

Impact of a Nurse-Led Self-Care Educational Program on Fatigue and Psychological Distress in Women with Breast Cancer Undergoing Chemotherapy

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Abstract Background: Chemotherapy remains the mainstay treatment strategy to combat early breast cancer as a major global health problem. Simultaneously, it causes various adverse effects, including fatigue and psychological distress. This study examines the impact of a Nurse-led self-care educational program in improving fatigue and psychological distress among women with early breast cancer undergoing chemotherapy. **Methods:** A quasi-experimental study with a non-equivalent design was conducted at Hiwa Hospital in Sulaymaniyah, Kurdistan Region of Iraq. Through non-probability purposive sampling, a total of 108 patients were recruited and allocated into two groups. The control group received standard care, while the intervention group received three sessions of a structured self-care educational program using a dedicated booklet. Both groups were assessed at baseline in the first cycle and post-test intervention after two months of receiving chemotherapy using a questionnaire including the FACIT-F and HADS. Data were analyzed with SPSS using descriptive and inferential statistics. **Results:** At baseline assessment, both control and intervention groups did not differ statistically (p -value >0.05). The post- intervention test confirmed that the nurse-led self-care educational program significantly improved the fatigue level (p -value <0.001), HADS-Anxiety ($p<0.001$), HADS-Depression ($p<0.002$) and fatigue severity ($p<0.001$). Positive strong correlation was found between anxiety and depression ($\rho = 0.607$, $p<0.01$) and significant negative correlations between fatigue and both anxiety ($\rho = -0.293$, $p<0.05$) and depression ($\rho = -0.340$, $p<0.05$). Clinically, fatigue was significantly affected by duration of diagnosis ($p<0.015$), type ($p<0.017$) and regimen ($p<0.003$) of chemotherapy. Psychological distress was influenced by laterality of breast cancer (HADS-A: $p<0.049$, HADS-D: $p<0.045$), age (HADS-D: $p<0.016$) and chemotherapy regimen (HADS-D: $p<0.039$). **Conclusion:** A nurse-led structured self-care educational program significantly shared in the improvement of fatigue and psychological distress in women with early breast cancer undergoing chemotherapy. Formal implementation of such programs in outpatient chemotherapy settings, especially in Kurdistan and Iraq, will empower patients' self-management against physical and psychological distress and improve quality of life during chemotherapy.

Key Words Nurse-Led Intervention, Early Breast Cancer, Self-Care Education, Chemotherapy, Fatigue, Psychological Distress, Anxiety, Depression

INTRODUCTION

Breast cancer is a major global health issue since it is the most common type of cancer and the leading cause of cancer deaths in women [1]. In Iraq, breast cancer is the most frequent cancer among Iraqi women's in 2022. It accounts one-third of all cancer cases diagnosed in female, with a second most common cancer leading to death after lung cancer [2]. Patients who have been recognized with breast cancer, several management approaches are employed such as chemotherapy, surgery, hormonal therapy, targeted therapy and radiation therapy [3]. Chemotherapy is the

mainstay of treatment for early-stage breast cancer, significantly lowering the chance of recurrence and enhancing long-term outcomes [4]. Despite its curative benefits, chemotherapy is accompanied by several adverse effects that result in various physical and psychological symptoms significantly impacting patients' quality of life [5]. Among these side effects, Cancer-Related Fatigue (CRF) and psychological distress are representing two of the most widespread and interconnected problems, each exacerbates the other in a self-reinforcing cycle that significantly lowers quality of life [6].

Cancer-related fatigue affects 80-90% of patients during chemotherapy and is characterized by persistent, subjective tiredness that related to cancer or cancer treatment that is inconsistent to recent activity and interferes with daily living activity [7]. Cancer-related fatigue is a complex, multifactorial symptom arising from cancer itself such as inflammation and from cancer-related treatment, such as chemotherapy. Adverse effects such as anemia, pain, infection, appetite loss and insomnia also contribute, along with the emotional impact of the disease [8].

