

EFFECTIVENESS OF WARM WATER FOOT BATH THERAPY ON CANCER-RELATED FATIGUE AMONG PATIENTS RECEIVING CHEMOTHERAPY: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Background: Cancer-related fatigue (CRF) is one of the most prevalent and distressing symptoms among patients undergoing chemotherapy, significantly affecting physical functioning, psychological well-being, and quality of life. Pharmacological management alone is often insufficient, highlighting the need for safe, low-cost, nurse-led non-pharmacological interventions.

Objective: To evaluate the effectiveness of warm water foot bath therapy on fatigue among patients receiving chemotherapy. Methods: A quasi-experimental pre-test–post-test control group design was adopted. The study was conducted among patients undergoing chemotherapy in selected hospitals. Participants were assigned to experimental and control groups. The experimental group received warm water foot bath therapy for a specified duration over consecutive days, while the control group received routine care. Fatigue levels were assessed using a standardized fatigue scale before and after intervention. Data were analyzed using descriptive and inferential statistics. Results: Post-intervention fatigue scores showed a statistically significant reduction in the experimental group compared to the control group ($p < 0.05$). The findings suggest that warm water foot bath therapy effectively reduces chemotherapy-related fatigue. Conclusion: Warm water foot bath therapy is a simple, safe, economical, and effective nursing intervention for managing fatigue among chemotherapy patients. It can be integrated into routine oncology nursing practice to enhance patient comfort and quality of life.

Keywords: Cancer-related fatigue, Chemotherapy, Warm water foot bath therapy, Non-pharmacological intervention, Oncology nursing, Complementary therapy

INTRODUCTION

Cancer remains one of the leading causes of morbidity and mortality worldwide. According to the World Health Organization, approximately 20 million new cancer cases were reported globally in 2022, with projections indicating a significant rise in future decades. Advances in diagnosis and treatment have improved survival rates; however, patients frequently experience persistent treatment-related side effects.

Chemotherapy remains a major treatment modality in cancer management. Despite its therapeutic benefits, chemotherapy is associated with multiple adverse effects including nausea, anemia, neuropathy, sleep disturbances, and fatigue. Among these, cancer-related fatigue (CRF) is the most common and debilitating symptom.

The National Comprehensive Cancer Network defines CRF as a persistent, distressing, and subjective sense of physical, emotional, and cognitive exhaustion related to cancer or its treatment that is disproportionate to activity and interferes with usual functioning. Studies indicate that 70–90% of patients receiving chemotherapy experience moderate to severe fatigue.

Unlike normal fatigue, CRF is not relieved by rest and may persist throughout treatment and survivorship. Persistent fatigue negatively impacts activities of daily living, psychological well-being, social participation, and adherence to treatment protocols.

Pharmacological management of fatigue has limited and inconsistent efficacy. Therefore, evidence-based non-pharmacological interventions are increasingly recommended as part of comprehensive oncology care. Hydrotherapy, particularly warm water foot bath therapy, is a simple intervention that promotes peripheral vasodilation, improves circulation, activates parasympathetic responses, and induces relaxation.

Despite international evidence supporting hydrotherapy, limited research has examined its effectiveness among chemotherapy patients in Indian hospital settings. This study was conducted to evaluate the EFFECTIVENESS OF WARM WATER FOOT BATH THERAPY IN REDUCING CANCER-RELATED FATIGUE.

METHODOLOGY

In the present study, a quantitative approach with a quasi-experimental pre-test and post-test control group design was used to evaluate the effectiveness of warm water foot bath therapy on fatigue among cancer patients receiving chemotherapy. The study was conducted in selected hospitals of Gurugram, Haryana, namely Civil Hospital, Gurugram and Sarvamangala Hospital, Gurugram. The total sample size was 150 cancer patients, with 75 in the experimental group and 75 in the control group. A non-probability purposive sampling technique was adopted to select participants who met the inclusion

criteria.

