

Impact of Aromatherapy Massage Using Lavender Oil on Fatigue and Insomnia among Patients with Leukemia

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Abstract: Patients have leukemia may experience an array of different symptoms throughout their chemotherapy treatment in the hospital. Fatigue and insomnia are the most common distressing and persistent symptoms in patients with leukemia, they lead to restrictions in activities and significantly impact on quality of life. Aim: The aim of the study was to examine the impact of aromatherapy massage using lavender oil on fatigue and insomnia among patients with leukemia. Design: A quasi experimental design was utilized for conducting the study. Research hypotheses: H₁: The total mean score of fatigue in the study group will be less than control group. H₂: The total mean score of insomnia in the study group will be less than control group. Sample: A total of 60 adult male and female patients diagnosed with leukemia were randomly assigned to either study or control group (30 subjects each) at one of the teaching hospital, Cairo, Egypt. Tools: Data were collected through three tools; personal and medical background information form, cancer fatigue scale and insomnia severity index. Results: There were statistically significant differences regarding fatigue as well as insomnia in the study group after implementation of aromatherapy massage with lavender oil when compared to the control group. Conclusion: aromatherapy massage with lavender oil had a positive impact on reducing the intensity level of fatigue and insomnia among patients with leukemia. Recommendations: The oncology nurse ought to understand the basic essential oils pharmacological actions, massage skills, effective therapy for symptoms management in leukemia and conjointly replicate the study on a large number of study sample in different settings to generalize the results.

Keywords: Aromatherapy massage, lavender oil, leukemia, fatigue & insomnia.

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I. Introduction

Neoplastic diseases are the second reason of death in the most developed countries of the world and the most dreadful diseases nowadays [1]. Leukemia is an abnormal change of bone marrow's blood cells which is related to diminished production of normal blood cells and increased growth of abnormal cells [2]. In United States, there were an estimated number 387,728 individuals living with leukemia, the number of patients with leukemia was 13.7 per 100,000 each year. The number of deaths was 6.8 per 100,000 each year from 2010 to 2014 [3].

Leukemia is assessed into two categories: acute and chronic leukemia that may be classified into acute, chronic myeloid leukemia and acute or Chronic lymphocytic leukemia, the primary differences between the four kinds of leukemia refers to their rates of progression and wherever the cancer develops[4]. There are several symptoms related to leukemia as fatigue, insomnia, irritability, anorexia, joint pain, mild fever, bleeding from the nose, pallor, anemia, thrombocytopenia, neutropenia and skin rash that may be occurred with splenomegaly and lymphadenopathy [5].

Fatigue is one of the foremost complicated problems in the leukemia. Blood cancer related fatigue is manifested by excessive and chronic exhaustion that interferes with daily activity and body functions; it can't be overcome with rest or by proper night's sleep [6]. Fatigue typically begins before cancer is diagnosed, worsens throughout the course of treatment and may persist for months or perhaps years and once treatment ends [7]. About 72% to 95% of patients with cancer suffer from fatigue. In these patients, fatigue is also caused by the effect of the disease and its treatment [8].

Insomnia or hassle sleeping, it is other problem for patients with leukemia. Many studies have reported an incidence of 30 to 50 percent in cancer patients, compared to 15 percent in the general population. In addition, symptoms of insomnia were found in 23 to 44 percent of patients from two to five years after treatment for cancer [9]. It can characterize by difficult falling asleep, inability to maintain enough period of sleeping time, early arousal and poor sleep potency are prevalent in patients with leukemia. For patients with leukemia, sleep is doubtless littered with a variety of factors including biochemical changes related to the

method of malignant growth, antineoplastic treatments and symptoms that often accompany disease like fatigue, pain and depression [10]. Chemotherapy is the corner stone of treatment for leukemia. Although chemotherapy can have positive effects on the disease process, it is accompanied by many debilitating symptoms that can be experienced from the leukemia itself or from its treatment. Patients with leukemia seldom suffer from only one symptom at a time, but rather are faced with symptom clusters, significantly throughout therapy as fatigue that consequently result in or worsen sleep disturbances; depression, anxiety and pain, conjointly greatly have an effect on their quality of life [11] & [12].

Chemotherapy causes fatigue more than other treatments. Regarding 80 to 96 percent of the patients who are undergoing chemotherapy suffer from fatigue because these medications can cross the blood brain barrier and induce neurotoxicities that manufacture fatigue and also chemotherapy related fatigue may be associated with anemia [13], [14]. Pharmacological interventions to alleviate chemotherapy symptoms might not be indicated due to additional burden of the drug clearance on the liver and kidneys. Patients with leukemia could have underlying hepatic and renal impairments that may result in accumulation of the chemotherapeutic drugs and therefore elevated plasma drug levels may occur [15].

Complementary therapies are frequently used to relieve varied symptoms that result from leukemia and its treatment as chemotherapy. They may include aromatherapy, massage, acupressure, acupuncture, diet and herbal medicine [16]. National Association for Holistic Aromatherapy outlined aromatherapy as "the therapeutic application or the medicinal use of aromatic substances (essential oils) for holistic healing" [17]. Literature survey disclosed that this therapy has gained a lot of attention and become extremely popular nowadays, it is recognized as aroma science medical care. Aromatherapy uses essential oils extracted from flowers, leaves, stalks, fruits and roots and also distilled from resins [18].