Likewise, psychological distress, including anxiety and depression, affects between 18.8 and 84.1% of patients with breast cancer [9]. This can negatively affect treatment compliance, symptom burden and overall survival [10]. Breast cancer patients face varying degrees of psychological discomfort, which is exacerbated by worries about, hair loss, body image changes and shifts to their social, familial and personal roles and anxiety about their prognosis and treatment side effects [11]. These changes negatively contribute to fatigue severity, disrupting sleep, promoting physical inactivity and lowering quality of life [6,7]. Oncology nurses play a vital and dynamic role in the comprehensive care of patients with breast cancer, in addition to being in a unique position to provide ongoing symptom management, patient education, coordination and supportive interventions throughout chemotherapy [12]. Self-efficacy, emotional health and quality of life outcomes are all further enhanced by nurse-led health coaching [13]. However, the importance of empowering patients through self-care practices is becoming more and more clear [14]. Self-care education prepares patients with the knowledge and skills necessary to actively manage their symptoms, potentially improving treatment outcomes and quality of life [15]. Despite the fact that clinical guidelines call for routine screening, comprehensive assessment and non-pharmacological treatment for fatigue and psychological distress [8], healthcare professionals (HCPs) generally do not adhere to clinical standards for fatigue and distress management. The implementation of these recommendations in practical settings by oncology nurses and other healthcare professionals is hampered by a number of patient, nurse and system-related barriers [16]. The purpose of this study was to evaluate the impact of nurse-led self-care educational program on fatigue and psychological distress in women with early-stage breast cancer receiving chemotherapy.

METHODS

Study Design and Setting and Participants

A quasi-experimental study with a non-equivalent design was conducted at the outpatient chemotherapy unit of Hiwa Hospital, a specialized public oncology center in Sulaymaniyah City, Kurdistan Region of Iraq, between early February and late October 2025. Through non-probability purposive sampling, the study enrolled 108 breast cancer patients in two consecutive phases. In the first phase, a control group (n = 54) was recruited and received standard care only until the desired sample size had been achieved. After two

weeks apart, the intervention group (n = 54) was enrolled in the second phase. This consecutive design was chosen because randomized options were inappropriate due to their impracticability in a shared chemotherapy setting, information leakage among participants and ethical considerations.

Inclusion and Exclusion Criteria

Participation inclusion criteria were the following: women aged 18 and older, newly diagnosed breast cancer (stage I-III), able to read and write the Kurdish language, receiving systemic adjuvant or neoadjuvant chemotherapy including Doxorubicin and Cyclophosphamide (AC), Docetaxel and Cyclophosphamide (TC), Docetaxel, Carboplatin and Trastuzumab (TCH) or Docetaxel, Carboplatin, Trastuzumab and Pertuzumab (TCHP). On the other hand, illiterate patients, metastatic breast disease and psychiatric patients or cognitive impairment were excluded from the study.

Recruitment Process

At the nursing station of chemotherapy outpatient unit, newly diagnosed breast cancer patients who were referred for systemic chemotherapy, was identified by Hospital Information System. The researcher reviewed the medical records through the computer system to assess eligibility criteria. Brief interviews were also conducted to evaluate individuals' proficiency in speaking and reading Kurdish. Eligible women were informed of the study aims, voluntary participation and their rights as participants. Then, written and verbal informed consent was taken from each participant (Figure 1).

