RESEARCH PAPER

Effect of Topical Cryotherapy on Lymphedema Symptoms among Breast Cancer Survivors with Mastectomy

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ABSTRACT

Background: Lymphedema is a common complication post mastectomy. Breast cancer survivors with lymphedema experience multiple symptoms such as feeling of tightness and heaviness during the initial development of lymphedema. Early symptom management is crucial for clinicians and researchers to control the early stages of lymphedema and prevent its progression to late chronic stages. Cryotherapy is one of the non-pharmacological interventions that has been shown to be promising in controlling the lymphedema and improving its symptoms. So, the aim of this study was to evaluate the effect of topical cryotherapy on lymphedema symptoms among breast cancer survivors with mastectomy.

Method: Quasi experimental design with a purposive sample of 80 breast cancer survivors with lymphedema stage 0 & 1 was enrolled in this study. Data were collected using three tools: Structured Interview Questionnaire, Lymphedema Tracking Tool and Numerical Pain Rating Scale.

Results: The present study revealed a significant improvement in all self-reported lymphedema symptoms among the study group compared to the control group (p value <0.05).

Conclusion: The study concluded that the topical cryotherapy was effective in improving the lymphedema symptoms among breast cancer survivors with lymphedema.

Keywords: Lymphedema symptoms, Breast cancer survivors with mastectomy, Cryotherapy

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Introduction

Breast cancer (BC) is the most prevalent type of cancer among Egyptian women, with a 37.6% incidence rate (Abed El-Rahman Mohamed& Mohamed Abdelkader, 2023). There are different treatment modalities for BC, including surgical therapy, hormonal therapy, radiation therapy, and chemotherapy. Unfortunately, these types of treatment modalities, especially surgery through mastectomy, have some possible complications. One of these complications is lymphedema (Kamel et al., 2025).

Lymphedema is a progressive condition of impaired lymphatic transport that leads to fluid accumulation in the ipsilateral side of mastectomy. It affects nearly one in every five BC survivors within months to years following mastectomy (Chen et al., 2025). Clinical progression of post mastectomy lymphedema, defined by changes in symptoms over time in which the early phase of post mastectomy lymphedema (Stage 0 or latent stage), the fluid accumulation may not be clinically noticeable although the lymphatic impairment but the patient experiences feeling of heaviness, tightness and fullness (Blom et al., 2022).

However, stage 0 can progress to clinically evident lymphedema that resolves with elevation of the limb (Stage I) and can be characterized by a lack of fibrosis. Subsequently, the chronic, irreversible phase of the disease can be classified by the development of intradermal fibrosis. So, it is important to focus on and manage the lymphedema symptoms (van Gemert et al., 025).

Hence, the earlier symptoms of post mastectomy lymphedema which reported by BC survivors before the detection of significant arm volume changes and fluid pockets include: feeling of

tightness, heaviness, Fullness, numbness, tingling, reports of poor clothing fit, arm swelling and pain (Sun et al., 2024). These symptoms not only limit BC survivors' physical functioning but also negatively affect their quality of life, body image, social functioning, and financial status.

Oncology nurses &clinicians play an important role in recognizing lymphedema symptoms and controlling it by applying the best practice. As early symptom management can decelerate edema progression and enhance BC survivors' quality of life (Shen et al., 2024). Over the last years, there has been a rise in the complementary therapies' research for their effectiveness and easy applicability (Skwiot, 2025).

Cryotherapy is one of these complementary therapies. It involves the application of cold temperatures by ice, cold water, or cold air on an affected part of the body. It produces cooling to a depth of about 2-4 cm of the skin, ensuing an initial local vasoconstriction that can persist beyond the time of skin temperature normalization and reduces the normal post-ischemic hyperemic (Miranda et al., 2025). It has been shown that it is useful in reducing pain and edema in various studies (Reis et al., 2025). In this scenario, topical cryotherapy has been investigated as a promising complementary therapy that can control lymphedema symptoms

Significance of the study:

Post mastectomy lymphedema is a common complication affecting BC survivors, with an incidence ranging from 20% to 30% in Egypt (Abed El-Rahman Mohamed& Mohamed Abdelkader, 2023). During the early stages of lymphedema, BC survivors experience various symptoms, such as tightness, heaviness, numbness, and pain, before noticing any significant changes in arm size or fluid accumulation. Unfortunately, most clinicians recommend treatment options based solely on the objective measurement of lymphedema, neglecting the symptoms reported by the patients themselves. This can lead to lymphedema progressing to advanced stages (Hansen, Jørgensen& Sørensen, 2023; Shen et al., 2025).

