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Original Article

Health-related quality of life after neoadjuvant chemotherapy in elderly women with breast cancer.

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Abstract

Background:
There are numerous treatment regimens for breast cancer, but the side effects of treatments and their impact on quality of life (QOL) are different. So, stratification of treatments should focus on individual profiles and QOL.

Objective:
To assess QOL of elderly females with breast cancer after neoadjuvant chemotherapy.

Methods:
A prospective cohort study included 73 elderly females recruited from Ain Shams University oncology clinics.

Sociodemographic data were collected, Past relevant medical history was taken using Charlson Comorbidity Index (CCI).

Two questionnaires assessed QOL: the European Organization for Research and Treatment Quality of Life questionnaire (EORTC QLQ-C30), which included global health status, function, and symptom scales.

The second questionnaire was the European Organization for Research and Treatment of Cancer Quality of Life breast cancer-specific module (EORTC QLQ-BR23), which included functional and symptom scales.

These questionnaires were administered at baseline, prior to treatment, and 1 month after the completion of neoadjuvant chemotherapy (NAC).

Results:
In our study, 73 patients diagnosed with non-metastatic breast cancer were enrolled. The mean age was 63.59 years, and the median CCI score was 4.

Regarding EORTC QLQ-C30, there was statistical significance in all items of the QOL from baseline to post-chemotherapy. Mean of overall health and QOL declined. They showed an increased burden over time in the aspects of physical, role function, emotional, cognitive, social functions, and symptoms.

Regarding EORTC QLQ-BR23, deterioration in scores was observed in body image, most of the side effects, arm symptoms, and Hair loss upset. However, breast symptoms showed a decline over time, while the mean score for quality of sexual life increased after chemotherapy. **Conclusions:** Overall, breast cancer patients perceived benefits from cancer treatment. However, after completing treatment, patients reported issues related to global QOL, body, arm symptoms, and body image

Keywords: quality of life, chemotherapy, breast cancer, elderly.

INTRODUCTION

Female cases of breast cancer have increased over lung cancer cases as the most commonly diagnosed cancer, with an estimated 2.3 million new cases, representing 11.7% of all cancer cases. It is the leading cause of cancer death, followed by colorectal and lung cancer for incidence and mortality [1][2].

In Egypt, breast cancer is the most common of all cancer types in females, with 28,000 confirmed cases each year, as reported by the National Cancer Institute (NCI) in Egypt [3].

Contemporary oncology focuses on pharmacological treatment and seeks to understand the experiences of patients and their families. This approach prioritizes resource allocation and planning, providing holistic care that significantly improves quality of life (QOL), a subjective, multidimensional construct encompassing physical, psychological, social, and spiritual well-being [4].

The cancer symptoms and side effects of the therapies severely reduce breast cancer patients' QOL. Indeed, physical and psychosocial functioning, family life, and relations affect their overall well-being [5].

Cancer-related complications often include emotional distress, such as uncertainty or fear of recurrence, post-traumatic stress symptoms, and pain [6].

Chemotherapy causes significant side effects in women with breast cancer, such as fatigue, febrile neutropenia, depression, dyspnea, pain, nausea and vomiting [7].

QoL is a multi-dimensional concept of an individual's general well-being status in relation to the value, environment, cultural and social context in which they live. Since QoL measures outcomes beyond biological functioning and morbidity, it is recognized as an important measure of overall [8]. Assessments are valuable for gathering information from patients regarding their disease symptoms and treatment side effects, as well as for evaluating psychological, social, and spiritual aspects [9].

Therefore, it is essential to understand the patients' needs to enhance their quality of life, stabilize their mental, social, and physical health, and manage specific signs and symptoms throughout the treatment [7].

Materials and methods

Ethical consideration

This study was approved by the ethical committee of the faculty of medicine at Ain Shams University (Approval number MD106/2023). Informed consent was obtained from each participant. Participants were informed about the nature of the study, the test used, and the data collected from this study. Confidentiality and privacy of data were ensured for all participants.

Sample size:

Using the PASS 15 program for sample size calculation, with a 95% confidence level and a 10% margin of error, it is estimated that a sample size of 73 women will be needed to detect an expected incidence of cognitive function decline of 25% [10].

Study design and patients

The study was designed as a prospective cohort study involving 73 elderly female participants who were newly diagnosed with non-metastatic breast cancer candidates for preoperative neo-adjuvant chemotherapy at Ain Shams University

Oncology clinics before any surgical intervention or hormonal treatment.

Inclusion criteria involved females aged 60 years and older, newly diagnosed with invasive breast cancer stage I-III, and who are candidates for preoperative chemotherapy.