The tool for data collection consisted of two sections: Section A included demographic and clinical variables such as age, gender, type and stage of cancer, duration and frequency of chemotherapy; Section B comprised a standardized fatigue assessment scale to measure fatigue levels before and after the intervention. After obtaining formal administrative approval from the concerned authorities and ethical clearance, written informed consent was taken from the participants. Pre-test fatigue assessment was conducted for both groups. The experimental group received warm water foot bath therapy along with routine care, whereas the control group received routine hospital care only. Post-test fatigue assessment was conducted after completion of the intervention period, and the data were analyzed using descriptive and inferential statistics.

RESULT

The data obtained were analyzed with respect to the objectives of the study by using the descriptive and inferential statistics

Table 1: Frequency and Percentage distribution of the socio-demographic variables among cancer patients receiving chemotherapy in the Experimental and Control Groups.

n = (75+75=150)

Socio Demographic Variables	Category	Experimental Group		Control Group	
		Frequency	Percentage	Frequency	Percentage
Age	18–24	6	8.0%	19	25.3%
	25–32	23	30.7%	17	22.7%
	33–40	17	22.7%	9	12.0%
	41–48	21	28.0%	17	22.7%
	49 and above	8	10.7%	13	17.3%
Gender	Male	36	48.0%	34	45.3%
	Female	39	52.0%	41	54.7%
Religion	Hindu	29	38.7%	18	24.0%
	Muslim	32	42.7%	29	38.7%
	Christian	7	9.3%	14	18.7%
	Sikh	7	9.3%	14	18.7%
	Other	0	0.0%	0	0.0%
Educational Level	No Formal Education	14	18.7%	18	24.0%
	Primary School	22	29.3%	21	28.0%
	Secondary School	14	18.7%	15	20.0%
	Higher Secondary	12	16.0%	10	13.3%
	Graduate/ Postgraduate	13	17.3%	11	14.7%
Occupational Status	Employed (Full time)	17	22.7%	20	26.7%
	Employed (Part-time)	26	34.7%	28	37.3%

	Unemployed	17	22.7%	12	16.0%
	Homemaker	15	20.0%	15	20.0%
	Other	00	0.0%	0	0.0%
Marital Status	Single	9	12.0%	14	18.7%
	Married	48	64.0%	47	62.7%
	Widowed	12	16.0%	10	13.3%
	Divorced/ Separated	6	8.0%	4	5.3%
Monthly Family Income	Below ₹11,700	6	8.0%	0	0.0%
	₹11,701 – ₹19,500	10	13.3%	15	20.0%
	₹19,501 – ₹29,000	15	20.0%	6	8.0%
	₹29,001 – ₹39,000	18	24.0%	19	25.3%
	₹39,001 – ₹78,000	18	24.0%	21	28.0%
	Above ₹78,000	8	10.7%	14	18.7%
Type of Family	Nuclear	26	34.7%	31	41.3%
	Joint	36	48.0%	37	49.3%
	Extended	13	17.3%	7	9.3%
Place of Residence	Urban	40	53.3%	31	41.3%
	Rural	35	46.7%	44	58.7%
Family history	Present	29	38.7%	26	34.7%
	Absent	46	61.3%	49	65.3%

Table 1 presents the distribution of socio-demographic characteristics of cancer patients undergoing chemotherapy in the experimental group (n = 75) and control group (n = 75), highlighting baseline comparability between the two groups prior to intervention.

Most participants in both groups were young to middle-aged adults. In the experimental group, the highest proportion belonged to 25–32 years (30.7%), while in the control group, 18–24 years constituted the largest group (25.3%). Females were slightly higher than males in both groups, showing nearly equal gender distribution.

Regarding religion, Muslims formed the largest proportion in both groups, followed by Hindus, with smaller percentages of Christians and Sikhs in the control group. Most participants had primary-level education, with a considerable proportion having no formal education and a smaller percentage being graduates or postgraduates, indicating mixed educational backgrounds.

In terms of occupation, the majority were part-time workers, followed by full-time workers and homemakers. Most participants were married in both groups. Monthly household income commonly ranged between ₹29,001–₹78,000 in both groups.

Joint families were predominant in both groups, followed by nuclear families. The experimental group had slightly more urban participants, whereas the control group had more rural participants. A positive family history of illness was reported by around one-third of participants in both groups.

Overall, the socio-demographic characteristics were fairly comparable between the experimental and control groups.