Hence, early symptom management is crucial to control the early stages of lymphedema and prevent its progression to late chronic stages that are difficult to treated (Sharifi& Ahmad, 2024). Cryotherapy is a new simple physical therapy has been already suggested to reduce edema, inflammation and pain (Bracciano & Bracciano, 2024). Therefore, it is reasonable to think that cryotherapy may have a positive effect on managing lymphedema and alleviating its symptoms in BC survivors.

Aim of the study: The aim of the current study was to evaluate the effect of topical cryotherapy on lymphedema symptoms among breast cancer survivors with mastectomy.

Research hypotheses: Patients who receive topical cryotherapy will exhibit a significant improvement in lymphedema-related symptoms compared to patients who do not receive cryotherapy.

Operational definition:

Topical cryotherapy involves application of reusable gel ice packs on the affected arm for 15-20 minutes, started distal to proximal (from the hand toward the upper arm) to imitate the direction of lymphatic drainage and improve lymphedema symptoms.

Method

Study Design:

A quasi-experimental research design with two groups (control &study) was utilized in this study.

Setting:

The study was carried out at Oncology center -Mansoura University, Egypt.

Subjects:

A purposive sample of 80 adult breast cancer female patients who had mastectomy and experienced lymphedema was involved in the study. The study participants were allocated into two matched groups:

Group I (control group): It was composed of 40 patients who received only the routine hospital care which included exercise and compression therapy.

Group II (study group): It was also composed of 40 patients who received the routine hospital care in addition to scheduled cryotherapy sessions at the affected arm.

Sample size:

The sample size for evaluating the effect of topical cryotherapy on patients' post-mastectomy lymphedema symptoms**,** was calculated using research software (https://clincalc.com). Based on the results of a similar previous study done by **Askary, & Elshazly, (2022),** that noticed a pronounced decrease in thickness and circumferential limb difference at the wrist, below and above the elbow of group A at Post I (after 6 weeks) and Post II (after 12 weeks) compared with that of group B. At Power (1-β error probability) = 0.80 and α error probability = 0.05.

Then the final sample size required was 80 female patients (40 patients in study group, and 40 patients in the control group)

$$N_1 = \left\{ z_{1-\alpha/2} * \sqrt{\bar{p} * \bar{q} * (1 + \frac{1}{k})} + z_{1-\beta} * \sqrt{p_1 * q_1 + (\frac{p_2 * q_2}{k})} \right\}^2 / \Delta^2$$

$$q_1 = 1 - p_1$$

$$q_2 = 1 - p_2$$

$$\bar{p} = \frac{p_1 + kp_2}{1 + K}$$

$$\bar{q} = 1 - \bar{p}$$

$$N_1 = \left\{ 1.96 * \sqrt{0.205 * 0.795 * (1 + \frac{1}{1})} + 0.84 * \sqrt{0.33 * 0.67 + (\frac{0.08 * 0.92}{1})} \right\}^2 / 0.25^2$$

$$N_1 = 40$$

$$N_2 = K * N_1 = 40$$

p_1, p_2 = proportion (incidence) of groups #1 and #2
$\Delta = p_2 - p_1$ = absolute difference between two proportions
n_1 = sample size for group #1
n_2 = sample size for group #2
α = probability of type I error (usually 0.05)
β = probability of type II error (usually 0.2)
z = critical Z value for a given α or β
K = ratio of sample size for group #2 to group #1

Askary, Z. M., & Elshazly, M. (2022). Addition of local cryotherapy for treatment of post-mastectomy lymphedema. Lymphology, 55(2), 70-76.

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The study participants selected according to the following criteria:

***Inclusion criteria*:**

Adult breast cancer female patients with age between 20–60 years old, who undergone mastectomy and experienced arm lymphedema (stage 0–1), able to communicate verbally, and who exhibited their willingness to participate in the study.