Aromatherapy is widely used among patients have leukemia for a range of reasons, the foremost common reasons is to treat insomnia that is defined as the subjective dissatisfaction with the length or quality of sleep. Obtaining enough sleep hours is a crucial for a person's health and well being, a lack of sleep can induce fatigue, drowsiness, nervousness, dizziness, instability, disorientation, and also attention disorders [19]. The consequences of aromatherapy is result from the binding of chemical parts within the volatile oil to receptors in the olfactory bulb, impacting the brain's emotional center and also the limbic system. Topical application of aromatic oils could exert antibacterial, anti-inflammatory and analgesic effects [20]. Several studies have investigated the use of volatile oil during leukemia treatment have reported a range of positive result as intensity of fatigue was diminished and sleep quantity improved in the aromatherapy group and also improvement in the range of movement, mental clarity, alertness, and quality of lifetime of patients with leukemia [21], [22] and [23].

The African Journal of Traditional, Complementary and Alternative Medicines revealed that aromatherapy massage by using lavender oil, helps patients with leukemia to cope with stress, fatigue, insomnia, nausea, chronic pain and also depression, as a result of lavender oil works to stimulate the immune system, boost mood, fight stress and conjointly improve sleep, it may be used as a therapeutic agent [24]. Lavender is a plant belonging to the family of mints, and its scientific name is *Lavandula* [25]. It can be administered through oral use, inhalation, and massage. Lavender oil contains cineol, linalool, linalyl acetate, lavender, flavonoids, geraniol tannin and has antifungal, antimicrobial, antibiotic, antidepressant and analgesic effects [26].

The most common type of aromatherapy employed by nurses is massage. It is determined that massage with lavender oil relieves fatigue, pain and improve sleeping pattern by stimulating endorphins and by reducing anxiety [27]. A large two studies published in America checked out the consequences of massage therapy on virtually 1300 individuals with cancer over three years. The study reported that massage therapy reduced pain, fatigue, nausea, anxiety and also depression [28].

Oncology nurses play a vital role in managing symptoms and adverse effects of leukemia and its treatment. Trained nurses could also play a crucial role in assessing the advantage of aromatherapy massage and discussing the choice with patients. To further safeguard patients, clinical guideline and policy ought to be developed to provide ethical and legal framework for aromatherapy massage [29] & [30]. Nurses can also advise patients with leukemia on the international guidelines and institutional policies for using aromatherapy massage within the hospitals. So they should increase their knowledge and skills in aromatherapy massage like recognizing the pharmacological actions of the essential oils and skills of aromatherapy massage. Moreover, oncology clinicians and nurses ought to guide and support patient's decision in the application of aromatherapy massage by providing evidence-based and comprehensive recommendation on the potential benefits, risks and related safety issues [31]. Therefore this study was conducted to examine the impact of aromatherapy massage using lavender oil on fatigue and insomnia among patients with leukemia.

1.1. Significance of the study

Leukemia is a progressive type of cancer during which patient's bone marrow produces an exaggerated number of immature or abnormal leukocytes cells [32]. Incidence rates of leukemia is between lowest rate in

Africa as Uganda's was 1.3 per 100 000 in males, 1.4 per 100 000 in females and highest incidence rate in New Zealand was 14.8 per 100 000 in males and 8.7 per 100 000 in females [33]. The incidence rate of leukemia in Gharbiah, Egypt (2012) was 4.41 per 100,000 between age 20 to 64 years old classified into 2.24 per 100 000 in males and 2.17 per 100 000 in females [34]. According to the annual statistics of Cairo university hospitals, the number of patients have leukemia were about 396 from the year 2014 to 2016 [35].

Fatigue is more prevalent and protracted in patients with leukemia. Cancer related fatigue and insomnia have strong relationship exists between these symptoms that may be reciprocally related [36]. The bulk of studies that have assessed each insomnia and fatigue in patients with leukemia offer evidence supporting a strong correlation between cancer related fatigue and numerous sleep parameters disorders, including poor sleep quality, disrupted initiation and maintenance of sleep, nighttime arousal and excessive daytime somnolence [37].

Chemotherapy is a standard treatment for leukemia and edges most patients. However, patients may experience many adverse effects of chemotherapy, which might considerably have an effect on comfort and well-being throughout and after leukemia's treatment [38]. Moreover, disturbed sleep might have an effect on mental health and physical functioning and significantly impact the quality of patient's life have leukemia [39]&[40]. Increasing the comfort and well-being of patients with leukemia during chemotherapy is the main goal for all oncology nurses, and emphasis has been placed on the use of complementary therapy to attain this goal [41].

Complementary therapies are an integral part of oncology care, and although this science has been abundant advancement, optimal symptom management remains elusive for some patients. Complementary therapies, like relaxation, guided imagery, massage, and aromatherapy, are now widely used by patients with cancer [42]. Nurses, who are at the forefront of healthcare delivery, need adequate information of complementary therapies and skills to provide appropriate advice and holistic care incorporating the patient's physical, psychological, social and emotional wellbeing and needs. This study will be conducted to objectively quantify the impact of aromatherapy massage using lavender oil on fatigue and insomnia among patients with leukemia. Data derived from this study is also utilized to assist care supplier particularly nurses to assess patient's condition, offer the specified care and teaching about leukemia and chemotherapy. Additionally, it's hoped that the findings of this study may facilitate in rising quality of patients care and establish evidence based data that can promote nursing practice and research.

II. Material and Methods

The current study aims to examine the impact of aromatherapy massage using lavender oil on fatigue and insomnia among patients with leukemia.