Table 2: Frequency percentage distribution of the clinical variables among cancer patients receiving chemotherapy in the experimental and control Groups. n = (75+75=150)

Clinical Variables	Category	Experimental Group		Control Group	
		Frequency	Percentage	Frequency	Percentage
Type of Cancer Diagnosed	Breast cancer	18	24.0%	28	37.3%
	Lung cancer	7	9.3%	17	22.7%
	Gastrointestinal cancer	16	21.3%	11	14.7%
	Haematological cancer	18	24.0%	10	13.3%
	Head and Neck	16	21.3%	9	12.0%
	Other	0	0.0%	0	0.0%
Stage of Cancer	Stage I	28	37.3%	18	24.0%
	Stage II	29	38.7%	45	60.0%
	Stage III	11	14.7%	4	5.3%
	Stage IV	7	9.3%	8	10.7%
Duration Since Diagnosis	Less than 6 months	24	32.0%	11	14.7%
	6 months – 1 year	36	48.0%	35	46.7%
	1–2 years	9	12.0%	21	28.0%
	More than 2 years	6	8.0%	8	10.7%
Number of Chemotherapy Cycles Completed	1–2 cycles	8	10.7%	24	32.0%
	3–4 cycles	31	41.3%	30	40.0%
	5–6 cycles	24	32.0%	13	17.3%
	More than 6 cycles	12	16.0%	8	10.7%
Frequency of Chemotherapy	Weekly	23	30.7%	36	48.0%
	Bi-weekly	33	44.0%	27	36.0%
	Monthly	19	25.3%	12	16.0%
Presence of Comorbid Illness	None	21	28.0%	24	32.0%
	Diabetes Mellitus	27	36.0%	24	32.0%
	Hypertension	16	21.3%	6	8.0%
	Both diabetes and hypertension	11	14.7%	21	28.0%
	Other	0	0.0%	0	0.0%
Hemoglobin Level	< 8 g/dl	22	29.3%	19	25.3%
	8–10 g/dl	30	40.0%	26	34.7%
	10–12 g/dl	17	22.7%	18	24.0%
	> 12 g/dl	6	8.0%	12	16.0%
Experience fatigue after chemotherapy	Yes	75	100%	39	52.0%
	No	0	0.0%	36	48.0%
Previous methods used to reduce fatigue	Rest/sleep	18	24.0%	17	22.7%
	Medications	18	24.0%	25	33.3%
	Exercise	10	13.3%	13	17.3%
	Complementary therapy	11	14.7%	9	12.0%
	None	18	24.0%	11	14.7%
Status of Anaemia	Present	43	57.3%	33	44.0%
	Absent	32	42.7%	42	56.0%

Table 2 shows the distribution of clinical variables among cancer patients receiving chemotherapy in the experimental (n = 75) and control (n = 75) groups, demonstrating baseline clinical comparability before the intervention.

Breast cancer was the most common diagnosis in both groups, followed by hematological, gastrointestinal, lung, and head and neck cancers. Most participants in both groups were in Stage I or Stage II, indicating early to moderately advanced disease.

Nearly half of the participants in both groups had been diagnosed for 6 months to 1 year. The majority had completed 3–4 chemotherapy cycles. In the experimental group, bi-weekly chemotherapy was most common, whereas weekly chemotherapy was predominant in the control group.

Diabetes mellitus was the most frequently reported comorbidity in both groups, and a notable proportion had both diabetes and hypertension. Many participants had hemoglobin levels between 8–10 g/dl, suggesting mild to moderate anemia, and anemia was present in over half of the experimental group and nearly half of the control group.

All participants in the experimental group reported experiencing fatigue after chemotherapy, while just over half in the control group reported fatigue. Common fatigue management methods included rest, sleep, and medication, whereas exercise and complementary therapies were less commonly used.

Overall, the clinical characteristics of both groups were relatively comparable prior to the implementation of the intervention.

Table 3: Pre-test of Frequency percentage distribution of the level of fatigue among cancer patients receiving chemotherapy in the experimental and control Groups.