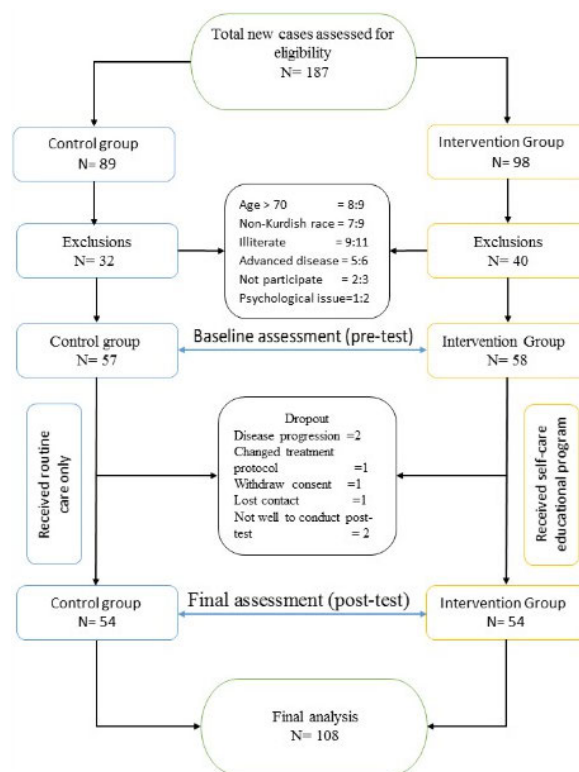


Figure 1: Distribution of the Study Sample

Data Collection

Data collection was performed over a nine-months, from early February to late October 2025, at the women's chemotherapy outpatient unit. Data were collected at two time points. The baseline (pre-test) assessment was conducted at the first cycle of chemotherapy. Prior receiving chemotherapy, each participant from both groups were completed the questionnaire including demographic and clinical data; FACIT-F and HADS, via face-to-face interviews. The post-test assessment was conducted after 8 weeks, at the start of the 4th or 5th cycle depending on whether the regimen cycle was 21 days or 14 days. Each participant was followed for about two months from enrollment to post-test assessment.

Standard Care

Hiwa Hospital is the only national institution in Sulaimani province that provides free services to cancer patients. The oncologists and nurses at the Hiwa hospital give standard care to all patients as the day's oncology care. Oncologists are the primary and formal source for giving information to patients, diagnosing, regulating treatment plans and giving prognoses. Prior to chemotherapy, there is no formal educational program for new patients diagnosed with cancer, including breast. The nurses are in charge of receiving patients, ensuring blood tests, vital signs charts, giving chemotherapy, monitoring them during treatment and doing other procedures. In addition to being loyal to the patient, nurses are uniquely positioned to educate and support the patient through their difficult journey. However, the nurses have no formal or written responsibility for this task in terms of patient education.

Intervention

The intervention group contributed in a structured self-care educational program that was implemented by a nurse researcher using a structured nursing booklet in Kurdish language (Self-Care During Chemotherapy). The booklet was empowered based on scientific publications such as the NCCN guidelines and the NCI's Chemotherapy and You [17,18]. The program was divided into three individual sessions; each sessions lasts 30-40 minutes. All sessions were conducted in a female outpatient setting, starting from the 1st cycle for three consecutive cycles.

The first educational lessons focused on a brief overview of the contents of the booklet and how to use it. Emotional changes, hair loss reasons and expectations, along with self-care practices, have been introduced. To reduce stress and provide relaxation, the deep breathing exercise was presented practically. The second lessons were focused on fatigue and symptom management, including energy conservation, dietary guidance, physical activity, sleep and rest and performing relaxation techniques. Several gastrointestinal symptoms that intensify fatigue severity were discussed, along with methods to alleviate them. The third lessons were focused on hematological-related adverse effects such as anemia and sleep disturbance. Several non-

pharmacological treatments for anemia have been discussed, such as sleep and rest, eating a balanced diet and limiting activity. Also, sleep hygiene, as an indicator of mental and physical wellness, has been clarified.

Research Questionnaire

The questionnaire was divided into three main sections. The 1st section contains demographic and clinical data such as (age, marital status, level of education, duration of diagnosis, chemotherapy regimen and breast cancer stages). The 2nd section was evaluated fatigue using the Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F) scale, a 13-item validated tool assessing fatigue and its effect on daily activities. Scores vary between 0 and 52; higher scores represent better functioning and less fatigue. Furthermore, in cancer population FACIT-F severity was estimated as follow: Fatigue more than 43 indicate less fatigue and better quality of life; 30-43 indicate moderate fatigue; and Less than 30 indicates severe fatigue [19]. The 3rd section was devoted to its evaluation of psychological distress using the Hospital Anxiety and Depression Scale (HADS), a 14 item questionnaire with two subscales (HADS-Anxiety) and (HADS-Depression) each with 7 items. The subscales scores vary between 0 to 21, scores of 0-7 denoting normal levels, 8-10 representing borderline levels and 11-21 indicating clinical levels of psychological distress [20]. The pilot study was conducted prior to the main study with 10 early breast cancer patients receiving chemotherapy via purposive sampling. The Cronbach's alpha for all instruments was 0.759 ($p < 0.01$), indicating good internal consistency reliability. The pilot testing revealed that questionnaire items were generally clear and understandable to participants.