2.1. Research Hypotheses:

H₁: The total mean score of fatigue in the study group will be less than control group

H₂: The total mean score of insomnia in the study group will be less than control group

2.2. Design

A quasi-experimental design was utilized to accomplish this study.

2.3. Setting

This study was conducted at one of the teaching hospital, Cairo, Egypt, which provide medical treatment including chemotherapeutic medication for patients with leukemia.

2.4. Sample:

Data collection phase was conducted over a period of six months. It was between (July, 2017 and December, 2017). A total of 60 adult male and female patients met the inclusion criteria with confirmed diagnosis of leukemia. Subjects were randomly assigned to either study or control group (30 subjects each). Matching was done according to age, gender, residence, and co morbidities. The inclusion criteria were as follows: adult and alert patients have leukemia receiving chemotherapeutic drugs, the intensity of fatigue is over 10 from 60 according to cancer fatigue scale [43] and sleep disorders of 8 and more from 28 as regard to Insomnia Severity Index [44]; The exclusion criteria throughout the intervention were as follows patients who had another form of cancer, receiving another type of cancer treatment besides chemotherapy, had hypersensitivity reaction to lavender oil, had skin injury or diseases in the massage space, blood platelet count less than 150,000 mcL or mentally disturbed, failure to attend 2 consecutive sessions of massage therapy or three sessions throughout the study; a history of sleep apnea, asthma and patients with previous experience with aromatherapy.

2.5. Data collection tools:

Three data collection tools were used to collect data. The study tools consisted of :

1-Personal and Medical Background Information Form (PMBIF), this tool consists of two parts: The first part included personal data such as age, gender, marital status, residence, occupation, and allergy. While, the second part included medical related data such as co morbidities and history of leukemia.

2- Cancer Fatigue Scale: The cancer fatigue scale (CFS) has scores of 28 for the physical subscale of fatigue, 16 for affective subscale and 16 for cognitive subscale. A Likert scale of 5-point was used to rate each item. The possible response range from 0 to 60. The first subscale (physical subscale of fatigue) consisted of 7 items. The second subscale consisted of four items that assessed affective activity (affective subscale of fatigue). The third subscale consisted of four items (cognitive subscale of fatigue) that assessed attention and memory [43]. The total score is interpreted as follows: No Fatigue (0); little fatigue (1–15); somewhat fatigue (16–30); considerably fatigue (31–45); and (46–60) very much fatigue [43].

3- Insomnia Severity Index: The Insomnia Severity Index (ISI) was a seven item self report questionnaire assessing sleep dissatisfaction, early morning awakening problems, the severity of sleep onset and sleep maintenance, interference of sleep difficulties with daytime functioning. A 5-point Likert scale was used to rate each item. A total score ranging from 0 to 28. The total score was interpreted as follows: absence of insomnia (0–7); sub-threshold insomnia (8–14); moderate insomnia (15–21); and (22–28) severe insomnia [44].

2.6. Pilot study

A pilot study was conducted on 10 patients to test feasibility of the study, as well as to examine issues related to the design, sample size, data collection procedures, and data analysis approaches. The pilot sample was excluded from the study.

2.7. Ethical considerations

An official permission to conduct the study was obtained from the head of the hospital administrators. Written consent for patient's agreement was obtained after explanation of the nature and purpose of the study. Each patient was free to either participate or not in the study and had the right to withdraw from the study at any time without any rationale and it will not affect upon care provided. Also, patients were informed that obtained data will not be used in any further researches. Confidentiality and anonymity of each participant were assured through coding of all data.

2.8. Procedure for data collection:

Once the official permission was granted from the authoritative person of the medical department to proceed with the proposed study, the researchers initiated data collection. Patients who met the criteria for the study inclusion were approached by the researchers. Each potential patient was informed about the purpose and nature of the study as well as patient rights for voluntary participation. All patients were informed that confidentiality will be assured. Subjects were randomly assigning to either study or control group. The procedure is divided into four phases for control and study group.

The study group subjects were followed by the researchers for four phases, first phase was at the first week before aromatherapy massage, the second, third was during application of aromatherapy massage (at the end of every week) while the fourth phase was at the fourth week (after application of aromatherapy) to assess effect of aromatherapy massage on fatigue and insomnia among patients with leukemia. Control group subjects (untreated or unexposed group) were also assessed at the same time for four phases as the same with study subjects without aromatherapy intervention with lavender oil, they were received the routine hospital care.

Phase 1: at the first week of the disease process

Patients had leukemia on admission who admitted to receive chemotherapeutic medications and agreed to participate in the study were interviewed by the researchers to fill out Personal and Medical Background Information Form (PMBIF) was completed in ten minutes, Cancer Fatigue Scale (CFS) which include questions related to three subscales of fatigue (physical, affective, and cognitive) was completed in fifteen minutes and Insomnia Severity Index (ISI) assessing the intensity of sleep disorder, sleep maintenance and early morning awakening problems, sleep dissatisfaction, interference of sleep difficulties with daytime functioning and distress caused by the sleep difficulties was performed in ten minutes .

After completion of data collection tools, the researchers provided brief information to the study group and their significant others related to the benefit of aromatherapy massage by using lavender oil and how it can be applied in an effective manner. The researchers also demonstrated aromatherapy massage procedure by using lavender oil for those patients. In addition, the researchers offered the steps of aromatherapy massage with illustrated pictures in a written paper to help them to re-demonstrate aromatherapy massage procedure by their significant others to be sure that they can perform it effectively.

