have lower QoL levels. R-squared has been increased to 0.417 (p < 0.005).

Results (qualitative)

In the interviews, the participants felt that anxiety had a negative influence on their lives and conveyed their perceptions of the ways that anxiety interfered with their QoL. Based on the principles of qualitative data reporting, the main themes were presented in the language used in the patients' descriptions. The following themes were formulated: "Life is Not the Same Anymore," "Feeling trapped in my thoughts" and "Live in the Moment."

The patients highlighted the fact that both cancer and its treatments were a significant source of anxiety that resulted in significant changes in their everyday lives. Patients used examples such as the change of their life's priorities in order to demonstrate how anxiety impacted their lives. Patients found themselves in situations where they had to move from living and enjoying life to merely surviving in life. These forced changes were perceived as limiting their QoL.

"Life is not the same anymore"

There has been a major change in my perspective on life since the diagnosis and treatment began, nothing seems to be the same to me anymore, I mean I have revised my priorities in life, my everyday life has been adjusted to this, this is not the way I imagined living, certainly not enjoying life. (Female, 36)

Similarly, a patient conveyed that

It's all about the treatment, my mind is fixed exclusively on this, I just think the outcome of the chemotherapy on my tumor, nothing else can be important during this period […]. (Female, 59)

"Feeling trapped in my thoughts"

The sense of feeling trapped in the worrying thoughts that the patients conveyed in the interviews was a common experience among all the participants. These thoughts seemed to be perceived as a form of "torture" inflicted by the potential outcome of the treatment:

I have become more pessimistic since the beginning of the treatment, I tried to think positively about the result but the thoughts are eating me up inside. You know nobody knows the real outcome, or whether things will be like what you expected, I don't want to be disappointed or have false hope […] I have had so many disappointments that I am not sure I could take one more. (Female, 41)

Things are not black or white, there are so many things these days that are interfering to the way I live, such as frequent hospitalizations, side effects, diagnosis, and these are only what come to mind now […], I get the feeling that these are too much

[…], I keep telling (or trying to persuade) myself that everything will be alright […]. (Female, 65)

"Live in the moment"

Being treated for breast cancer with chemotherapy was an aspect that, according to patients, brought them face to face with their own mortality or their loss of "immortality":

Death and dying has been my daily routine now that I am receiving treatment […] I am frequently so intensively worried about treatment and the possible negative results that it made me physically ill. I am struggling to adjust to the treatment's effects […] my mortality has become conscious to me for the first time in my life, and this has somewhat "crippled" me in doing anything else. My everyday living and actions are determined by this fact. I am so anxious that I am afraid to think of the word "future" or even living with future in my thoughts, it is so disappointing and depressive. (Female, 27)

Before cancer I thought I was immortal, I though nothing could take away my life but this is life I guess, it's all part of God's will I guess, and since I can't change the future I only live in the moment. I am still alive, aren't I? So the best thing for me and my family to do is to try and live for the "now," away from anxious and negative thinking … to be honest I don't see how it could be different. (Female, 40)

[…] My life is like a 24-hour timer, I have come terms with the fact that this is probably what I have and I try to make the most of it […] the next day (if I am lucky to have another one) the timer resets and live as if it's the last one I will get. This might sound harsh or even a little bit extreme, but at least it gave me peace from all that thinking of what the future holds […]. (Female, 32)

Discussion

The purpose of this study was to assess anxiety and QoL and explore any correlations between these variables in breast cancer patients during the early period of active treatment. Results showed that anxiety levels (assessed by the SAS) ranged from moderate to high, with 38% of the patients experiencing low or moderate anxiety, whereas 36% of the patients experienced severe anxiety. These findings are consistent with those of preceding studies, showing that anxiety is significantly higher in patients undergoing chemotherapy even when anxiety levels are compared to those receiving radiotherapy.[15,16] A significant contribution of this study is that it provided evidence on the presence of anxiety in patients at the end of the first cycle of chemotherapy. This finding is contrary to those of previous studies' findings showing that anxiety reaches the highest levels before the first infusion.[28]

