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EFFECT OF SWEDISH MASSAGE THERAPY ON CANCER-RELATED FATIGUE IN CHEMOTHERAPY PATIENTS

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ABSTRACT:

Cancer-related fatigue is one of the most common and debilitating symptoms affecting most patients at some point during their cancer journey and it can persist long after treatment is completed. Swedish massage therapy is one of the complementary treatment options that plays an important role in treating cancer-related fatigue in chemotherapy patients. **Aim:** To investigate the effect of Swedish massage therapy on cancer-related fatigue in chemotherapy patients. **Design:** A quasi-experimental research design was utilized to investigate the efficacy of Swedish massage therapy. **Setting:** The study was conducted at the outpatient oncology clinic at Minia University Hospital**. Sample:** A purposeful sample of 60 male and female adults patients was recruited for a control and study group. **Tools**: Data collection tool included the Structured Interview Questionnaire and the Brief Fatigue Inventory scale (BFI). **Results:** The study revealed that there was a significant decreases in the level of fatigue mean scores among the study group after implementing the Swedish massage therapy. **Conclusion:** Based on the result, Swedish massage therapy was found to have a positive effect on reducing cancer-related fatigue intensity among the studied patients compared to the control group. **Recommendations:** The outcomes of this study show the value of including Swedish massage therapy as a complementary method and an integral part of oncology management by certified oncology nurses, who play a critical role in cancer treatment and care.

Keywords: Swedish massage therapy**,** Cancer – related fatigue, Chemotherapy.

INTRODUCTION

Cancer is a group of diseases that affect any region of the body when cells start to grow out of control. Chemotherapy is regarded as the cornerstone of the cancer treatment; despite the fact that it may produce a variety of adverse effects. These effects will vary depending on the dosages and combinations of the prescribed drugs. [1-2]Cancer-related fatigue (CRF) is a complex condition that affects many cancer patients and is often associated with pain, insomnia, anxiety, and distress.[3- 4]Furthermore, CRF is considered one of the most widespread and irritating side effects of cancer treatment modalities, with 70-100% of the survivor's reporting.[5- 6]

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CRF is estimated to occur in 30% to 91% of patients receiving chemotherapeutic intervention, 25% to 83% of patients receiving radiation therapy, and 59% to 83% of patients undergoing chemo-radiation therapy. It may even last for years after treatment cessation. [7]In fact, when patients were asked about the most bothersome adverse effects of chemotherapy, nausea ranked first (34%), then fatigue (18%), and finally hair loss (11%). Fatigue came out on the top when asked which side effect had the greatest effect on the patient's life after completion of therapy, with 54% reporting fatigue that persisted more than 2 weeks after treatment and may lasted up to a year in many cancer survivors.[8- 9]

CRF is commonly defined as a self-recognized subjective phenomenon that manifests as a feeling of exhaustion or lack of energy that varies in frequency, intensity and duration. Excessive and persistent exhaustion, as well as distressing, subjective experience of physical, emotional, and/or cognitive tiredness that can impair activities of daily living and physical function.[4,10-11]Effective management for patients is crucial to provide comfort, prevent complications, and boost recovery.[12]On the other hand, managing CRF requires a collaborative effort from all healthcare professionals, including doctors, qualified oncology nurses, caseworkers, physiotherapists, cancer rehabilitation specialists, dietitians, and mental health professionals.[13]

Pharmacological and non-pharmacological therapies are used as CRF management strategies. Several systematic studies have found that the efficacy of pharmacologic regimens is shown to be limited, while non-pharmacologic approaches, both alone and in combination with specific pharmacological therapy are effective in decreasing CRF. [14]The related variables, including as anemia, pain, sleeplessness, and emotional distress or depression, constitute the foundation of CRF pharmaceutical therapies. On the other hand, non-pharmacological therapies include a wide range of techniques that are relatively easy, non-invasive, inexpensive, and no special equipment is required. [15]Exercise; patients and family education, counseling, and self-care measures; and cognitive-behavioral therapies for the distress that may worsen fatigue are examples of non-pharmacological strategies. [16]