Aromatherapy massages session applied three times a week (every other day) for 4 weeks (duration of chemotherapeutic medication’s protocol). Steps of aromatherapy massage after applying sensitivity test to lavender oil on the patient’s skin, they include the following: 1- Explain the procedure of aromatherapy massage to the patient. 2- Perform hand hygiene. 3- Keep privacy. 4- Assist the patient to the prone position or lateral or sitting position with the back exposed from the shoulders to the sacral area. 5- Use the bath blanket to drape the patient. 6- Warm the lavender oil in the palm of hand that is diluted in olive oil (5ml of lavender oil added to 95 ml of olive oil) that is prescribed by pharmacist more specialized in complementary therapy. 7- Apply the lavender oil to patient’s shoulders, back , and sacral area by using light gliding strokes(effleurage). 8- Place the hands beside each other at the base of the patient’s back and stroke upward to the shoulders and downward to the buttocks in slow, continuous strokes Continue for 3 to 5 minutes (20 strokes in 30 seconds). 9- Massage the patient’s shoulders, back, areas over iliac crests, and sacrum with circular motion (20 strokes in 30 seconds) Continue for 3 to 5 minutes, applying additional lavender oil as necessary. 10- Knead the patient’s skin by gently alternating grasping and compression motions (petrissage) 20 strokes in 30 seconds. 11- Complete the massage with additional long stroking movements. 12- During massage, observe the patient’s skin for reddened or open areas. Pay particular attention to the skin over bony prominences. 13-Perform hand washing. 15- Assess the patient’s response [45], [46].

Phase 2,3 and 4: at the 2nd, 3rd and 4th week of the disease process

Study group who received chemotherapeutic medications were interviewed by the researchers at the end of third and fourth week of the disease process to fill out again Cancer Fatigue Scale (CFS) and Insomnia Severity Index (ISI) to identify the effect of aromatherapy massage by using lavender oil on the level of fatigue and intensity of insomnia that affect their life.

2.9. Statistical analysis:

Upon the completion of data collection, each answer assessment tool was coded and scored manually. Data were analyzed using Statistical Package for the Social Sciences (SPSS) program version 23. Using descriptive and inferential statistics. The descriptive statistics included frequency and percentage distribution, means as an average that describes the central tendency of observations, standard deviation as a measure of dispersion of results around the mean. Inferential statistics included t- test was used to compare equality of means between variables and chi-square test was used identify relationship between qualitative variables and ANOVA test were used.

III. Results

Statistical findings of the current study are presented in two main sections as a following:

Section 1: Describes demographic characteristics and Medical data of the study and control groups (Table 1) and (Figures1-2).

Section 2: Delineates hypothesis testing for being supported or not (Tables 2-4) and (Figures 3- 4).

Table (1): Demographic characteristics of both study and control group (n= 60).

Variables	Study group		Control group		χ^2	P- value
	No.	%	No.	%		
Age / Yrs:					1.965	0.374
1. 20≥30	1	3.3	4	13.3		
2. 30>40	18	60.0	16	53.4		
3. 40≥60	11	36.7	10	33.3		
Mean ± SD	39.77± 5.049		38.50± 6.912			
Gender:					0.067	0.795
1. Male	17	56.7	16	53.3		
2. Female	13	43.3	14	46.7		
Marital status:					0.139	0.933
1. Single	11	36.7	10	33.3		
2. Married	14	46.7	14	46.7		
3. Divorced/Widowed	5	16.6	6	20.0		
Occupation:					0.550	0.908
1. House wife	6	20.0	4	13.3		
2. Farmer	8	26.7	9	30.0		
3. Worker	5	16.6	6	20.0		
4. Employee	11	36.7	11	36.7		
Residence:					0.067	0.792
1. Rural	17	56.7	16	53.3		
2. Urban	13	43.3	14	46.7		

* Significant ≤ 0.05

Table (1) In relation to age, (60.0 %) and (53.4 %) of the study and control groups had age ranged between 30 to 40 years with mean age (39.77± 5.049) for the study group, and (38.50± 6.912)for control group. Male gender represents (56.7 %) of the study group and (53.3 %) of the control group. In relation to marital status (46.7 %) of both study and control groups were married. With reference to occupation, (36.7%) of both study and control group subjects were employee. In addition more than the half of both groups reside rural areas (56.7% & 53.3% respectively), with no significant statistical differences between study and control groups in relation to demographic data.

Figure (1) percentage distribution of the past medical history among study and control groups (n=60)