Statistical Analysis

The IBM SPSS version 27 was utilized for statistical analysis. Descriptive statistics were used for frequencies and percentages, means and standard deviations. The Shapiro-Wilk test evaluated the normality of continuous variables. Independent t-tests and the Mann-Whitney U test are used for group comparison. Also, several tests such as t-test, Mann-Whitney U and one-way ANOVA were used for the association between variables. The p-value at $p < 0.05$ was set as statistical significance.

RESULTS

Participant Characteristics

Table 1 shows sociodemographic and clinical characteristics of the study sample. The average age was (control: 48.24 ± 10.99) and (intervention: 44.72 ± 9.31) years, with the higher age groups being between 40 and 49 years (42.6% in both groups), respectively. Most of the women who took part were married (87 vs. 83.3%) and housewives (68.5 vs. 70.4%), with the highest percentage (40.7 vs. 27.8%) having only primary schooling. Clinically, most women were started receiving treatment after 1-2 months from diagnosis (44.4 control vs. 57.4% intervention). Patients from the

Table 1: Sociodemographic and Clinical Characteristic of the Study Sample

Sociodemographic and clinical characteristics		Control (n = 54)	Intervention (n = 54)	p-value
Age	30-39	12 (22.2)	19 (35.2)	0.273 ^x
	40-49	23 (42.6)	23 (42.6)	
	50-59	11 (20.4)	5 (9.3)	
	60+	8 (14.8)	7 (13)	
	(Mean±SD)	48.24±10.99	44.72±9.31	0.104 ^u
Marital status	Married	47 (87)	45 (83.3)	0.828 ^x
	Unmarried	5 (9.3)	7 (13)	
	Widowed/Divorced	2 (3.7)	2 (3.7)	
Level of Education	Able to read and write	10 (18.5)	14 (25.9)	0.495 ^x
	Primary	22 (40.7)	15 (27.8)	
	Secondary	8 (14.8)	7 (13)	
	Institute level	4 (7.4)	8 (14.8)	
	University and above level	10 (18.5)	10 (18.5)	
Occupation	Employed	15 (27.8)	13 (24.1)	0.837 ^x
	Housewife	37 (68.5)	38 (70.4)	
	Retired	2 (3.7)	3 (5.6)	
Duration of diagnosis	<1 month	12 (22.2)	15 (27.8)	0.079 ^x
	1-2 months	24 (44.4)	31 (57.4)	
	>2 month	18 (33.3)	8 (14.8)	
Laterality breast cancer	Rt. side	27 (50)	24 (44.4)	0.750 ^u
	Lt. side	23 (42.6)	27 (50)	
	Bilateral	4 (7.4)	3 (5.6)	
Type of Chemotherapy	Neoadjuvant	20 (37)	21 (38.9)	1.000 ^u
	Adjuvant	34 (63)	33 (61.1)	
Chemotherapy regimen	Dose-dense AC	32 (59.3)	29 (53.7)	0.863 ^x
	Standard AC	6 (11.1)	8 (14.8)	
	TC	7 (13)	9 (16.7)	
	TCH/TCHP	9 (16.7)	8 (14.8)	
Menopausal status	Pre-menopause	36 (66.7)	40 (74.1)	0.608 ^u
	Menopause	6 (11.1)	3 (5.6)	
	Post-menopause	12 (22.2)	11 (20.4)	
Breast cancer stages	Stage I	8 (14.8)	8 (14.8)	0.813 ^x
	Stage II	27 (50)	30 (55.6)	
	Stage III	19 (35.2)	16 (29.6)	

x: Chi-Square test, U: Mann-Whitney U, a: Fisher-Freeman-Halton Exact Test, b: Fisher's Exact Test

Table 2: Comparison of Fatigue and Psychological Distress Mean Score Between Groups