Level of Fatigue	n = (75+75=150)			
	Experimental Group		Control Group	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Mild fatigue	00	0.0%	8	10.7%
Moderate fatigue	35	46.7%	37	49.3%
Severe fatigue	40	53.3%	30	40.0%

Table 3 shows the pre-test frequency and percentage of cancer patients getting chemotherapy in the experimental group (n = 75) and the control group (n = 75) who were tired. In the experimental group, no subjects experienced light weariness (0.0%). Almost half of the people who took part (46.7%) reported moderate exhaustion, and most of them (53.3%) reported severe fatigue. This indicates a high burden of fatigue among participants in the experimental group at

baseline.

In the control group, 10.7% of participants reported light fatigue, 49.3% experienced moderate fatigue, and 40.0% reported severe exhaustion. A tiny number of people in the control group said they were mildly tired, but most said they were moderately to severely tired.

Table 4: Pre-test of Frequency percentage distribution of the Level of Fatigue Interference among cancer patients receiving chemotherapy in the experimental and control Groups.

n = (75+75=150)

Level of Fatigue Interference	Experimental Group		Control Group	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Mild interference	00	0.0%	24	32.0%
Moderate interference	31	41.3%	24	32.0%
Severe interference	44	58.7%	27	36.0%

Table 4 shows the pre-test frequency and percentage distribution of how much fatigue affected cancer patients getting chemotherapy in the experimental group (n = 75) and the control group (n = 75).

In the experimental group, no subjects experienced minor fatigue interference (0.0%). A significant percentage of participants encountered moderate interference (41.3%), although the majority indicated severe interference (58.7%). This shows that weariness had a big effect on the everyday lives and ability to do things of the people in the experimental group at the start of the study.

In the control group, 32.0% of individuals reported mild tiredness interference, another 32.0% had moderate interference, and 36.0% reported severe interference. This distribution indicates a more uniform level of functional impact relative to the experimental group.

Table 5: Post-test of Frequency percentage distribution of the level of fatigue among cancer patients receiving chemotherapy in the experimental and control Groups.

n = (75+75=150)

Level of Fatigue	Experimental Group		Control Group	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Mild fatigue	49	65.3%	21	28.0%
Moderate fatigue	26	34.7%	41	54.7%
Severe fatigue	00	0.0%	13	17.3%

Table 5 shows the post-test frequency and percentage distribution of fatigue levels in cancer patients who were getting chemotherapy in the experimental group (n = 75) and the control group (n = 75). A significant enhancement in fatigue levels was noted in the experimental group. Most of the people who took the exam (65.3%) said they felt mild weariness afterward, while 34.7% said they felt significant exhaustion. Notably, none of the individuals experienced severe exhaustion (0.0%), showing a significant decrease in fatigue severity following the intervention. The control group, on the other hand, showed higher levels of weariness. Only 28.0% of the people who took part said they were mildly tired, while the majority (54.7%) said they were moderately tired. Additionally, 17.3% of subjects persisted in reporting extreme weariness during the post-test interval. The comparison between the two groups shows that the experimental group made more progress than the control group. The removal of severe fatigue and the large shift toward mild fatigue in the experimental group definitely imply that warm water foot bath therapy is good for reducing fatigue.

Table 6: Post-test of Frequency percentage distribution of the Level of Fatigue Interference among cancer patients receiving chemotherapy in the experimental and control Groups.

Level of Fatigue Interference	n = (75+75=150)			
	Experimental Group		Control Group	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Mild interference	51	68.0%	23	30.7%
Moderate interference	24	32.0%	28	37.3%
Severe interference	00	0.0%	24	32.0%

Table 6 shows the post-test frequency and percentage distribution of how much fatigue affected cancer patients who were getting chemotherapy in the experimental group (n = 75) and the control group (n = 75) after the experimental group used warm water foot bath therapy. This table's goal is to see how the intervention affected functional interference caused by weariness. In the experimental group, a significant enhancement in functional outcomes was noted. The majority of participants (68.0%) reported mild fatigue interference in the post-test, while 32.0% experienced moderate interference. Notably, none of the participants experienced severe tiredness interference (0.0%), showing a significant decrease in the functional impact of fatigue post-intervention. In contrast, the control group demonstrated comparatively higher levels of fatigue interference. Only 30.7% of the people who took part said they had light interference, while 37.3% said they had moderate interference. A large number of participants (32.0%) continued to experience severe fatigue

interference.