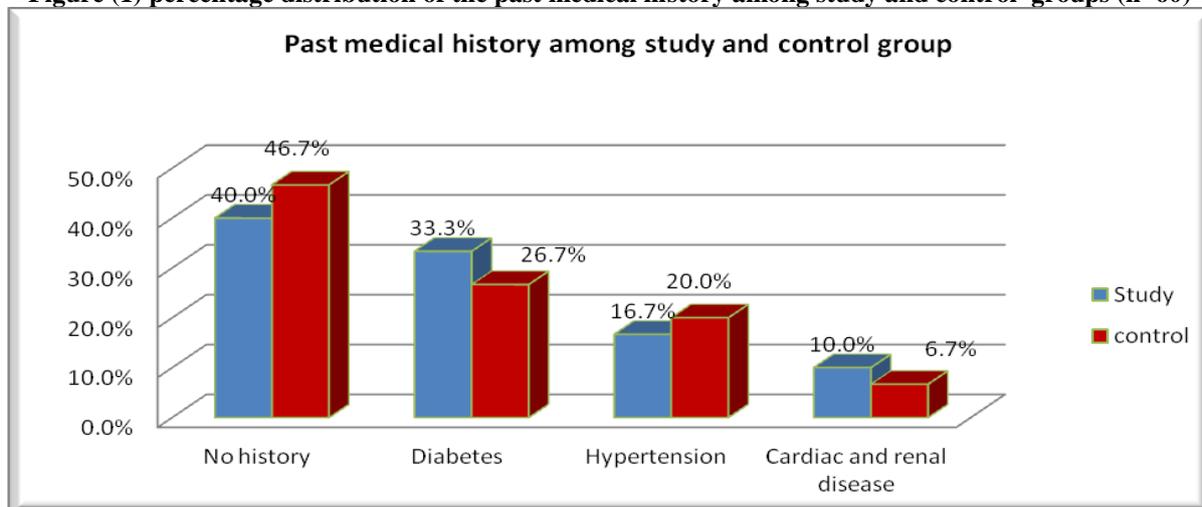


Figure (1) represents that (40.0%, 46.7% respectively) of both study and control group had no morbidities. While (33.3%, 26.7% respectively) of both study and control group had diabetes. In addition, there was no statistical significant difference between both groups ($\chi^2 = 0.667$, p-value=0.881).

Figure (2) percentage distribution of the duration of leukemia among study and control groups (n=60)

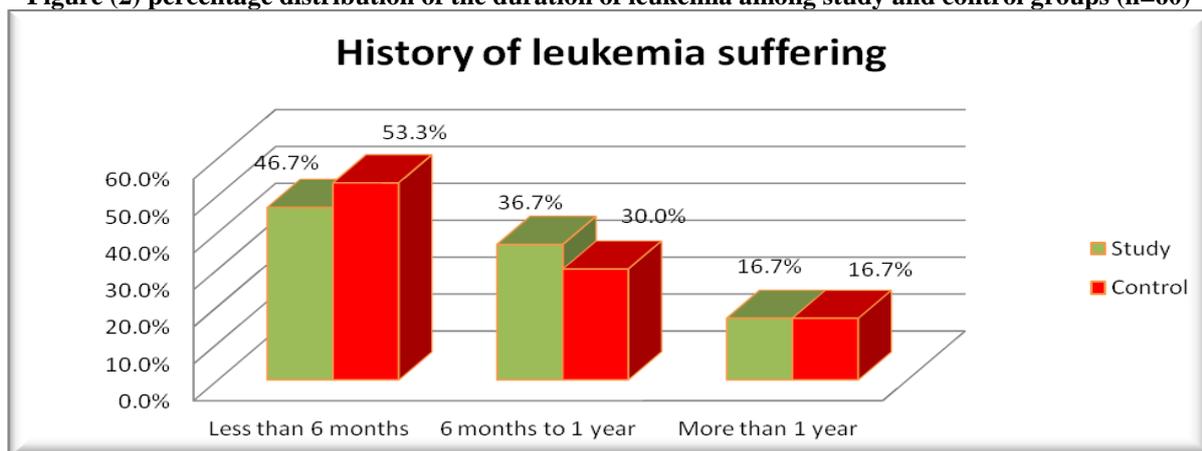


Figure (2) shows that (46.7%, 53.3% respectively) of both study and control group had less than 6 month's duration of leukemia. In addition, there was no statistical significant difference between both groups ($\chi^2 = 0.333$, p-value=0.846).

Table (2) Comparison of mean scores of fatigue classification among study and control groups (n=60)

Classification of fatigue	Before intervention		t- test P value	After intervention		t- test P value
	Study group	Control group		Study group	Control group	
	X ± SD	X ± SD		X ± SD	X ± SD	
Physical Fatigue	9.40±3.244	10.13±3.401	0.855 0.396 NS	5.70±2.718	7.70±3.405	2.514* 0.015

Affective Fatigue	8.83±3.563	9.70±3.544	0.945 0.349 NS	6.47±3.340	7.63±3.746	1.273 0.208
Cognitive fatigue	7.17±3.302	7.07±2.490	0.132 0.895 NS	5.37±3.615	5.47±2.713	0.121 0.904

*Significant at the ≤ 0.05

Regarding classification of fatigue, there was no statistical significant difference between study and control groups before intervention in physical, affective and cognitive fatigue along the study period. In addition, there was no statistical significant difference between study and control groups after intervention in affective and cognitive fatigue, While, there was a statistical significant difference between study group when compared to control group in physical fatigue (t-test: 2.514, p-value: 0.015).