Scales	Groups(54/G)	Baseline (Mean±SD)	t-value	p-value	Post-intervention (Mean±SD)	t-value	p-value
FACIT-F	Control	46.72±3.70	1448.5 U	0.953	26.17±5.22	645 U	<0.001
	Intervention	46.93±3.53			31.24±3.91		
HADS-A	Control	9.17±2.25	1396 U	0.7	9.74±2.83	809 U	<0.001
	Intervention	9.04±2.51			7.24±3.00		
HADS-D	Control	5.56±2.49	1370 U	0.585	8.56±2.92	962.5 U	<0.002
	Intervention	5.76±2.49			6.89±2.66		
HADS-T	Control	14.72±3.61	1454 U	0.98	18.30±4.70	4.386t	<0.001
	Intervention	14.80±4.35			14.13±5.14		

b: Mann-Whitney U, t: t-test for two independent sample

control group mainly presented with right-sided breast cancer compared to left-sided in the intervention group (50 vs. 50%) and mainly had adjuvant chemotherapy (63 vs. 61.1%). The majority of women were on Dose-Dense AC regimen (59.3 vs. 53.7%), Also, most of them were pre-menopause (66.7 vs. 74.1%) and about half of the patients had stage II breast cancer (50 vs. 55.6%). Statistically, there were no significant differences between control and intervention groups for any sociodemographic and clinical characteristic (all $p>0.05$).

Cancer Related-Fatigue and Psychological Distress

Table 2 represent the comparison between the control and intervention groups in relation to fatigue and psychological distress at pre-posttest. At baseline assessment, both control

and intervention groups did not differ statistically (p -value >0.05) among all study outcomes (FACIT-F and HADS). At the post-test, the intervention group significantly showed greater improvement in fatigue total score than the control group ($p<0.001$), since higher FACIT-F scores mean less fatigue. In terms of psychological distress, the subscales' total score, including HADS-A ($p<0.001$), HADS-D ($p<0.002$) and HADS-T ($p<0.001$) significantly demonstrates that the intervention group had much less psychological distress than the control group.

Table 3 illustrated the comparisons of fatigue severity at baseline and post-intervention among groups. At baseline, the majority of participants in the control (85.2%) and intervention (83.3%) groups experienced no or mild fatigue, indicating a similar distribution of participants among

Table 3: Fatigue Severity Comparison Between Groups (FACIT-F)

Scale-time point	Severity	Control (n = 54) F (%)	Intervention (n = 54) F (%)	p-value
FACIT-Fatigue (Baseline- test)	No-mild fatigue	46 (85.2)	45 (83.3)	0.792 ^x
	Moderate fatigue	8 (14.8)	9 (16.7)	
	Severe fatigue	0 (0)	0 (0)	
FACIT-Fatigue (Post-intervention)	No-Mild fatigue	0 (0)	0 (0)	<0.001 ^x
	Moderate fatigue	14 (25.9)	39 (72.2)	
	Severe fatigue	40 (74.1)	15 (27.8)	

χ^2 : Chi-Square test

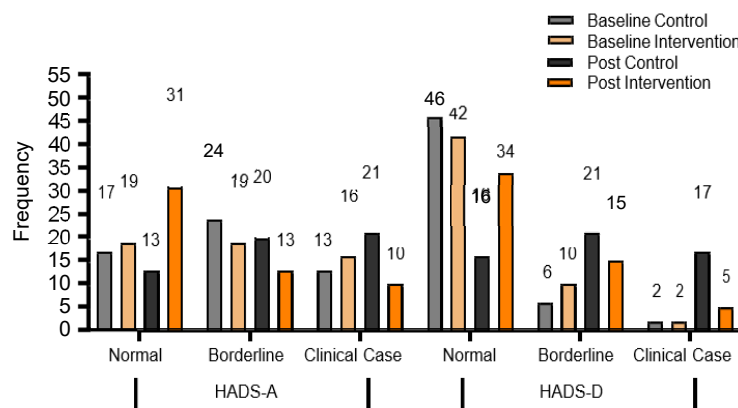


Figure 2: Psychological Distress Severity Comparison Between Groups

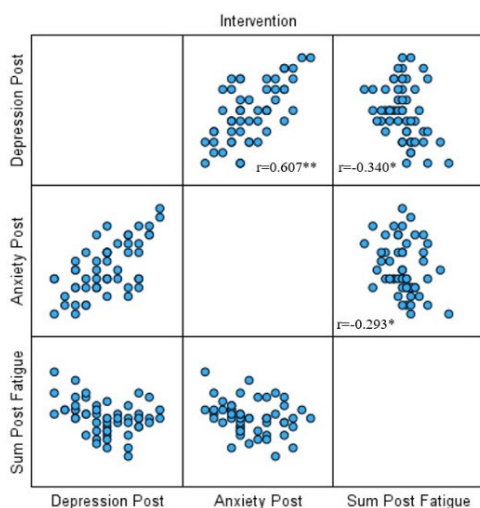


Figure 3: Post-Intervention Correlation Between Fatigue, Anxiety and Depression

groups. Following the post-test, both groups exhibited a significant change in their level of fatigue. Most of the women in the control group (74.1%) reported severe fatigue, while most of the women in the intervention group (72.2%) stated they had moderate fatigue. Statistically, this was a significant result ($p < 0.001$).