The use of complementary and alternative medicines to relieve disease symptoms, lessen the side effects of traditional treatments, and improve overall well-being and quality of life is recommended by national and worldwide cancer specialists and organizations for the management of CRF. Among the complementary and alternative medicine approaches include acupuncture, morning exposure to bright light, massage, biofield therapies such asmoxibustion, qigong, tai chi, herbal remedies, and nutritional supplements. Massage therapy is one of the most effective non-pharmacologic interventions for CRF. It could be incorporated into routine nursing tasks. [17]Swedish massage therapy and aromatherapy massage are the most commonly used complementary therapies in the National Health Service of the United Kingdom. [18-19]

Swedish massage therapy is defined as systematic manipulation of the soft tissues of the body by rubbing, kneading, pressing, and rolling in order to improve local circulation,

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reduce muscle tension, promote muscle relaxation and produce emotional and psychological effect.[20 -22]Swedish massage, on the other hand, involves effleurage, petrissage, and friction, which are methods used to relieve muscles tension and promote lymphatic vessels drainage.[4]Oncology nurses are the healthcare providers who have regular contact and play a key role in the management of CRF using massage therapy. Additionally, qualified nurses are expected to take effective actions in assessing the benefit of massage therapy, discussing the option with patients, and providing massage therapy to improve survival and quality of life.

The investigators noticed that fatigue are common in the clinical practice, especially in the days following chemotherapy, and that prescribed pain killers were ineffective in alleviating CRF completely. In addition, there is a noticeable lack of knowledge about the effects of Swedish massage therapy on oncology patients undergoing chemotherapy. As a result, it was worthwhile to determine how Swedish massage therapy affected CRF alleviation in order to create evidence of its effectiveness and safety, especially for cancer patients. Therefore, the current study aimed to investigate the effect of Swedish massage therapy on cancer-related fatigue in chemotherapy patients.

MATERIALS AND METHODS

Aim:

The aim of the current study was to investigate the effect of Swedish massage therapy on cancer-related fatigue in chemotherapy patients.

Research Hypothesis:

The following research hypothesis was developed: The study group receiving Swedish massage therapy before, during, and after completion of chemotherapy would have a lower mean score of cancer-related fatigue than the control group, as measured by a brief fatigue inventory scale.

Theoretical Framework:

Massage therapy is frequently utilized to treat patients with different conditions. According to reports, massage therapy acts by improving circulation and lymphatic flow, this may help to accelerate the elimination of catabolites which possibly reduces the sensation of fatigue. [23]Pain reduction is another benefit of massage treatment. Based on the gate-theory (GCT), developed by Melzack and Wall (1965), the mechanical stimulus caused by manual contact on the skin may have a neurological effect and blocking the noxious stimuli of pain. [24] According to this theory, GCT stipulates that massage provides stimulation that blocks or disrupts pain signals delivered to the brain. Another possibility is that massage stimulate the production of chemical substances in the body such as serotonin, which inhibits the transmission of noxious nerve signals to the brain, or releasing endorphins that promote a feeling of well-being and relax the body .[25-26]

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Design:

A quasi-experimental study design was utilized. This design is appropriate to evaluate the effect of Swedish massage therapy on cancer-related fatigue among chemotherapy patients. It is a method for assessing the effect of an intervention by comparing scores on a variable before and after intervention. [27-28]

Setting:

The current study was conducted at the oncology outpatient clinic at Minia University Hospital.

Subjects:

Over the course of eight months, a purposive sample of 60 patients who received chemotherapy and met the inclusion criteria was recruited. Inclusion criteria were as follows: adult male and female patients above 18 years; free from cognitive impairment; willing to participate in the study; and receiving chemotherapy as a primary treatment at 3rd or more chemotherapy cycles for 2-3 hours. All patients with medical conditions that could be clinically contributing to fatigue such as COPD, CHF, renal or hepatic dysfunction, metastasis cancer, and history of chronic pain; patients with open wounds, fractures, or luxation in the back, neck, and shoulders; and patients with a known history of psychiatric illness such as depression, chronic anxiety or being treated with the psychotropic drug, were excluded.