Patients reported the lowest scores on emotional (49.30 ± 29.12) and role functions (56.34 ± 27.50) and the highest on fatigue and insomnia (49.04 ± 29.12 and 44.32 ± 32.97,

respectively). The increased symptom burden experienced by the patient had negatively influenced their QoL (55.91 ± 17.94) and in turn appeared to interrupt their ability to perform their roles.[29] Although the EORTC QLQ C-30 does not clarify what roles are affected, previous studies demonstrated that the women experiencing physical and psychological symptoms also faced difficulties in performing some of their roles such as returning to their workplace and caring for themselves and their families.[30] This study showed a statistically significant negative correlation between anxiety and QoL, indicating that the inability to maintain their roles can exacerbate patient's stress and lead to poor emotional function (49.30 ± 29.12).

Sexual functioning (24.93 ± 20.75) and sexual enjoyment (31.82 ± 23.34) received the lowest scores in terms of patients' functionality (assessed by the EORTC QLQ-BR23). The worst symptoms they reported included hair loss (48.25 ± 38.32) and arm symptoms (36.53 ± 23.71). The results confirmed the negative association between symptom burden and functionality status in breast cancer patients. For example, previous studies showed that treatment-induced body image changes can make the adjustment process to this "new" body difficult (i.e. loss of hair).[31] These difficulties can lead to women experiencing poor sexual functioning and sexual enjoyment. Poor functioning can be further exacerbated by poorly managed side effects (i.e. pain) and can in turn lead to the cascading consequences of elevated stress.[32]

The results stressed the importance on the availability of supportive means to patients during the end of the first cycle of chemotherapy. Explicitly, patients who had multiple sources of support experienced lower levels of anxiety and higher QoL (p < 0.001) compared to those simply relying on their family's support (β = −2.213, p < 0.061). This finding can be interpreted in several ways. For example, it can be explained by the ill preparation of family for providing support to their patients during the early period of active treatment. Another interpretation is provided by Lueboonthavatchai[33] who showed that the presence of poor family relationships and functioning (p < 0.05) predicted anxiety in breast cancer women. Poor family relationships, the short time from diagnosis to treatment characterized by a flooding of emotions and family's unmet informational needs have all been identified as factors that can prevent family members from assuming an active role in their relatives' care.[34,35]

Time from diagnosis showed a statistically significant correlation to QoL (p = 0.068 < 10%), where a negative coefficient (β = −1.842) indicated that if the time of first diagnosis was greater, there was a lower QoL. Partly, this can be interpreted by the fear of disease recurrence, which in previous studies was found 70% even 5 years following the first diagnosis.[36] Similarly, other studies supported the finding that long-term survivors can also experience severe anxiety and low levels of QoL.[37]

Based on this study's results, there was a negative correlation between anxiety and QoL (r = −0.623, p < 0.001), which showed that higher anxiety can lead to lower QoL (β = −0.884, p ≤ 0.001). Anxiety can negatively affect the person's QoL in several ways. It can, for example, exacerbate physical symptoms such as pain and insomnia, but it can also negatively affect the person's social, emotional and work functioning.[38,39]

The qualitative part of this study aimed to explore patients' experiences on the ways they perceived that anxiety influenced their QoL. The results showed that the alterations in one's life due to breast cancer and the treatment are sources of significant anxiety. These alterations triggered patients' anxiety through the undesirable adjustments they had to perform in their lives (i.e. change in their roles) ultimately leading to poor QoL. Previous studies echoed these results asserting that these alterations can result in the women living with an "uncertain certainty" and struggling to achieve a physical redefinition and a mental redefinition of self that can lead to increased anxiety and poor QoL.[40] The uncertainty in this study resulted in the patients feeling the need to survive rather than to enjoy life. Similarly, Ashing-Giwa et al.[41] found that this need derived from an uncertainty about recurrence, death and loss of autonomy, all of which triggered feelings of fear and anxiety. The results, however, showed that this is only one possible reaction to cancer and its treatments. Preceding studies provided evidence that patients can also find a positive meaning in this situation by learning to take things day by day as well as finding new ways of enjoying life in order to maintain a good QoL.[42]