Exclusion criteria:

Patients with irreversible lymphedema (stages II–III), have a local infection or wounds & abrasions of the affected arm& had a history of peripheral vascular diseases, connective tissue disorders, diabetic neuropathy and patients with cognitive impairment.

Tools

In order to attain the purpose of the current study, the following three tools were used:

Tool I: **Structured Interview Questionnaire**:

This tool was developed by the researcher based on recent literature review Fu et al., (2023); Yaghoobi Notash et al., (2022); Ali, El Gammal & Eladl, (2021), it consists of two parts:

Part I: Patients ' socio demographic characteristics as: age, marital status, educational level and occupation.

Part II: patients ' health-relevant data. This tool was used to assess height, weight, body mass index (BMI), breast cancer stage, type & site of operation, time of lymphedema development, stages of lymphedema, and history of chronic diseases (diabetes mellitus, hypertension and cardiac diseases).

Tool II: Lymphedema Tracking Tool

This tool was developed by the researcher after reviewing the recent literature from Sobh et al., (2023); Fu et al., (2022); Zhang et al., (2020) to assess lymphedema symptoms. It composed of 12 symptoms as swelling, arm heaviness, tightness, numbness, tingling, tenderness, arm weakness, etc. These symptoms associated with early stages lymphedema (grade 0 &1) to compare levels of improvement pre and post intervention. Each item has two responses (i.e., 0 = No (symptom absent), and 1 = Yes (symptom present).

Scoring systems of lymphedema Tracking tool

The total score ranges from 0 to 12 representing the number of symptoms present, with higher scores indicating a greater number of symptoms. Symptom severity was categorized as follows:

- 0–2 = No or minimal symptoms
- 3–5 = Mild symptoms
- 6–9 = Moderate symptoms
- 10–12 = Severe or multiple symptoms

Tool III: Numerical Rating Scale (NRS)

The numerical rating scale (NRS) adopted from Downie et al. (1978). It was used to assess pain intensity among patients who have lymphedema post mastectomy. This scale involves an 11-point rating scale (0 to 10), with 0 representing "no pain" and 10 "the worst pain ". The patients asked to circle the number that best described their pain intensity. The NRS transformed into a five-point ordinal scale interpreted as follows; "no pain = 0; mild pain = 1-4; moderate pain = 5–7; severe pain = 8 <10; the worst pain = 10".

Content validity and reliability:

Validity: - The tools were tested by five experts in medical-surgical nursing and medical statistics. Based on their feedback, modifications were made. The tool's feasibility and applicability were also tested through a pilot study conducted on 10% of BC survivors with stage 0 and 1 lymphedema (8 patients) who were randomly selected and excluded from the study sample.

Reliability was measured to evaluate whether all items of the study tools measure the same variables, and how well the used items fit together conceptually. Internal consistency and a reliability coefficient (Cronbach's alpha) of the components of the tool of data collection was tested by SPSS software version 26. The Cronbach's alpha value (internal consistency) of Tool II and Tool III were 0.810 and 0.789, respectively, indicating strong reliability.

Ethical considerations:

All relevant possible aspects considered. Prior to the study, oral / written consent was obtained from every patient enrolled in the study after providing comprehensive information about the nature of the study, aim, benefits, risks, compensation, and alternative treatment. The researcher emphasized that participation is voluntary, and the collected data will be treated confidentially and only used for the study. Participants also informed that they have the right to refuse to participate in the study and withdrawn at any time and the refusal to participate in the study won't affect their care. Anonymity, privacy, safety, and confidentiality were assured throughout the whole study.

Field work & data collection process:

Data collection extended over a period of eight months started from the beginning of October 2024 to the end of May 2025. The study was carried out through the following three phases:

Phase I: Preparatory &Assessment phase

Before data collections, permissions were obtained from Research Ethics Committee of and the hospital authority. Then data collections tools were prepared by the researcher, tool I and tool II were created by the researcher after reviewing the recent literature while tool III was a standardized tool that was used without altering its content. Next, the tools' final English version were translated into Arabic. Subsequently, the tools were tested by five experts of Medical- Surgical Nursing& medical statistics to assess its validity. According to their opinions, modifications were done.