Figure 2 demonstrates the changes in the number of participants experiencing anxiety and depression during chemotherapy at two time points.

HADS-Anxiety

At baseline, control and intervention groups showed comparatively similar distributions of having anxiety.

Following post-intervention, the control group distressed over time; normal cases decreased from (17 to 13) and clinical cases increased from (13 to 21). Conversely, the intervention group exhibited positive results. Normal cases rose from (19 to 31) and clinical cases lessened from (16 to 10).

HADS-Depression

At baseline, control and intervention groups showed comparatively similar distributions of having depression. Following post-intervention, both groups showed important increases in depression symptoms, but there was a significant difference between them. The control group exhibited a high decline in normal cases (46 to 16) and a severe rise in clinical cases (2 to 17). Conversely, the intervention group showed a better outcome. Normal cases lessened from (42 to 34) and a mild increase occurred in clinical cases (2-5). These results are consistent with the statistically significant findings presented in Table 2.

Following the post-intervention, the Spearman correlation matrix illustrates a strong positive correlation between anxiety and depression ($\rho = 0.607$, $p < 0.01$) (Figure 3). As well, significant negative correlations were found between fatigue and both anxiety ($\rho = -0.293$, $p < 0.05$) and depression ($\rho = -0.340$, $p < 0.05$) in breast cancer patients.

Association Between Demographic and Clinical Characteristics and the Studied Outcome

Table 4 shows the association between the sample characteristics and the studied outcomes. Clinically, fatigue was significantly worse in patients diagnosed in < 1 month ($p = 0.015$), receiving neoadjuvant chemotherapy ($p = 0.017$) and in patients with a dose-dense AC regimen ($p = 0.003$). In terms of psychological distress, anxiety symptoms were

Table 4: Association Between Demographic and Clinical Characteristic with the Study Outcomes

Demographic and clinical characteristic		Post-Intervention					
		Fatigue		Anxiety		Depression	
Variables	Sub-Groups	Mean±SD	p-value	Mean±SD	p-value	Mean±SD	p-value
Age	<45	30.65±3.53	0.122U	7.65±2.80	0.254t	7.65±2.30	0.016U
	≥ 45	32.04±4.33		6.70±3.24		5.87±2.82	
Marital status	Married	31.36±4.21	0.634t	7.40±2.91	0.362U	6.78±2.53	0.551U
	Unmarried	30.67±1.87		6.44±3.50		7.44±3.36	
Level of education	≤ Secondary	30.81±3.62	0.381U	7.42±3.07	0.586U	7.17±2.82	0.271U
	≥ Institute L.	32.11±4.42		6.89±2.91		6.33±2.28	
Occupation	Employed	31.54±3.60	0.831U	6.69±3.25	0.476U	6.62±2.36	0.737U
	Non-Employed	31.15±4.05		7.41±2.94		6.98±2.77	
Duration of diagnosis	<1month	29.53±2.39	0.015U	6.27±1.98	0.173U	6.33±1.76	0.293U
	≥ 1month	31.90±4.20		7.62±3.26		7.10±2.93	
Laterality breast cancer	Rt. Side	30.96±4.11	0.848K	7.00±3.02	0.049K	6.17±2.35	0.045K
	Lt. side	31.48±3.88		6.96±2.79		7.19±2.76	
	Bilateral	31.33±3.79		11.67±1.16		10.00±1.73	
Type of chemotherapy	Neoadjuvant	29.67±3.57	0.017t	7.24±2.90	0.996t	7.14±2.13	0.581t
	Adjuvant	32.24±3.84		7.24±3.11		6.73±2.97	
Chemotherapy regimen	Dose-Dense AC	30.03±3.51	0.003F	7.52±3.14	0.425K	7.55±2.56	0.039K
	Standard AC	31.88±2.95		7.38±3.38		6.50±1.93	
	TC	35.22±3.93		5.67±2.78		4.56±3.01	
	TCH / TCHP	30.50±3.59		7.88±2.17		7.50±2.00	