Exclusion criteria involved patients who are known to have cognitive impairment or psychiatric disorders in their history, discovered to have cognitive impairment during screening, found to be delirious during the assessment using Confusion Assessment Method (CAM) [11] who started chemotherapy before the baseline assessment, receiving alternative treatment such as hormonal or immunotherapy, or having severe hearing or visual impairment preventing patients from continuing the assessment.

Data collection:

1. Participants' demographic data, including age, marital status, education, living arrangements, and special habits, were obtained. Past relevant medical history was taken using the Charlson Comorbidity Index (CCI) [12].
2. Drug and Surgical history
3. Staging of breast cancer
   a) It was based on the American Joint Committee on Cancer (AJCC)Staging for Breast Cancer**.**
   b) It classified breast cancer according to T (size of primary tumor) (Tis to T4), N (clinical& pathological lymph node) (N0 to N3) and M (presence of distant metastasis) (M0 or M1) classification and these categories are combined to determine the overall anatomic stage (stage 0 to stage IV).
4. Quality of life assessment was done using the European Organization for Research and Treatment-Quality of life questionnaire (EORTC QLQ-C30) and the European Organization for Research and Treatment-Quality of life breast cancer-specific module questionnaire (EORTC QLQ-BR23) [13,14] using the Arabic version [15].
   - The assessment was done before starting chemotherapy and one month after chemotherapy ended.
   - Items of these questionnaires were measured using a 4-point Likert Scale ranging from Not at all (1) to Very much (4).
   - Lower scores mean lower burden in QOL, higher scores mean higher burden and worse outcomes.

➢ **EORTC QLQ-C30** is a validated tool for measuring the global health, physical functions, and symptoms of cancer patients.

1) It consists of 30 items measuring: 2 items for Global Health status (overall health and QOL), 15 items for Functional scales and 13 items for symptoms scales.
2) Physical function included (doing physical activities, long walk, short walk, need help and need to stay in bed), psychological function (feeling tense, worry, irritable and depressed), cognitive function

(difficult concentrating and remembering), social function (having family life and social activities) and role function (daily activities and leisure time activities)

3) Symptoms scales included fatigue, nausea, vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea and financial difficulties.

EORTC-BR23 is a validated tool for measuring symptoms which most breast cancer patients complain about.

1) It consists of 23 items, which are measured on two main scales: the Functional Scale (8 items) and the Symptoms Scale (15 items).
2) Functional scale included body image (less attractive, less feminine, difficult to look at yourself, body satisfaction), sexual functioning (interested in sex), sexual enjoyment (sexually active) and future perspectives (worry about future health).
3) Symptoms scale included systemic side effects (dry mouth, different taste, feeling ill, hot flushes, headache, hair loss), breast symptoms (breast pain, swollen breast, breast oversensitivity and skin problems), arm symptoms (shoulder pain, swollen arm, difficulty in raising arm) and finally hair loss upset.

Statistical Analysis:

Appropriate statistical methods will be used to present and analyze the data. Quantitative variables will be presented as mean and standard deviation, and the independent t-test will be used to compare the two groups. Qualitative data will be presented as frequency and proportion, and a chi-square test will be used to compare the two groups.

Statistical Package: Data entry and statistical analysis will be on a personal computer using the Statistical Package for Social Science (SPSS) version 20.0.

i. Descriptive statistics:

1. Mean, Standard deviation (± SD) and range for parametric numerical data, while Median and Interquartile range (IQR) for non-parametric numerical data.
2. Frequency and percentage of non-numerical data.

ii. Analytical statistics:

1. **Paired t-test** was used to assess the statistical significance of the difference between two means measured twice for the same study group.
2. **The Kruskal-Wallis** test was used to assess the statistical significance of the difference between more than two study group ordinal variables.

P- value: level of significance

- P>0.05: Non-significant (NS).
- P< 0.05: Significant (S).

RESULTS:

In table 1, the population group's age ranged from 60 to 76 years, and the mean age was 63.59. Regarding marital status, 69.8% of the population group were married. Regarding their educational level, 31.5% were illiterate, 23% completed university education, 16% had an education of less than 4 years, 15% had a secondary level, and 13% had primary education. Regarding living arrangements, 90% of the population were living with their families, while the other 10% were living alone. None of them had a history of smoking or alcohol.

The mean of the Charlson Comorbidity Index in table 2 was 4.81 and ranged from 4-8 (65.7%) of the population group had a score of 4, while the rest of them had a score of more than 4.