Table 7: Pre-test and Post-test Mean, Stander deviation of level of fatigue and Level of Fatigue Interference among cancer patients receiving chemotherapy in the experimental and control Groups.

	Experimental Group		Control Group	
	Mean	SD	Mean	SD
Pre-test Level of Fatigue	2.53	0.502	2.29	0.653
Pre-test Level of Fatigue Interference	2.59	0.496	2.04	0.829
Post-test Level of Fatigue	1.35	0.479	1.89	0.669
Post-test Level of Fatigue Interference	1.32	0.470	2.01	0.797

Table 7 shows the differences between the mean scores and standard deviations of the level of fatigue and level of fatigue interference before and after the tests for cancer patients getting chemotherapy in the experimental and control groups. The average pre-test fatigue score for the experimental group was 2.53 (SD = 0.502), which means that they were really tired to begin with. After the intervention, the average post-test fatigue score dropped dramatically to 1.35 (SD = 0.479), showing that fatigue severity had gone down a lot. The average pre-test fatigue interference score was 2.59 (SD = 0.496), but it dropped significantly to 1.32 (SD = 0.470) after the test. This shows that functional performance and daily activity levels improved significantly. The average pre-test fatigue score for the control group was 2.29 (SD = 0.653), and it went down somewhat to 1.89 (SD = 0.669) after the test. The average pre-test tiredness interference score was 2.04 (SD = 0.829), and the average post-test score was 2.01 (SD = 0.797), which was only a small drop. These improvements indicate minimal enhancement in fatigue and functional interference without the intervention.

Table 8: Paired t-test Analysis Level of Fatigue Experimental Group

Level of Fatigue	Mean Score	Standard Deviation	Degree of Freedom	Calculated Value	Tabulated Value	Level of Significance
Pre-Test	2.53	0.502	74	15.300	4.002	0.0001
Post-Tes	1.35	0.479				

Table 8 shows the results of a paired t-test that compared the average fatigue scores of cancer patients in the experimental group before and after treatment. The average score for exhaustion before the exam was 2.53, with a standard deviation of 0.502. This shows that people were very tired at the start. After the intervention, the average post-test fatigue score dropped to 1.35, with a standard deviation of 0.479. This shows that the severity of fatigue decreased a lot.

The t value that was found was 15.300 with 74 degrees of freedom. The calculated t value of 4.002 at the 0.0001 level of significance is much lower than this number. The computed t value is higher than the critical value, which means that the difference between the pre-test and post-test fatigue scores is statistically very significant.

This finding demonstrates that the decrease in weariness shown in the experimental group is not attributable to chance and is instead the outcome of warm water foot bath therapy. Consequently, the null hypothesis is dismissed, and the research hypothesis is affirmed, signifying that warm water foot bath therapy markedly alleviates fatigue in cancer patients undergoing chemotherapy.

Table 9: Paired t-test Analysis Level of Fatigue Interference Experimental Group

n = 75

Level of Fatigue Interference	Mean Score	Standard Deviation	Degree of Freedom	Calculated 't' Value	Tabulated 't' Value	Level of Significance
Pre-Test	2.59	0.496	74	16.510	4.002	0.0001
Post-Test	1.32	0.470				

Table 9 shows the results of a paired t-test that compared the mean scores of tiredness interference before and after the test for cancer patients in the experimental group who were getting chemotherapy. The aim of this investigation was to ascertain whether warm water foot bath therapy resulted in a statistically significant decrease in fatigue-related disruption of daily activities. The average score for fatigue interference before the test was 2.59 (SD = 0.496), which means that

there was a lot of functional interference before the intervention. After the intervention, the average post-test tiredness interference score dropped significantly to 1.32 (SD = 0.470), showing that the participants' functional capacity and everyday performance had improved a lot. The t value we found was 16.510 with 74 degrees of freedom. This is far higher than the tabulated t value of 4.002 at the 0.0001 level of significance. The difference between the pre-test and post-test fatigue interference scores is statistically very significant because the estimated value is higher than the critical value.