t: t-test, U: Mann-Whitney U, F: One-Way ANOVA, K: Kruskal-Wallis H, p-value<0.05: Significant, p-value<0.01: Highly significant, p-value>0.05: Non-Significant

significantly high in patients with bilateral breast lumps ($p = 0.049$). Also, depression symptoms were significantly high in younger patients less than 45 years ($p = 0.016$) who had bilateral breast lumps ($p = 0.045$) and patients who received a dose-dense AC regimen ($p = 0.039$). Overall, no significant relation was found between all demographics (except age), menopausal status and stages of breast cancer (p -value >0.05).

DISCUSSION

Cancer Related-Fatigue

In the present study, chemotherapy-related fatigue showed a consistent pattern during chemotherapy. Post-intervention test, participants from both groups worsened fatigue over time. This point was well mentioned in literature [21], due to the fact that systemic chemotherapy causes notable toxicity and damaging effects on cancer patients. However, the intervention group showed a higher mean score on the FACIT-F compared to the control group, indicating a less fatigue. The significant increase in FACIT-F scores following the intervention is well-documented in the previous published work that discovered that after a structured, personalized nursing education, fatigue levels rose in the control group and reduced in the experimental group over the duration of chemotherapy [22]. Also, numerous studies clearly stated that patients can actively manage their fatigue, rather than just experiencing it, by providing beneficial self-care techniques based on research, such as energy conservation and sleep management [17,23]. Moreover, previously published work indicated that non-pharmacological, behavioral interventions are more effective than pharmacological interventions in the management of cancer-related fatigue [24].

At the individual level, more than half of intervention group reported their fatigue at a moderate level. Conversely,

three- quarters of participants from the control group experienced fatigue at severe level, demonstrating a significant difference in score severity. These outcomes align with the confirmation of the study guideline by Bower *et al.* [25], indicated that psychoeducation and nursing support for CRF in chemotherapy-naïve patients led to markedly reduced fatigue levels in comparison to standard care ($p<0.05$). A trial involving 109 women receiving adjuvant chemotherapy demonstrated more significant increases in FACT-F and Piper fatigue severity scores in the control group immediately following the intervention ($p<0.05$).

Psychological Distress

In term of psychological distress, study population from both group expressed notable symptom of anxiety at baseline test. While, symptom of depression remains it within normal limit as determined by mean score of HADS-A and HADS-D subscale. Following post-intervention, compared to the control group, breast cancer patients from the intervention group demonstrated significantly greater protective effect against anxiety and depression. Multiple studies with similar methodologies have used the HADS to assess psychological distress at two-time interval, before and after chemotherapy. They acknowledged that anxiety symptoms cumulatively rose at the beginning of therapy, while depressive symptoms rose considerably following multiple treatment cycles [26,27]. The protective effect of self-care education will be further clarified by clinical outcomes.

At the individual level, cases in the control group developed significant increase in clinical cases of anxiety and depression symptoms at the end of cycles 4 and 5, respectively. Conversely, the intervention group limited these improvements in clinical anxiety and slight increase in depression symptoms. The our findings align with prior

worldwide data demonstrating a significant prevalence of psychological distress among oncology and hematology patients [9,27]. In a randomized controlled trial on 30 newly diagnosed breast cancer patients undergoing chemotherapy, the study found that pre-chemotherapy education programs led by nurses are significantly beneficial in lowering psychological discomfort in women with intervention group ($p < 0.05$) [28]. Likewise, a quasi-experimental study with a similar design and instrument conducted in 2022 revealed that a self-care education program markedly reduced anxiety and depression ($p < 0.001$) in 246 women with breast cancer over several chemotherapy cycles [29]. A systematic review conducted by the ASCO clinical guideline, which included 17 systematic reviews, meta-analyses and 44 randomized controlled trials, concluded that educational and psychosocial interventions consistently and effectively alleviate anxiety and depression in women with breast cancer, recommending their integration into standard oncology care [30].