Sample size:

The appropriate sample size for a present study is determined by three factors: (i) The estimated prevalence of the variable of interest – cancer-related fatigue among chemotherapy patients, (ii) The desired level of confidence, and (iii) The acceptable margin of error. The sample size required can be calculated according to the following formula:

$$n = \frac{t^2 \times p\,(1-p)}{m^2}$$

Description:

n = required sample size

t = confidence level at 95% (standard value of 1.96).

p = estimated prevalence of cancer-related fatigue among patients receiving chemotherapy in the project area
m = margin of error at 5% (standard value of 0.05).

$$n = \frac{(1.96)^2 \times 0.04\,(1-0.04)}{(0.05)^2} = 59.006976 \approx 60$$

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Tools:

The following two main tools were used to obtain data relevant to the current study variables:

(1) **Structured interview questionnaire** which was designed by the investigator that comprises the following two essential aspects: (a) **Socio-demographic characteristics** such as age, gender, marital status, educational level, and employment status; (b) **Medical background data sheet** related to medical diagnoses, stage of cancer, total chemotherapy treatment cycles, chemotherapeutic regimen currently received, factors likely to aggravate the level of fatigue, and factors likely to alleviate the level of fatigue.

(2**) Brief Fatigue Inventory scale (BFI):** It was adopted from Mendoza**,** et al. **(1999**). This scale has been confirmed as suitable to be used among oncology patients. This questionnaire was designed to rapidly measure the severity of cancer-related fatigue and its impact on everyday activities. There are ten questions in the BFI: (a) the first question asks if patients have been experienced fatigue in the previous week (yes or no). (b) Three questions measure fatigue intensity “fatigue at the moment, average fatigue intensity, and most awful fatigue level” respectively via numeric rating scales that are anchored by 0 (no fatigue) to 10 (as bad as the patient can imagine). (c) Six questions measure fatigue interference with everyday activities in the previous 24hourswith numeric rating scales anchored by 0 (does not interfere) to 10 (completely interferes). **Scoring system**: Each item's response is graded on a Likert scale ranging from 0 to 10 (0 indicating no fatigue (or no interfering) at all and 10 indicating the most awful fatigue (or interfering) the patient has ever experienced).Global fatigue scores (GFSs) are calculated from the averages of these 9 items and are divided into three categories: mild (1-3); moderate (4-6) and severe (7-10). [29-30]

Validity and reliability:

Structured interview questionnaire were designed and adapted after extensive literature review and sent to a panel of five experts’ academic members in the field of medical-surgical, education and community health nursing. Each expert on the panel was asked to examine the instruments for face and content validity. Minor modifications were done. In the other hand, the Brief Fatigue Inventory had a reliability factor of 0.793.This tool is a reliable and valid tool to assess fatigue among Arab cancer patients. [31-32]

Pilot study:

Once permission to proceed with the proposed study was granted, a pilot study was conducted on 10% of the sample in the same selected study setting to estimate the time needed for data collection, judge the feasibility, objectivity, and test the tool’s ability to elicit the desired information, as well as appropriateness, content, wording, and order. The needed modification was done and the pilot study subjects were excluded from the actual research subject.

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Protection of Human Rights:

The authoritative person in the faculty granted official approval to conduct the study. The researcher explained the purpose of the current study to the study and control groups in order to gain their consent to participate in it. The researcher emphasized that participation in the study is entirely voluntary; they were all informed of their right to withdraw from the study at any time and that the data is coded to ensure anonymity and confidentiality. Each subject gave written informed consent for their participation. Furthermore, the researchers notified the study and control group that the data acquired would be utilized just for the purpose of the study and would not be used in any other research without their permission.

Procedure:

CRF was assessed three times in both groups: before the intervention using the Structured Interview Questionnaire and the Brief Fatigue Inventory scale(BFI); immediately after the intervention; and 24 hours after intervention via telephone calls.