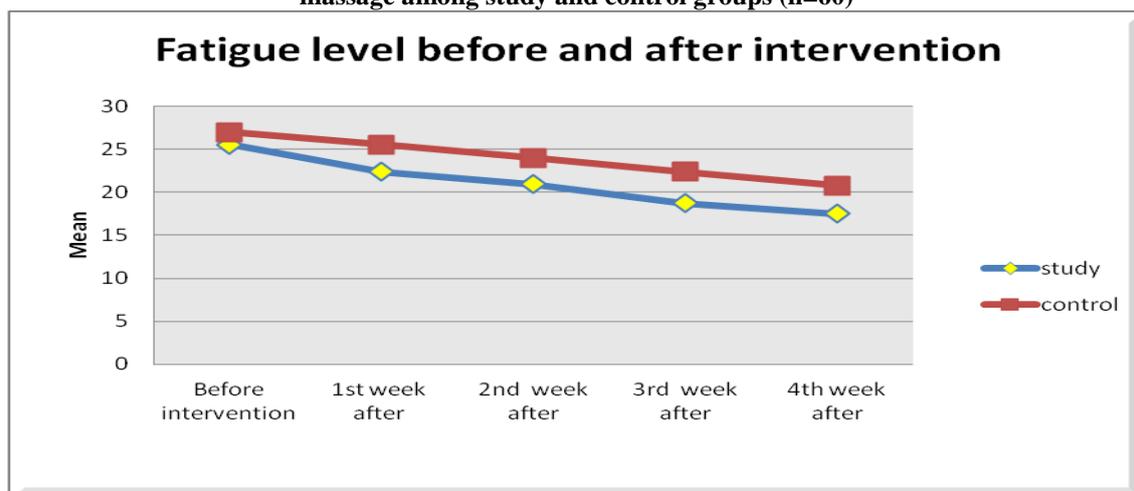
Table (3) Frequency and percentage distribution of fatigue level among study and control groups (n=60)

Variable	Study group		Control group		χ^2	P-value
	No.	%	No.	%		
- Fatigue level before intervention					3.118	0.374
▪ No fatigue	0	0	0	0		
▪ Little fatigue	4	13.3	5	16.7		
▪ Somewhat fatigue	11	36.7	15	50.0		
▪ Considerably fatigue	13	43.3	10	33.3		
▪ Very much fatigue	2	6.7	0	0.0		
- Fatigue level after 1 week of intervention					9.568	0.023*
▪ No fatigue	0	0	1	3.3		
▪ Little fatigue	13	43.3	4	13.3		
▪ Somewhat fatigue	14	46.7	15	50.0		
▪ Considerably fatigue	3	10.0	10	33.3		
▪ Very much fatigue	0	0	0	0		
- Fatigue level after 2 weeks of intervention					8.042	0.018*
▪ No fatigue	0	0	0	0		
▪ Little fatigue	13	43.3	5	16.7		
▪ Somewhat fatigue	15	50.0	16	53.3		
▪ Considerably fatigue	2	6.7	9	30.0		
▪ Very much fatigue	0	0	0	0		
- Fatigue level after 3 weeks of intervention					6.026	0.049*
▪ No fatigue	0	0	0	0		
▪ Little fatigue	13	43.3	5	16.7		
▪ Somewhat fatigue	15	50.0	19	63.3		
▪ Considerably fatigue	2	6.7	6	20.0		
▪ Very much fatigue	0	0	0	0		
- Fatigue level after 4 weeks of intervention					4.925	0.085
▪ No fatigue	0	0	0	0		
▪ Little fatigue	14	46.7	6	20.0		
▪ Somewhat fatigue	14	46.7	20	66.7		
▪ Considerably fatigue	2	6.7	4	13.3		
▪ Very much fatigue	0	0	0	0		

*Significant at the ≤ 0.05

Table (3) shows that (43.3 %) of the study group had considerably fatigue and(50.0%) of the control group had somewhat fatigue score before the intervention of aromatherapy with lavender oil, while in the 1st week after intervention patients who had somewhat fatigue score were (46.7%) among study group compared to control group (50.0%). In the 2nd week after intervention patients who had somewhat fatigue were (50.0%) among study group compared to control group (53.3%). Moreover, (50.0%) of the study group had somewhat fatigue score when compared to control group (63.3%) in the 3rd week and (46.7%) of the study group had somewhat fatigue score when compared to control group (66.7%) in the 4th week after intervention. In addition, there were statistical significant difference between study and control group regarding 1st, 2nd and 3rd week of aromatherapy intervention.

Figure (3): Comparison of mean scores of fatigue level before and after intervention of aromatherapy massage among study and control groups (n=60)



Mean and standard deviation of fatigue scores among study group before intervention was (25.60± 9.633), while control group before intervention was (27.03± 8.572). First week after intervention was (22.43± 9.088) for study group and (25.60± 10.207) for control group. Second week after intervention was (20.97± 8.935) for study group and (24.03± 9.072) for control group. Third week after intervention was (18.77± 9.160) for study group and (22.43± 8.901) for control group. Fourth week after intervention was (17.53± 9.202) for study group and (20.80± 9.189) for control group. In addition, there was a significant statistical difference between study and control group after intervention of aromatherapy massage with lavender oil on fatigue, $F (df, 2.909) = 278.797$ P value was 0.000.

Table (4) The percentage distribution of insomnia intensity level among study and control groups (n=60)