The results stressed the need for more effective and comprehensive ways to support the patients as early as the first cycle of chemotherapy. For example, Charalambous et al.[43] in a randomized controlled trial (RCT) with 208 breast and prostate cancer patients in active treatment provided evidence for the effectiveness of Guided Imagery and Progressive Muscle Relaxation for the management of anxiety and depression. A systematic review and meta-analysis by Boehm et al.[44] showed that arts therapies (i.e. music therapy, art therapy and dance/movement) can have a positive effect in reducing breast cancer patients' anxiety and depression. Psychoeducation, cognitive behavioral therapy (CBT) and supportive–expressive therapy can also be useful in the management of anxiety and depression and for improved QoL in breast cancer patients.[45]

There appears to be a consensus among researchers on the chemotherapy-induced anxiety to breast cancer patients; however, the same does not apply as to when patients experience the highest levels of anxiety. Many preceding studies claim that anxiety levels in women who underwent chemotherapy were highest before the first chemotherapy infusion and subsided over time.[16] Other studies showed that the period following the completion of chemotherapy also found the patients experiencing anxiety and depression.[46] Although significantly lower levels of anxiety and depression were recorded compared to the period preceding the onset of chemotherapy, 1 year after chemotherapy anxiety disorders were found among 8% of the patients.[47] However, Montazeri et al.[48] reported a prevalence rate of anxiety as high as 29% after adjuvant therapy. Overall, the prevalence of anxiety among breast cancer patients varies considerably, both with time and between studies. The prevalence of anxiety although more profound at diagnosis and prior to adjuvant therapy

(although not universally reported), the levels of anxiety reported by this study during the first cycle of chemotherapy mean that any supportive measures and resources utilized prior to chemotherapy need to continue during the period following the initiation of chemotherapy. Due to the large variation of studies' findings, it is not possible to draw safe conclusions in terms of the level of support needed by the patients during the early phase of chemotherapy compared to the later phases or compared to the period prior to the beginning of chemotherapy.

This study is not without limitations. One of the limitations was that the largest number of patients came from one district (i.e. Nicosia). This resulted in women visiting private clinics in other districts not been included in the sample. Future studies, conducted in Cyprus, could make the effort to also collect data from the private sector. Finally, the "source of support" was collected through a single item question as part of the demographics questionnaire; however, more information could have been collected by a social support–specific questionnaire. This would have provided more detailed information on the type and the ways this support was utilized by the patients.

Conclusion

This study highlights that breast cancer patients in active chemotherapy experience significant levels of anxiety, with higher anxiety correlating to low QoL. In addition, it highlights that the time of first diagnosis plays a significant role in the QoL of breast cancer patients.

Results of this study could help cancer care nurses to identify high-risk patients for anxiety and low QoL during the first cycle of chemotherapy. The explicit correlations between anxiety and QoL and patients' characteristics can facilitate the implementation of various strategies for effectively minimizing the feelings of anxiety and improving QoL during chemotherapy.

Further studies are also recommended for examining the benefits of integrating methods such as guided imagery or relaxation methods to more traditional ones as a part of a more comprehensive management strategy for anxiety and QoL in breast cancer patients.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Ethical approval

The study protocol was approved by the Cyprus National Bioethics Committee (File number: 2010/06) and the Cyprus Ministry of Health (MH 5.04.019). Participants were informed for the purpose and procedure of the study prior to their consensus to participate and signed a consent form (article 11(1), Law 138 (1)/2001).[37]

Informed consent

Participants have signed an informed consent form prior to their participation to the study.

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