The implementation stage was divided into two phases as follows: **the first phase** involved with the control group assessment to prevent sample contamination. The researcher assessed the patient's medical history after admitted to the chemotherapy unit and consulted with the doctor to see whether the patient met the study inclusion and exclusion criteria to participate in the study. The researcher then introduced self and explain the study's aim to patients. Following the completion of the Structured Interview Questionnaire and the Brief Fatigue Inventory scale(BFI) from the control group, patients and their families were given the chance to raise any questions they had regarding the issue.

In the second phase of the implementation stage, patients in the study group got Swedish massage therapy on a regular basis, that was administered by an investigator who had previous training on this field, as follows: (1) One time for 20 minutes before starting the chemotherapy infusion; (2) Two or three times for 20 minutes each during the chemotherapy infusion depending on the chemotherapy cycles administered: after 25 minutes of the first, second, and third hours of starting the chemotherapy infusion; and finally (3) One time for 20 minutes after finishing the infusion.

Each session began with the patient draped and lying on a table in a prone position while the investigator worked slowly down the body, as follows: (a) At first, Effleurage was implemented for 2 minutes (slow, rhythmic, continuous circular stroking movement from the sacral to cervical regions of the spine) to warm the superficial tissues surface to induce relaxation. (b) Petrissage was implemented for 3 minutes (the skin is lifted, pressed down, and squeezed, pinched, shaken, rolled, and wrung). (c) Friction is the deepest technique of Swedish massage strokes. Deep, circular movements are given to soft tissue with this stroke, causing the underlying layers of tissue to rub against each other. Friction was applied for 3 minutes. (d) Tapotement is the tapping, cupping, or hacking of a large area with cupped hands, fists, the ulnar border of the hand, or tented fingers in a rhythmic,

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relatively quick mannerfor 3 minutes. (e) Vibration is a faster technique that involves lightly shaking or vibrating a region with flat hands and fingers for 3 minutes.[33-37]

Statistical Analysis:

The collected data were scored, tabulated and analyzed using Statistical Package for the Social Science (IBM-SPSS 25) program. The data was summarized and tabulated using descriptive and inferential statistics. Before intervention, immediately after intervention and 24 hours after intervention were examined using Paired t-test, Pearson r, and ANOVA. The significance level was set at a *p-value* ≤ 0.05.

RESULTS

The statistical results are presented in the following two sections: The first section is devoted to the description of the structured interview questionnaire, which includes two aspects: (a) Socio-demographic characteristics (Table 1); (b) Medical background (Table 2). The second section presents the results that answer the research hypothesis regarding the fatigue inventory scale variables (Table 3-6).

Section I: Socio-demographic characteristics and medical background:

Table 1: Frequency and percentage distribution of socio-demographic characteristics in the study and control groups (n = 60):

Socio-demographic characteristics	Study		Control		Pearson X^2/t test (p-value)
	No	%	No	%	
Age (Mean ± SD) **Range**	45.8 ± 10.9 28-61		41.1± 7.5 28-62		1.9 (0.06)
Gender: Male. Female.	 10 20	 33.3 66.7	 11 19	 36.7 63.3	0.07 (0.9)
Marital Status: Married. Unmarried.	 23 7	 76.7 23.3	 27 3	 90 10	2.4 (0.5)
Education level: Illiterate. Educated.	 7 23	 23.3 76.6	 8 22	 26.7 73.3	1.3 (0.9)
Employment status: Employment. Unemployment.	 10 20	 33.3 66.7	 12 18	 60 40	0.43 (0.8)

*Significant at the *p*≤ 0.001 probability level.

Table (1): the subjects in both groups were around the same age, with means of (45.8 ± 10.9 and 41.1 ± 7.5 years) respectively. Both groups had more than half of female (66.7 and 63.3 %) respectively. For the study and control groups respectively, the majority of

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them were already married (76.7 and 90%).Both groups had high level of education (76.6 and 73.3 %). In addition, while the study group had a higher unemployment rate than the control group (66.7%), (60%) of the control group was employed. There is no statistically significant difference between the two groups in terms of gender, marital status, education level, and employment status, (P >0.001).