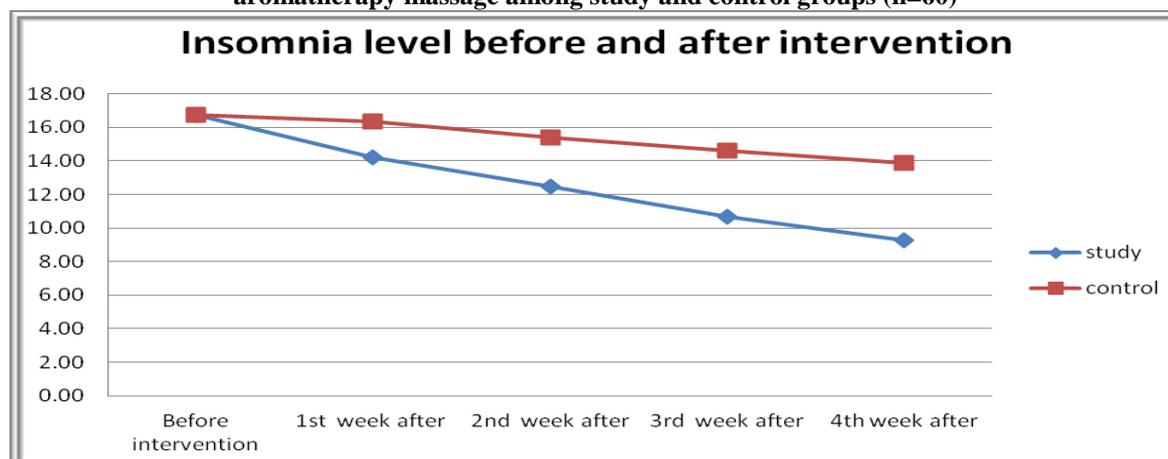
Variable	Study group		Control group		χ^2	P-value
	No.	%	No.	%		
- Insomnia level before intervention					0.133	0.936
▪ No Insomnia	0	0	0	0		
▪ Mild insomnia	7	23.3	8	26.7		
▪ Moderate insomnia	15	50.0	15	50.0		
▪ Severe insomnia	8	26.7	7	23.3		
-Insomnia level after 1 week of intervention					4.760	0.190
▪ No Insomnia	5	16.6	1	3.3		
▪ Mild insomnia	9	30.0	8	26.7		
▪ Moderate insomnia	14	46.7	15	50		
▪ Severe insomnia	2	6.7	6	20		
-Insomnia level after 2 weeks of intervention					8.566	0.036*
▪ No Insomnia	7	23.3	2	6.7		
▪ Mild insomnia	12	40.0	9	30		
▪ Moderate insomnia	11	36.7	14	46.7		
▪ Severe insomnia	0	0	5	16.6		
-Insomnia level after 3 weeks of intervention					6.618	0.085
▪ No Insomnia	7	23.3	4	13.3		
▪ Mild insomnia	15	50	10	33.3		
▪ Moderate insomnia	8	26.7	12	40.1		
▪ Severe insomnia	0	0	4	13.3		
-Insomnia level after 4 weeks of intervention					9.746	0.021*
▪ No Insomnia	7	23.3	7	23.3		
▪ Mild insomnia	17	56.7	7	23.3		
▪ Moderate insomnia	6	20.0	13	43.3		
▪ Severe insomnia	0	0	3	10.1		

*Significant at the ≤ 0.05

Table (4) represents that (50.0 %) of both study and control group had moderate insomnia score before the intervention of aromatherapy with lavender oil, while in the 1st week after intervention patients who had moderate insomnia score were (46.7%) among study group compared to control group (50.0%). In the 2nd week after intervention patients who had mild insomnia were (40.0%) among study group compared to control group (46.7%) had moderate insomnia. Moreover, (50.0%) of the study group had mild insomnia score when compared to control group (40.1%) had moderate insomnia in the 3rd week and (56.7%) of the study group had mild insomnia score when compared to control group (43.3%) had moderate insomnia in the 4th week after

intervention. In addition, there were significant statistical difference between study and control group regarding 2nd and 4th week of aromatherapy intervention.

Figure (4): Comparison of mean scores of insomnia intensity level before and after intervention of aromatherapy massage among study and control groups (n=60)



Mean and standard deviation of insomnia scores among the study group before intervention was (16.73 ± 5.298), while control group before intervention was (16.77 ± 5.667). First week after intervention was (14.20 ± 5.182) for study group and (16.37 ± 5.696) for control group. Second week after intervention was (12.47 ± 5.264) for study group and (15.40 ± 5.624) for control group. Third week after intervention was (10.70 ± 5.011) for study group and (14.60 ± 5.905) for control group. Fourth week after intervention was (9.27 ± 5.285) for study group and (13.90 ± 6.008) for control group. In addition to There was a significant statistical difference between study and control group after intervention of aromatherapy massage with lavender oil on insomnia, $F (df 2,231) = 310.029$ P value was 0.000

IV. Discussion

The discussion concerned about answering the hypotheses of the current study which were related to the impact of aromatherapy massage using lavender oil on fatigue and insomnia among patients with leukemia. The discussion presented in two main sections. **Section I**; is concerned about the data distribution among patients with leukemia related to the demographic and medical data. While **Section II**; is related to fatigue classification among study and control groups and intensity of fatigue and insomnia level before and after the aromatherapy massage intervention using lavender oil among patients with leukemia.

Regarding description of the demographic and medical data, it was found that more than half of the sample for both the study and the control groups had age ranged between thirty to forty years old. Male gender represents more than the half of the study and the control groups. While in relation to the marital status it was observed that around half of the sample of the study and the control groups were married. With reference to occupation, more than one third of both study and control group subjects were employee.

These findings were congruent with [1] and [48], they reported that the mean age of the study subjects have leukemia was 31.3 ± 3.6 years, more than half of the subjects were male patients, more than one third of them were employed, other study developed by [45] conducted that more than two third of study subjects have leukemia were married. In contrast, the study which carried out on 100 participants had leukemia by [5], it was revealed that the average age of participants was more than forty years and more than half of them were female patients. The study finding revealed that more than half of both groups reside rural areas. The researchers pointed out that rural patients may be less educated, have less utilization of early cancer detection programs and also experience variation in the availability, quality and accessibility of services when evaluating against their urban counterparts, so rural patients at high risk for developing cancer than urban patients.