In the current study, Spearman correlation reveals significant relationships between post-intervention fatigue and psychological symptoms in breast cancer patients. There is a strong positive correlation between depression and anxiety ($\rho = 0.607$, $p < 0.01$). This outcome is consistent with an earlier study confirming their co-occurrence as a symptom pair in this population [31]. Also, significant negative correlations were found between fatigue and both depression ($\rho = -0.340$, $p < 0.05$) and anxiety ($\rho = -0.293$, $p < 0.05$), indicating that patients experiencing more psychological distress also suffered from elevated fatigue, as the FACIT-F is scored inversely. The bidirectional association has been repeatedly documented in cancer patients undergoing chemotherapy, with previous study revealing that higher HADS-A ($\rho = 0.535$, $p < 0.001$) and depression scores HADS-D ($\rho = 0.556$, $p < 0.001$) were considerably correlated with a higher probability of fatigue [32]. In turn, fatigue, anxiety and depression are all parts of the circle that alter patients' physical, psychological and social lives. Nursing self-care education breaks this pattern by addressing all three at the same time, which is not possible with a single-symptom approach. This phenomenon was well documented by the ESMO guideline, advising that fatigue and emotional distress should concurrently be addressed in combination through physical and psychoeducational intervention [8].

Association Between the Study Variables

Finally, the post-intervention association between the studied outcomes and demographic and clinical factors demonstrate different results. The finding of the current study indicates that fatigue level was significantly elevated in patients who were diagnosed in less than one month and started chemotherapy. A previous study acknowledged that fatigue begins with diagnosis and became more severe along with chemotherapy [8]. This pattern occurs due to cancer

related stress, harsh effect of chemotherapy and lack of adaptation period to stabilize patient physiologically and psychologically.

Our study results also demonstrated that Fatigue level are higher significantly in patients who received neoadjuvant chemotherapy and dose-dense AC regimens. These finding supported by previous study who indicated that fatigue level more severe in patient undergoing neoadjuvant rather than adjuvant chemotherapy [33] and in breast cancer patient on anthracycline-based chemotherapy rather than taxane-only regimen such as TC [34]. Moreover, our results indicate no significant association between fatigue and demographic factor such as age, marital status, number of children, level of education and occupation. In belong to our results, a cross-sectional pilot study revealed that a demographic variable such as marital status, nationality, education, socioeconomic status was not significantly associated with fatigue. While, number of chemotherapy cycle and decreased hemoglobin level are significantly associated with higher level of fatigue [35].

Our results also show a significant relationship between psychological distress and some demographic and clinical characteristics. Being diagnosed with bilateral breast cancer disease, significantly brought patients to felt more anxiety and depression. The best explanation for this is that a patient with bilateral breast cancer causes negative thoughts, including fear of spreading the disease, difficulty of treatment and concern related body image caused by surgery. This finding also reflect the study conducted by Rosenberg *et al.* [36] who reported that young women having thought of a bilateral mastectomy and body image, faced higher anxiety ($p = 0.0001$) and depression ($p < 0.0001$) [36].

CONCLUSIONS

Unfortunately, breast cancer patients under chemotherapy overcome several physical and psychological difficulties. Post-intervention outcomes prove that a nurse-led structured self-care educational program significantly shared in the improvement of fatigue and psychological distress among this population. Considering the clinical effectiveness, practicality and low cost, formal implementation of such programs in outpatient chemotherapy settings will empower patients' self-management against physical and psychological distress and improve quality of life during chemotherapy. Further studies with heterogeneous larger sample sizes and extended follow-up periods are advised.

Limitations

The quasi-experimental study method has several limitations. Introduce selection bias through non-randomization. A small sample size ($n = 108$) and a single hospital limit generalizability. Relying on interview technique may introduce risk and participants' discomfort. Future studies would need to employ randomized controlled designs, larger heterogeneous samples with extended follow-up periods.

Ethical Consideration

This study was received approval from the Institutional Review Board (IRB) Committee at the University of Raparin (No.: 17 Date: 15/08/2024 Reference: 2866/28-S-2023). The IRB confirms that this study from the College of Nursing complies with all relevant ethical guidelines and has no identified legal concerns.

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