Table 2: Frequency and percentage distribution of medical background data in the study and control groups (n = 60):

Medical Background Variables	Study		Control		Pearson X^2(p-value)
	No	%	No	%	
Diagnoses:					
Breast.	13	43.3	10	33.3	
Colon.	7	23.3	6	20	4.7 (0. 6)
Others.	10	33.3	14	46.7	
Stage:					
Stage I.	3	10	4	13.3	
Stage II.	19	63.3	14	46.7	3.1 (0.4)
Stage III.	8	26.7	12	40.0	
Chemotherapy treatment cycle:					
Third.	13	43.3	7	23.3	
Fourth.	10	33.3	16	53.3	0.3(0.5)
Fifth.	5	16.7	4	13.3	
6^{th} /7^{th}.	2	6.6	3	10	
Chemotherapy regimen:					
Taxol.	6	20	5	16.7	
Gemzar.	5	16.7	6	20	
Oxaliplatine.	5	16.7	4	13.3	17.3 (0.1)
Combination.	10	33.3	8	26.7	
Others.	4	13.3	3	10	
Factors aggravate:					
Chemotherapy.	10	33.3	7	23.3	
Pain.	2	6.7	7	23.3	13.7 (0.03) *
Mixed factors (sleep disturbance, anorexia, distress).	18	60	16	53.3	
Factors alleviate:					
Rest.	10	33.3	7	23.3	
Sleep.	5	16.7	4	13.3	
Light activities.	5	16.7	4	13.3	
Mixed factors.	4	13.3	7	23.3	3.9 (0.6)
None.	6	20	8	26.7	

*Significant at the *p*≤ 0.001 probability level.

Table (2): the majority of the study and control groups had breast cancer (43.3 and 33.3 %) respectively, which was followed by colon cancer (23.3 and 20 %). Furthermore, stage II cancer is present in the majority of the study and control groups (63.3 and 46.7 %)

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respectively. Most of them (43.3, 33.3 and 23.3, 53.3 %) respectively had finished their third and fourth chemotherapy cycles. Mixed factors, such as chemotherapy with sleep disturbance, pain, anorexia, or distress were identified by (60 and 53.3%) respectively as aggravating causes for fatigue. Rest was also a component that was likely to alleviate fatigue levels (33.3 and 23.3 %). There is no statistically significant difference in medical background between the study and control groups, with the exception of factors that aggravate fatigue.

Section II: Fatigue Inventory Scale:

Table 3: Frequency and percentage distribution of fatigue classification in study and control groups (n = 60):

Fatigue score	**Before intervention**		**Immediately after the intervention**		24 hours after the intervention	
	Study	**Control**	**Study**	**Control**	**Study**	**Control**
Fatigue classification (%): Mild (1-3) Moderate (4-6) Severe (7-10)	 3.3 80 16.7	 6.7 90 3.3	 56.7 40 3.3	 36.7 50 13.3	 36.7 63.3 0	 0 83.3 16.7
t-test (p-value)	0.2 (.420)		.192 (.310)*		-.010 (.958)*	

*Statistical significant p-value ≤0.001

Table (3): shows that before intervention, both study and control groups (80 and 90%) respectively had high percentages of moderate level of fatigue. There is no statistically significant difference between the study and control groups as regards before intervention fatigue score with p-value >0.001.Following Swedish massage therapy immediately and 24 hours after the intervention, there is statistically significant difference improvement in fatigue level with higher percentage of mild degree among study group with p-value <0.001.

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Table 4: Mean total score of fatigue inventory scale before intervention and 24 hours after intervention among study and control groups (n = 60).