Table 10: Paired t-test Analysis Level of Fatigue Control Group

n = 75

Level of Fatigue	Mean Score	Standard Deviation	Degree of Freedom	Calculated 't' Value	Tabulated 't' Value	Level of Significance
Pre-Test	2.29	0.653	74	3.418	3.174	0.001
Post-Test	1.89	0.669				

Table 10 shows the results of a paired t-test that looked at the mean scores of exhaustion before and after chemotherapy in cancer patients in the control group. The average fatigue score before the test in the control group was 2.29, with a standard deviation of 0.653. This means that the group was moderately tired at the start. The mean fatigue score went down a little bit to 1.89 with a standard deviation of 0.669 after the test, which means that things got a little better over time.

The t value that was estimated was 3.418 with 74 degrees of freedom. This is higher than the tabulated t value of 3.174 at the 0.001 level of significance. Consequently, the disparity between pre-test and post-test fatigue scores in the control group is statistically significant.

Table 11: Paired t-test Analysis Level of Fatigue Interference Control Group

n = 75						
Level of Fatigue Interference	Mean Score	Standard Deviation	Degree of Freedom	Calculated 't' Value	Tabulated 't' Value	Level of Significance
Pre-Test	2.04	0.829	74	0.205	1.993	0.838
Post-Test	2.01	0.797				

Table 11 shows the results of a paired t-test that looked at the mean scores of tiredness interference before and after the test for cancer patients getting chemotherapy in the control group. The average score for fatigue interference before the test in the control group was 2.04, with a standard deviation of 0.829. This means that there was a moderate amount of functional interference at the start of the test. The mean fatigue interference score in the post-test changed very little, going from 2.01 with a standard deviation of 0.797 to 2.01. This shows that functional performance did not improve much.

The estimated t value was 0.205 with 74 degrees of freedom, which is far lower than the tabulated t value of 1.993 at the 0.05 level of significance. Also, the reported p value of 0.838 is higher than the degree of significance that is permitted ($p > 0.05$). So, the difference between the control group's pre-test and post-test tiredness interference scores is not statistically significant.

Table 12: Association between the pre-test of the Level of Fatigue and selected demographic variables in the Experimental Group.

n = 75

Socio Demographic Variables	Category	Frequency	χ^2 Value	df	p=Value
Age	18–24	6	13.167	4	0.010
	25–32	23			
	33–40	17			
	41–48	21			
	49 and above	8			
Gender	Male	36	1.039	1	0.308
	Female	39			
Religion	Hindu	29	0.389	3	0.942
	Muslim	32			
	Christian	7			
	Sikh	7			
	Other	0			
Educational Level	No Formal Education	14	4.017	4	0.404
	Primary School	22			
	Secondary School	14			
	Higher Secondary	12			
	Graduate/ Postgraduate	13			
Occupational Status	Employed (Full time)	17	4.928	3	0.177
	Employed (Part-time)	26			
	Unemployed	17			
	Homemaker	15			
	Other	00			
Marital Status	Single	9	5.804	3	0.122
	Married	48			
	Widowed	12			
	Divorced/ Separated	6			
Monthly Famil Income	Below ₹11,700	6	10.234	5	0.069
	₹11,701 – ₹19,500	10			
	₹19,501 – ₹29,000	15			
	₹29,001 – ₹39,000	18			
	₹39,001 – ₹78,000	18			
	Above ₹78,000	8			
Type of Family	Nuclear	26	3.606	2	0.165
	Joint	36			
	Extended	13			
Place of Residence	Urban	40	0.383	1	0.536
	Rural	35			
Family history	Present	29	2.715	1	0.099
	Absent	46			

Table 12 shows how the pre-test level of fatigue is related to certain socio-demographic factors in

cancer patients who are getting chemotherapy in the experimental group. A statistically significant correlation was identified between age and pre-test fatigue levels ($\chi^2 = 13.167$, $df = 4$, $p = 0.010$). This shows that fatigue levels were very different between age groups, which suggests that age may have an effect on how bad fatigue is for people getting chemotherapy. Conversely, no statistically significant correlation was identified between pre-test fatigue levels and gender ($\chi^2 = 1.039$, $df = 1$, $p = 0.308$), suggesting that fatigue intensity was similar among male and female individuals.