Regarding pathology in table 3, 91.7% of the population group had unilateral invasive ductal carcinoma, 6.8% had unilateral invasive lobular carcinoma, and 1.3% had bilateral invasive ductal carcinoma. Regarding staging, 52% of the group was IIIA, 32.8% were IIB, 10.9% were IIIC, and 4% were IIA.

In table 4, there was statistical significance in all items of quality-of-life assessment of the studied population from baseline to post-chemotherapy with a P-value <0.001.

There was a decline in the mean of overall health and quality of life over time. There was an increase in the mean scores for physical function, role function, emotional function, cognitive function, social function, and symptoms, indicating that over time, the burden increased.

There was statistical significance in the breast cancer-specific module questionnaire shown in table 5 with an increase in the mean of body image (as being less attractive& less feminine), most of the side effects, arm symptoms, and Hair loss upset with a P-value <0.001. The mean of breast symptoms declined over time, and the sexual life mean increased post-chemotherapy.

DISCUSSION

Breast cancer is the most commonly diagnosed cancer among women, with an estimated 2.3 million new cases globally each year. The number of women with breast cancer living beyond a diagnosis has grown significantly, with 5-year survival rates of around 90% and 10-year survival at 80%. Therefore, there is an increasing focus on survivorship issues, particularly concerning quality of life [16].

Given the increasing survival rates after breast cancer treatment, there is a greater focus on enhancing health-related quality of life both during and after oncologic therapies. While systemic therapies offer significant benefits by reducing the risk of breast cancer recurrence, they can also negatively impact survivors' quality of life [17].

Breast cancer patients are at increased risk of treatment side effects that can negatively impact their overall quality of life. These side effects may include physical issues such as fatigue, sleep disorders, and pain, as well as psychological challenges, including depression, anxiety, fear of recurrence, and concerns related to sexuality and body image [18].

Therefore, this work aimed to evaluate the quality of life with breast cancer elderly females treated with neoadjuvant chemotherapy (NAC).

The study's population ranged from 60 to 76 years; the mean age was 63.59. Regarding marital status, 69.8% of the population group were married. Regarding their educational level, 48% were illiterate and low-educated, and 52% were educated. Regarding living arrangements, 90% of the population lived with their families, while the other 10% lived alone. None of them had a history of smoking or alcohol.

The Mean of the Charlson Comorbidity Index was 4.81.

This study showed statistical significance in all items of QOL assessment of the population studied, comparing baseline measurements to those taken after chemotherapy. Overall health and QOL declined over time.

In our study, the mean deterioration in physical function, role function, emotional function, cognitive function, social function, and symptoms increased, which means that the burden increased over time.

Our results are similar to **Binotto et al., 2020,** who showed a decline in global health status and QOL of breast cancer patients receiving neoadjuvant chemotherapy. Over time, after chemotherapy, there was a decrease in physical, role, emotional, and social functioning, accompanied by an increase in side effects related to systemic therapy. These side effects included fatigue, nausea, vomiting, insomnia, appetite loss and diarrhea in breast cancer cases following chemotherapy [7].

Leinert et al., 2017 found a deterioration in global health among breast cancer patients during chemotherapy treatment, which was linked to an increase in symptoms attributed to systemic therapy [19].

The physical function domain in this study was affected after chemotherapy treatment ended due to limitations in functional status caused by both the disease and the treatment. **Gaston-Johansson et al., 2015** & **Arahori et al., 2024** confirmed that functional well-being was significantly worsened after 2 and 3 courses of chemotherapy [20, 21]

We suggest that this change was caused by the effect of body composition induced by NAC. This is supported by a retrospective, descriptive study, with data collected from 2017 to 2020 to measure body composition parameters for 317 Korean women with breast cancer before and at completion of NAC. The study revealed a significant decline in skeletal muscle index during NAC [22].

Breast cancer patients have a high risk of developing alterations in their psychological functions, which can negatively affect their quality of life [21]. In our study, feeling tense, worried, irritable, and depressed were significant, which was explained by the deterioration of other domains. Our results were similar to a prospective study that included women diagnosed with breast cancer undergoing chemotherapy treatment, outlining the negative impact that chemotherapy had on the emotional role [23].

Our participants' cognitive function domain was affected post-chemotherapy treatment, with difficulty concentrating and remembering. However, further evaluation is needed using a detailed cognitive assessment to determine the affected cognitive domains. **Ahles & Root, 2018** stated that most patients experience cognitive change (problems with attention, concentration, memory, and multitasking) during active treatment due to multiple factors, including general feeling ill, anemia, nausea, disturbed sleep, use of sedating medications and/or steroids to control side effects, stress, and anxiety [24].