Fatigue score	**Before intervention**		24 hours after the intervention	
	Study	**Control**	**Study**	**Control**
Fatigue now.	4.47 ± 1.83	3.3 ± 1.67	3.4 ± 1.45	5.4 ± 1.45
Usual level of fatigue.	4.93±1.7	3.53 ± 1.48	3.4 ± 1.45	4.27 ± 1.46
Fatigue at its worst.	6.27±1.82	4.9 ± 2.31	4.07 ± 1.82	5.53 ± 1.48
Interference with:				
General activity.	5.67 ± 1.73	5.17 ± 1.84	4.2 ± 1.63	5.8 ± 1.35
Mood.	5.47 ±2.22	5.1 ± 1.94	3.5 ±1.96	5.1 ± 1.58
Walking ability.	5.67 ± 2.25	4.43 ± 2.03	4.73 ± 2.03	5.07 ± 1.31
Normal work.	6.5±1,98	5.57 ± 1.41	5.3 ± 2.14	6.5 ± 1.25
Relations with other people.	0.87 ± 1.36	1.01 ± 1.11	0.5 ± 0.82	1.47 ± 1.46
Enjoyment of life.	4.47 ±2.27	5.2 ± 1.32	3.8 ± 2.11	5.2 ± 1.32

* Significant at the p≤ 0.001 probability level.

Table (4): illustrates the study and control groups' pattern of change in fatigue inventory scale at two measurement points (before intervention and 24 hours after the intervention). The study group saw a greater reductionin fatigue intensity 24 hours after the intervention, while,the control group saw a greater rise in fatigue intensity. Fatigue interfered with general activity, walking ability, and normal work.

Table 5: Difference in the overall mean score of the Fatigue Inventory Scale before intervention; immediately after the intervention and 24 hours after the intervention among study and control groups (n = 60)

Variable	**Study**	**Control**	**r/p-value among the study group**
Pre-intervention	4.8 ± 1.6	3.467 ± 1.17	Before intervention and immediately after the intervention: .592 (.001) *
t-test	0.2 (.420)		
Immediately after the intervention	3.27 ± 1.58	4.37 ± 1.61	Before intervention and 24 hours after the intervention: .663(.001) *
t-test	.192 (.310)*		
After 24 hours of chemotherapy session	3.9 ± 2.81	4.63 ± 1.65	Immediately after the intervention and 24 hours after the intervention: .587 (.001) *
	-.010 (.958)*		

*Significant at the p≤ 0.01 probability level.

Table (5): the results demonstrate that there was a significant statistical difference between the study and control groups immediately after the intervention and 24 hours after the intervention at p≤ .001. On the other hand, there were significant statistical differences between study group before intervention and immediately after the intervention (.592 at p≤ .001), before intervention and 24 hours after intervention (.663 at p≤ .001), and immediately after the intervention and 24 hours after intervention (.587 at p≤ .001).

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Table 6: Difference between the Fatigue Inventory Scale score and selected variables of socio-demographic characteristics and medical background variables before intervention, immediately after the intervention and 24 hours after the intervention in the study group (n=30):

Variables	t/f (p)		
	Before intervention	Immediately after the intervention	24 hours after the intervention
Age.	.106 (.578)	.057(.765)	.176 (.352)
Gender.	.251 (.181)	-.107 (.575)	.200 (.290)
Marital Status.	.132 (.487)	-.135 (.476)	.243 (.196)
Diagnoses.	-.015 (.936)	.303 (.103)	.174 (.359)
Stages.	-.242 (.198)	-.123 (.516)	-.202 (.284)
Chemotherapy regimen.	.186 (.325)	.212 (.260)	.094 (.620)
Factors aggravate the fatigue.	-.086 (.653)	.115 (.545)	-.163 (.389)
Factors to alleviate the fatigue.	-.187 (.322)	.068 (.722)	-.044 (.818)

Table (6): There are no statistically significant differences between the study group in terms of fatigue score and some selected variables related to socio-demographic characteristics and medical background, suggesting that these variables do not influence fatigue score after Swedish massage therapy.

DISCUSSION

CRF is a common and disabling symptom reported by cancer patients during and after chemotherapy. However, despite significant advances in cancer treatment and improvements in associated symptoms, less attention has been paid to fatigue in cancer patients undergoing chemotherapy. [18]Although a lot of information and research has been provided on chemotherapy CRF over the past two decades, it is still under-reported, under-diagnosed, and under-treated.