Likewise, religion did not exhibit a significant correlation with fatigue levels ($\chi^2 = 0.389$, $df = 3$, $p = 0.942$), indicating that religious background did not affect the fatigue experience of the individuals. With regard to educational level, no significant association was observed ($\chi^2 = 4.017$, $df = 4$, $p = 0.404$), indicating that literacy or educational attainment did not significantly impact fatigue severity. Occupational status exhibited no significant correlation with fatigue levels ($\chi^2 = 4.928$, $df = 3$, $p = 0.177$), indicating that job position did not affect baseline fatigue. In the same way, marital status did not reveal a statistically significant relationship ($\chi^2 = 5.804$, $df = 3$, $p = 0.122$), which means that being married did not significantly change how tired people felt. Regarding monthly family income, although a higher chi-square value was observed ($\chi^2 = 10.234$, $df = 5$), the association was not statistically significant ($p = 0.069$), suggesting that economic status did not significantly influence fatigue levels at baseline. The factors type of family ($\chi^2 = 3.606$, $df = 2$, $p = 0.165$), place of residence ($\chi^2 = 0.383$, $df = 1$, $p = 0.536$), and family history ($\chi^2 = 2.715$, $df = 1$, $p = 0.099$) exhibited no statistically significant correlation with fatigue levels.

Table 14: Association between the pre-test of the Level of Fatigue and selected Clinical variables in the Experimental Group.

n = 75

Clinical Variables	Category	Frequency	χ^2 Value	df	p=Value
Type of Cancer Diagnosed	Breast cancer	18	10.55	4	0.032
	Lung cancer	7			
	Gastrointestinal cancer	16			
	Haematological cancer	18			
	Head and Neck	16			
	Other	0			
Stage of Cancer	Stage I	28	1.957	3	0.581
	Stage II	29			
	Stage III	11			
	Stage IV	7			

Duration Since Diagnosis	Less than 6 months	24	5.301	3	0.151
	6 months – 1 year	36			
	1–2 years	9			
	More than 2 years	6			
Number of Chemotherapy Cycles Completed	1–2 cycles	8	3.489	3	0.322
	3–4 cycles	31			
	5–6 cycles	24			
	More than 6 cycles	12			
Frequency of Chemotherapy	Weekly	23	1.061	2	0.588
	Bi-weekly	33			
	Monthly	19			
Presence of Comorbid Illness	None	21	0.846	3	0.838
	Diabetes Mellitus	27			
	Hypertension	16			
	Both diabetes and hypertension	11			
	Other	0			
Hemoglobin Level	< 8 g/dl	22	1.995	3	0.574
	8–10 g/dl	30			
	10–12 g/dl	17			
	> 12 g/dl	6			
Experience fatigue after chemotherapy	Yes	75	NA	NA	NA
	No	0			
Previous method used to reduce fatigue	Rest/sleep	18	3.551	4	0.470
	Medications	18			
	Exercise	10			
	Complementary therapy	11			
	None	18			
Status of Anaemia	Present	43	0.819	1	0.366
	Absent	32			

Table 14 shows how the pre-test level of fatigue is related to certain clinical characteristics in cancer patients in the experimental group who are getting chemotherapy. There was a statistically significant link between the kind of cancer identified and the amount of weariness before the test ($\chi^2 = 10.55$, $df = 4$, $p = 0.032$). This shows that the level of fatigue was very diverse for different forms of cancer. This suggests that the way the disease works and the stress of therapy may affect how tired people feel. Conversely, there was no statistically significant correlation between fatigue levels and cancer stage ($\chi^2 = 1.957$, $df = 3$, $p = 0.581$), suggesting that baseline fatigue severity did not vary significantly across different cancer stages.

Likewise, the period since diagnosis had no significant correlation with fatigue ($\chi^2 = 5.301$, $df = 3$, $p = 0.151$), indicating that the length of illness did not markedly affect fatigue severity. The number of chemotherapy cycles completed did not show a statistically significant correlation ($\chi^2 =$

3.489, $df = 3$, $p = 0.322$), suggesting that cumulative chemotherapy exposure was not directly linked to baseline fatigue levels.