According to **Rodríguez et al. (2020)**, A decline in cognitive performance was observed in newly diagnosed non-metastatic breast cancer elderly patients receiving NAC. Processing speed and working memory were the most affected domains in breast cancer patients on chemotherapy treatment [25].

Our participants suffered from pain, dyspnea, loss of appetite, diarrhea, feeling fatigued, nausea, vomiting and financial problems post-chemotherapy treatment.

Marcelo Castro et al., 2021, conducted a descriptive, prospective study that assessed health-related quality of life in two phases: the initial day of chemotherapy treatment and after 120 days. The study revealed that fatigue, nausea and vomiting, appetite loss, and diarrhea were frequent symptoms in comparison to baseline in breast cancer patients after chemotherapy [23].

In the breast cancer-specific module questionnaire, regarding breast image for our participants post-chemotherapy treatment, being less attractive and less feminine increased, but feeling breasts hard decreased. That may be because of chemotherapy on the breast mass. They didn't have any sexual desire or enjoyment weeks before starting chemotherapy, which may be due to the pain they suffered or the diagnosis itself. These aspects improved a little post-chemotherapy.

After chemotherapy, patients reported several side effects, including changes in taste, anxiety about the future, eye pain, hair loss, headaches, and overall malaise.

Complaints of breast symptoms such as pain, swelling, skin sensitivity and other skin problems decreased after chemotherapy. On the other hand, arm symptoms increased over time.

In **Binotto et al., 2020,** participants reported a decline in body image, sexual function and sexual enjoyment during the third month after chemotherapy. However, there was a reduction in breast and arm symptoms [7].

Marcelo Castro et al., 2021, cleared the negative impact of chemotherapy on sexual function and satisfaction 4 months from the start of chemotherapy, which may need further evaluation and follow-up months after the end of treatment [23].

Therefore, understanding patient goals is essential for tailoring treatment to align with their priorities. This approach allows us to care for the whole person, considering their perceptions of cancer care and overall well-being throughout treatment. [9].

Additionally, minimizing the adverse effects of treatment and implementing strategies to help patients cope with these challenges are crucial for enhancing their QOL [26].

CONCLUSION

Breast cancer patients receiving chemotherapy often experience a decline in quality of life. Implementing quality-of-life assessment tools within geriatric oncology settings enables healthcare providers to enhance diagnosis and prognosis, monitor patient progress, support informed clinical decision-making, and ensure appropriate treatment and follow-up care. These tools accurately evaluate patients' physical, mental, functional, and social well-being.

Conflict of interest

Authors declare no conflict of interest.

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Tables

Table 1: Sociodemographic data for the whole study group.

		N (%)
Age	Mean ± SD	63.59 ± 4.33
	Range	(60 - 76)
Marital status	Married	51 (69.86%)
	Divorced	9 (12.33%)
	Widow	13 (17.81%)
education	Illiterate & Low educated	35 (48%)
	Educated	38 (52%)
Living arrangement	Alone	7 (9.59%)
	With family	66 (90.41%)
Alcohol		0 (0%)
Smoking		0 (0%)

Table 2: CCI for the whole study group

		N (%)
CCI	Mean ± SD	4.81 ± 1.24
	Median (IQR)	4 (4 - 6)
	Range	(4 - 8)
	4	48 (65.75%)
	More than 4	25 (34.25%)

CCI: Chalrlson Comorbidity Index.

Table 3: Breast Cancer pathology and classification according to the AJCC staging system

		N (%)
Pathology	Unilateral invasive ductal carcinoma	67 (91.78%)
	Unilateral invasive lobular carcinoma	5 (6.85%)
	Bilateral invasive ductal carcinoma	1 (1.37%)
Stage	IIA	3 (4.11%)
	IIB	24 (32.88%)
	IIIA	38 (52.05%)
	IIIC	8 (10.96%)