Massage is a complementary medicine intervention that has a short-term neuro-relaxing effect. Swedish massage therapy is a technique that relieves tense muscles and facilitates the drainage of lymphatic vessels. Therefore, the aim of this study was to investigate the effect of Swedish massage therapy on cancer-related fatigue in chemotherapy patients. To achieve the aim of this study, it was hypothesized that the study group receiving Swedish massage therapy before, during, and after completion of chemotherapy would have a lower mean score of cancer-related fatigue than the control group, as measured by a brief fatigue inventory scale.

According to the results of the current study, there was a significant difference in the mean score of fatigue between the study and control groups immediately and 24 hours after receiving the chemotherapy session. The results obtained from the subjects studied were discussed in two main parts as follows: (a) Socio-demographic characteristics and medical background and (b) Data-related to the fatigue inventory scale at baseline; immediately after the intervention, and 24 hours after the intervention.

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(a) Socio-demographic characteristics and medical background:

The results of the current study show that socio-demographic characteristics and medical background were significantly similar in the study and control groups, implying that participants were selected from an identical group of cancer patients receiving chemotherapy. The age ranged from 28–62 years, with a mean age of (45.8±10.9 and 41.1±7.5). The number of men and women was almost equal in both groups, but there were more women than men in both groups. This could be related to the fact that women are admitted to oncology departments for breast, ovarian, and lung cancer more often than men. Regarding marital status, most of the two groups were married and educated. Most of the study group was unemployed, but more than half of the control group was employed.

In terms of type and stage of cancer, the incidence of breast cancer was highest in both groups, followed by colon cancer. This result is in line with many researchers in Egypt who pointed out that the majority of the patients studied had breast and colon cancer with stage II. [38, 39]Obviously, there is no statistically significant difference between the study and control groups in terms of diagnoses and cancer stage with a p-value of > 0.001, indicating proper matching between study and control groups in these variables.

As for the factors aggravating fatigue in the study and control groups, more than half of them mentioned mixed factors such as sleep disturbances, pain, anorexia or anxiety in addition to the chemotherapy itself, while a third of them mentioned only the chemotherapy as a factor aggravating fatigue. On the other hand, the factors mentioned by the study and control groups that could alleviate the level of fatigue were mainly rest. There is no statistically significant difference between the study and control groups in terms of all medical backgrounds except factors that worsen fatigue, with a p-value > 0.001.

(b) Data- related Fatigue Inventory Scale:

Regarding fatigue score before the intervention, the current results showed that more than half of the study group reported a moderate level of fatigue, a third reported a mild level of fatigue and a few reported a severe level of fatigue. In contrast, more than half of the control group was slightly fatigued, a quarter of them were moderately fatigued, and a few were severely fatigued. Thus, a higher percentage of mild and moderate fatigue was found in both groups. These results confirm what has been reported previously, that participants started with moderate levels of fatigue at baseline assessment before intervention. [40] The current results are consistent with other studies that looked at women's reporting higher levels of fatigue severity than men during chemotherapy and radiotherapy. [40, 41]

Regarding the results immediately after the intervention, the results showed that the study group reported a lower percentage of moderate and severe fatigue, in contrast to their percentage in the pre-intervention results. A higher percentage of mild fatigue was reported by the same group. From the researcher's perspective, these changes in

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outcomes could be the result of the intervention. These findings support previously reported data that patients reported significant reductions in anxiety, nausea, pain, and fatigue following massage during chemotherapy, and that massage therapy provided clinically significant relief from CRF. [42- 44] In this regard, the current findings are consistent with another study that reported that the intervention of slow back massage (SSBM) significantly reduced the intensity of progressive pain, fatigue, and sleep disturbance over time. [43]

The control group reported a higher percentage of moderate and severe fatigue and lower percentage of mild fatigue compared to their before intervention levels. These results could be a consequence of the immediate effect of the chemotherapy. These results confirm the report that chemotherapy is a known aggressive form of chemical drug therapy that causes immediate complications such as fatigue. [4]