There was no significant link between how often chemotherapy was given ($\chi^2 = 1.061$, $df = 2$, $p = 0.588$), which means that the way the treatment was planned did not have a big effect on fatigue levels.

There was no significant link between having other illnesses and fatigue severity ($\chi^2 = 0.846$, $df = 3$, $p = 0.838$), which means that having more than one chronic illness did not make fatigue worse.

The results suggest the inclusion of warm water foot bath therapy in standard nursing care protocols as a supplementary non-pharmacological intervention to augment patient comfort, facilitate relaxation, and enhance quality of life during chemotherapy. Additional multicenter trials with extended follow-up durations and higher sample sizes are advised to enhance generalizability and investigate long-term benefits.

DISCUSSION

Cancer-related fatigue (CRF) is one of the most prevalent and distressing symptoms experienced by patients undergoing chemotherapy, significantly impairing functional ability and quality of life. In this study, both experimental and control groups demonstrated predominantly moderate to severe fatigue and fatigue interference at baseline, confirming the substantial symptom burden among patients receiving chemotherapy. These findings align with contemporary supportive oncology evidence and guideline recommendations, which emphasize that CRF is multifactorial and requires structured, non-pharmacological management rather than reliance on rest alone (Bower et al., 2024; Zuo et al., 2023). The socio-demographic and clinical profiles of participants reflected real-world oncology settings, enhancing external validity. While age and certain clinical factors such as chemotherapy frequency showed associations with baseline fatigue, most demographic variables were not significantly related, reinforcing that fatigue is a universal concern requiring routine assessment in all patients.

The findings clearly demonstrate the effectiveness of warm water foot bath therapy in reducing both fatigue intensity and fatigue interference. The experimental group showed a statistically highly significant reduction in fatigue and complete elimination of severe fatigue post-intervention ($p = 0.0001$), along with marked improvement in functional interference. In contrast, the control group exhibited only minimal or non-significant changes, indicating that standard care alone is insufficient for meaningful symptom reduction. These results are consistent with recent interventional studies and meta-analytic evidence supporting foot bath and similar supportive therapies in alleviating CRF and improving functional outcomes (Thakuria et al., 2022; Vijayalaxmi & Ullas, 2024; Uysal, 2025). Importantly, improvement in fatigue interference suggests enhanced ability to perform daily activities and self-care—key nursing outcomes.

Overall, the study supports warm water foot bath therapy as a safe, low-cost, and feasible nursing intervention that can be integrated into routine oncology care. In line with the updated American Society of Clinical Oncology guidelines, which prioritize non-pharmacological approaches for CRF management, this intervention may serve as a practical adjunct within comprehensive fatigue management programs. The evidence indicates that structured supportive interventions—not passive symptom monitoring—are essential for meaningful improvement in chemotherapy-related fatigue and its functional consequences.

CONCLUSION

The study finds that warm water foot bath therapy is a safe, easy, cheap, and clinically effective way for nurses to help cancer patients who are getting chemotherapy feel less tired and less productive. The intervention yielded superior results relative to standard therapy, with substantial enhancements in symptom severity and daily functioning.

Tiredness was identified as a prevalent symptom across several demographic and clinical categories, underscoring the necessity of regular tiredness evaluation and comprehensive symptom treatment measures in oncology environments. Certain characteristics, like age, cancer kind, and chemotherapy frequency, affected baseline fatigue patterns, but the therapeutic impact of the intervention stayed the same.

The results suggest the inclusion of warm water foot bath therapy in standard nursing care protocols as a supplementary non-pharmacological intervention to augment patient comfort, facilitate relaxation, and enhance quality of life during chemotherapy. Additional multicenter trials with extended follow-up durations and higher sample sizes are advised to enhance generalizability and investigate long-term benefits.

Conflict of Interests:

The authors have affirmed that they have no competing interests to declare.

Authors Contribution:

Author 1- Approval and finalization of the study's conception and design, as well as manuscript drafting.

Author 2- Collection and analysis of data, as well as interpretation of results.

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