AJCC: American Joint Committee on Cancer

Table 4: EORTC QLQ-C30 for the population studied

		Baseline	1 month after Chemotherapy end	Paired t-test	
				p-Value	Sig.
Overall health	Mean ± SD	5.32 ± 0.76	3.77 ± 0.79*	<0.001	S
	Median (IQR)	5 (5 - 6)	4 (3 - 4)**		
	Range	(4 – 7)	(3 – 6)		
Overall QOL	Mean ± SD	5.07 ± 0.48	3.75 ± 0.8*	<0.001	S
	Median (IQR)	5 (5 - 5)	4 (3 - 4)**		
	Range	(4 – 6)	(3 – 6)		
		Mean ± SD	Mean ± SD		
Physical function	Physical Activities	1 ± 0	2.16 ± 0.37	<0.001	S
	Long walk	1 ± 0	2.62 ± 0.66	<0.001	S
	Short walk	1 ± 0	2.12 ± 0.41	<0.001	S
	Stay in bed	1 ± 0	2.19 ± 0.46	<0.001	S
	Need help	1 ± 0	2.51 ± 0.6	<0.001	S
Role function	Difficulty in Activities	1 ± 0	2.16 ± 0.44	<0.001	S
	Difficulty in Hobbies	1 ± 0	2.15 ± 0.43	<0.001	S
Emotional function	Emotion tense	1.16 ± 0.37	2.15 ± 0.46	<0.001	S
	Worry	1.38 ± 0.49	2.36 ± 0.67	<0.001	S
	Irritable	1.07 ± 0.25	2.21 ± 0.76	<0.001	S
	Depressed	1 ± 0	1.47 ± 0.65	<0.001	S
Cognitive function	Difficult in Remembering	1 ± 0	1.79 ± 0.58	<0.001	S
	Loss Concentrate	1 ± 0	2.3 ± 0.46	<0.001	S
Social function affection	Social life	1 ± 0	2.27 ± 0.45	<0.001	S
	Life family	1 ± 0	2.21 ± 0.41	<0.001	S
Symptoms	Pain	2.52 ± 0.5	2.8 ± 0.47	<0.001	S
	Need rest	1 ± 0	2.64 ± 0.59	<0.001	S
	Dyspnea	1 ± 0	1.12 ± 0.33	0.002	S
	Loss Appetite	1.14 ± 0.35	2.14 ± 0.54	<0.001	S
	Constipation	1 ± 0	1 ± 0		
	Diarrhea	1 ± 0	1.34 ± 0.53	<0.001	S
	Feel weak	1.15 ± 0.36	2.44 ± 0.5	<0.001	S
	Feel fatigue	1.1 ± 0.3	2.36 ± 0.54	<0.001	S
	Pain on activity	1.1 ± 0.3	2.34 ± 0.53	<0.001	S
	Insomnia	1.36 ± 0.51	2.03 ± 0.71	<0.001	S
	Nausea	1 ± 0	1.6 ± 0.49	<0.001	S
	Vomiting	1 ± 0	1.22 ± 0.42	<0.001	S
	Financial problem	1.55 ± 0.67	1.88 ± 0.53	<0.001	S

Table 5: EORTC QLQ-BR23 for the population studied

		Baseline	**1 month after Chemotherapy end**	**Paired t-test**	
		Mean ± SD	**Mean ± SD**	**P-value**	**Sig.**
Body image	Body less attractive	1.99 ± 0.12	2.1 ± 0.3	0.01	S
	Less feminine	1 ± 0	1.97 ± 0.33	<0.001	S
	Look hard	2.45 ± 0.5	2.1 ± 0.3	<0.001	S
	Unsatisfactory	2.29 ± 0.46	2.23 ± 0.43	0.437	NS
Sexual life	Sex desire	1 ± 0	1.71 ± 0.49	<0.001	S
	Enjoyment	1 ± 0	1.71 ± 0.49	<0.001	S
Side effects	Future worry	2.45 ± 0.5	2.63 ± 0.49	0.027	S
	Dryness	1 ± 0	1.58 ± 0.52	<0.001	S
	Taste	1 ± 0	1.22 ± 0.42	<0.001	S
	Eye pain	1 ± 0	1.1 ± 0.3	0.007	S
	Hair loss	1 ± 0	2.37 ± 0.49	<0.001	S
	Unwell	2.66 ± 0.48	2.67 ± 0.47	0.857	NS
	Flush	1.07 ± 0.25	1.08 ± 0.28	0.765	NS
	Headache	1.32 ± 0.47	1.78 ± 0.61	<0.001	S
Breast symptoms	Pain	2.45 ± 0.5	1.71 ± 0.49	<0.001	S
	Swelling	2.56 ± 0.5	1.34 ± 0.51	<0.001	S
	Breast sensitive	2.41 ± 0.5	1.67 ± 0.5	<0.001	S
	Skin problem	2.48 ± 0.5	1.38 ± 0.52	<0.001	S
Arm symptoms	Pain	1 ± 0	1.23 ± 0.43	<0.001	S
	Swelling	1 ± 0	1.05 ± 0.23	0.045	S
	Elevation	1 ± 0	1.01 ± 0.12	0.321	NS
Hair loss upset		1 ± 0	2.4 ± 0.52	<0.001	S