It is evident that the study group reported the following 24 hours after the intervention: Zero percent reported severe levels of fatigue, almost two-thirds reported moderate levels of fatigue, and one-third reported low levels of fatigue. For the control group, the proportion of mild fatigue was zero per cent, but the proportion of moderate and severe fatigue was higher. The results showed that the mean score of fatigue intensity in the study group had changed significantly before and after the Swedish massage therapy. In addition, the study group found that fatigue limited their general activities (washing, dressing, undressing, etc.) and their ability to walk. More than half of them also reported that fatigue affected their mood and enjoyment of life (shopping, going to the cinema, etc.), and for the majority of them, fatigue prevented them from doing normal work or maintaining relationships with other people, such as friends or relatives. These findings are in line with research by Diaz et al. (2008) who found that cancer patients perceive fatigue as the symptom with the greatest impact on their daily lives and that it significantly affects their emotional and social domains. [45]

Interestingly, the study group had a higher decrease in fatigue intensity 24 hours after the intervention, as shown by the mean score of the different items of the fatigue inventory scale. The control group had a higher increase in fatigue intensity 24 hours after the intervention, as illustrated by the mean score in relation to various items of the fatigue inventory scale. There were significant statistical differences between study group before the intervention and immediately after the intervention, before the intervention and after 24 hours of chemotherapy, and immediately after the intervention and 24 hours after the intervention, with $p \leq .001$. These results are consistent with the results of a study that indicated that there was no statistically significant difference between the study and control groups in the level of fatigue before chemotherapy, while the level of fatigue in the study group decreased statistically significantly immediately after intervention during chemotherapy and the next day after chemotherapy. [46]

According to the current results, there are no statistically significant differences between the study group in terms of fatigue score and some selected variables related to socio-demographic characteristics and medical variables. This suggests that these variables

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have no influence on the fatigue score after Swedish massage therapy. From the researcher's point of view, this could be due to the fact that the majority of the patients studied were female, unemployed, and married, as well as those promoting some kind of support. This finding is consistent with a study in eastern China, which reported that gender, education level, religion, marital status, household income, medical payments, and current treatment modalities were not significantly associated with the prevalence of cancer-related fatigue. [47] However, this result contradicts another study that mentioned that women had higher levels of fatigue than men. [48]

Furthermore, there were no statistically significant associations between the different stages of cancer and fatigue levels in the patients studied. This finding is consistent with researchers who concluded that cancer-related fatigue occurs regardless of race, cancer type, cancer stage, or treatment type. [25] This finding is in contrast to other researchers who reported that higher clinical cancer stages correlate with higher levels of cancer-related fatigue. [47-49]

Finally, it was found that there were no statistically significant associations between different medical background and fatigue scores in the patients studied. This finding is consistent with the finding that no significant association was found between tumor site and fatigue levels. [48, 50]

CONCLUSION

Based on the research findings and hypothesis, the current study concluded that Swedish massage therapy significantly reduced fatigue immediately after the intervention and 24 hours after the intervention in the studied group compared to the control group. Actually, Swedish back therapy during chemotherapy is a safe, inexpensive, and effective technique for reducing cancer-related fatigue during the chemotherapy. Therefore, Swedish massage therapy for cancer-related fatigue could be a critical component of cancer treatment by certified nurses.

RECOMMENDATION

In view of the current results, the following recommendations are suggested: Swedish massage therapy should become an integrated part of the overall treatment of cancer patients to reduce the level of fatigue. It is also recommended that all cancer patients be screened for the presence of fatigue before, during, and after cancer treatment. On the other hand, it is recommended that a written guideline on Swedish massage therapy training be established describing basic standards. Furthermore, nursing curricula should integrate the concepts of non-pharmacological and patient education. Finally, the long-term effects of Swedish massage therapy need to be further investigated. It is recommended that the study be repeated on a larger probability sample from different geographical areas to obtain generalizable data.

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