With reference to past medical history, the study results shown up that more than one third of the study and the control groups had no co morbidities while, around one third of the study and control groups had diabetes. In relation to history of leukemia it was found that around the half of both study and control group had less than 6 month's history of leukemia. The research findings revealed that there was no statistical significance difference related to the demographic data and medical data, so homogeneity of the study and control groups was achieved. These findings were supported by [1] who mentioned that average duration of the leukemia was more than three months and less than six months, other study carried out on 2792 patients had leukemia reported that more than two third of the participants did not have any co-morbidities and the other participants had one or more co-morbid disease [49].

According to classification of fatigue, there was no statistical significant difference between study and control groups before intervention in physical, affective and cognitive fatigue along the study period. In addition, there was no statistical significant difference between study and control groups after intervention in affective and cognitive fatigue, While, there was a statistical significant difference between study group when compared to control group in physical fatigue. The researchers pointed out that there was no statistical significant difference between study and control groups after intervention in affective and cognitive fatigue because the majority of the participants were married and have children, so they were anxious regarding their family, they were afraid of the treatment course and recurrence of the disease.

In relation to fatigue level before and after intervention of aromatherapy massage with lavender oil. The current study denoted that there was no significance differences between study and control group before intervention, while there was significant difference between study and control group regarding 1st, 2nd and 3rd week of aromatherapy intervention. In the fourth week, there was no significant difference between study and control group, however, percentage of patients who had somewhat fatigue in the study group is less than control group and percentage of patients who had severe fatigue in control group is more than study group, therefore, the results supported the 1st hypothesis.

The researchers interpreted these results as aromatherapy massage with lavender oil can induce feeling of relaxation, increased energy levels and reduce muscles tension. The findings of the current study was supported by [1] according to his study on One hundred and fifteen patients with leukemia at Medical science University, the results showed that more than ninety percent of the study subjects experienced a different levels of fatigue. Other study documented that slow stroke back massage intervention is a simple, safe and cost-effective approach can be used to improve the symptom cluster as fatigue and other symptoms in patients have leukemia [45]

Regarding the intensity level of insomnia .The current study revealed that there was no significance differences of insomnia intensity level between study and control group before intervention of aromatherapy massage with lavender oil, while there was significance difference between study and control group in the 2nd and 4th week of aromatherapy intervention with lavender oil. There was no significance difference between study and control group in the 1st and 3rd week of aromatherapy intervention with lavender oil, however, in the first and third week after aromatherapy intervention, the percentage of patients who had no or mild insomnia in the study group is greater than control group, therefore, the results supported the 2nd hypothesis.

The researchers of the current study reported that the main causes of insomnia in patients have leukemia according to their experience in clinical setting were delaying in falling asleep, waking up during the night, excessive daytime sleepiness ,waking in the early morning with the inability to get back to sleep, these causes were also supported by [5] on patients treated in oncology department of hospital, delays in falling asleep and staying up during night were mentioned to be the main causes of sleep disorders. Other author [30] added for patients with cancer, sleep is affected by a range of factors, including the biochemical changes related to the process of malignant cell growth and anticancer treatments, and symptoms that more frequently accompany cancer, such as pain, fatigue, and depression.

On the same line with the current study [45] documented according to their study on one hundred and fifteen patients with leukemia at Medical science University, there was no statistical significant difference between the two groups in terms of sleep quality score before intervention. However, after the intervention, sleep quality was significantly improved in the intervention group compared to the control group. The sleep quality before and after the intervention had no statistical significant difference in the control group. In this respect other study reported that most patients had poor quality sleep before intervention, but aromatherapy massage had a significant positive impact, it was a crucial intervention for improving insomnia and other manifestations commonly experienced by patients with leukemia [11]. This finding was also supported by [47] their results revealed that aromatherapy had a positive impact on patient experience and managed symptoms well. The lavender scent was most commonly chosen. Overall, aromatherapy has decreased the common symptoms associated with chemotherapy such as insomnia and has increased the patients' overall wellbeing. The same author added that aromatherapy benefits all subjects irrespective of gender; aromatherapy interventions do not cause harm when recipients are screened properly.

V. Conclusion of the study:

The results of the current study supported the research hypotheses whereas aromatherapy massage with lavender oil had a positive impact on patients have leukemia receiving chemotherapy in reducing the intensity level of fatigue and insomnia as well as improve quality of sleeping pattern.

VI. Recommendation of the study:

- 1- Aromatherapy massage with lavender oil should be used as a one of the complementary therapy in managing or reducing the intensity of fatigue and insomnia among patients with leukemia.

- 2- The oncology nurse should recognize the pharmacological actions of the essential oils, massage skills and proper therapy for symptoms management in leukemia.
- 3- Application of aromatherapy massage with lavender oil on different cancer types not only leukemia.
- 4- Replication of the study on a large number of patients selected from different geographical areas in Egypt is essential to obtain more generalized findings in relation to the current study.
- 5- Further studies should be carried out to assess effectiveness of aromatherapy massage with lavender oil on other patients have different level of fatigue and insomnia and other problems.

VII. Nursing Implication of the study:

The aromatherapy massage is considered a safe nursing management and it could be used as a complementary treatment to minimize the fatigue and insomnia intensity among patients with leukemia receiving chemotherapy. It could be performed for patients either at hospital or at home, it is easy to learn, inexpensive, noninvasive, and associated with relaxation. Moreover, it does not need any equipment rather than well trained care giver on the technique of aromatherapy massage.

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