Moreover, a pilot study carried out on 10 % of the post mastectomy patients with lymphedema stage (0, 1) (8 patients) who randomly selected. It was done to check feasibility &applicability of the tools. Also, through this phase the researcher developed simple colored booklet about the effective application of cryotherapy for the study group and reviewed by experts, it was covering the following items; Overview about BC and its complications, Lymphedema definition and its stages, Definition of cryotherapy, Idea of cryotherapy, Tips of effective cryotherapy application, schedule of cryotherapy application& its precautions. The booklet is written in simple Arabic with various illustrations to enhance understanding of the content for patients who are unable to read.

Afterward, the researcher met BC survivors who suffered from early stages of lymphedema according to the inclusion criteria and accepted to participate in this study after explaining the study aim and nature, the researcher started by the assessment of the demographic & health relevant data using tool I (part 1&2) and for lymphedema symptoms using tool II& tool III. Then the participants divided equally in to two groups: control group and study group.

Phase II: Implementation phase

Topical cryotherapy was applied for the study group only in the form of using reusable gel ice packs with straps, which are gel-based. The gel content of the pack provides better cooling power than frozen water, which can be refreezed and used more than once, and the straps secure it in place as much as needed. Moreover, it is manufactured wrapped in cotton cloth, which reduces patient discomfort from direct exposure to cold.

Cryotherapy was used over a 12-week period, consisting of three sessions per week on alternate days. Each session lasted for 15-20 minutes. according to standard protocol and recommendations from recent research Askary& Elshazly, (2022).

In the first session, after explaining the procedure and its purpose, the researcher confirmed that there were no contraindications to cryotherapy among the study participants, such as wounds or abrasions on the affected arm. The researcher then provided each participant with a booklet explaining the technique for applying localized cryotherapy to the affected arm. Afterward, the skin of the affected arm was washed and gently dried. A reusable ice pack was then applied to the affected arm from the distal end to the proximal end (from the hand towards the upper arm) to mimic the direction of lymphatic drainage, for 15- 20 minutes. During the session skin and patient response were monitored for any abnormality such as exaggerated numbness and tingling.

After the session, the researcher removed the ice pack, dried the skin with a clean towel, and helped the patient to cover his arm. The researcher then returned the reusable gel ice pack to the plastic bag to keep it clean, labeling it with the patient's name and room number. As each patient in the study group received a reusable gel ice pack, which then stored in the freezer for later use.

The participants were instructed to repeat the procedure twice daily on three non-consecutive days per week for 12-weeks period. This frequency helps maintain regular control over swelling, discomfort and other lymphedema symptoms associated with lymphatic congestion.

Phase III: Evaluation phase

- lymphedema related symptoms among the control group were evaluated after 12 weeks from receiving the routine care of lymphedema then the results compared with the pretest.
- The study group also evaluated for lymphedema related symptoms after 12 weeks of receiving cryotherapy sessions. Then the results compared with the pretest.
- Then the results of control and the study group were compared to investigate the effect of topical cryotherapy on lymphedema symptoms among BC survivors with mastectomy.

Statistical analysis

The collected data were coded, entered, tabulated, and analyzed using SPSS (Statistical Package for Social Sciences) version 26 (IBM Corporation, Armonk, NY, USA). For quantitative data, the mean and standard deviation were calculated. For qualitative (categorical) data, described by frequency and percentage, comparisons between groups were conducted using the Chi-square test (χ^2) or the Monte Carlo test for small, expected frequencies. The significance level of $p<0.05$ was considered statistically significant, with $p<0.01$ indicating high significant.

Results

Table (1): Show patients ' socio demographic data in both groups, it was noted that the mean age of the control and study groups were (46.75±5.34) and (47.50± 4.67) respectively. Regarding marital status, 57.5% of the control group and 70% of the study group were married. Concerning educational level, 40 % and 52.5% of the control and study groups respectively have secondary education.

As regards occupation, the majority of the control and study groups (92.5% and 95%) respectively were un employed.

This table demonstrates that, there is no statistically significant difference between the two groups as regard demographic data ($p > 0.05$).

Table 2: - Represents the health relevant data the studied patients in both groups, as it observed that more than half (55%) of both groups had undergone mastectomy less than one year ago. In relation to the type of operation, more than two third (70%) of the control and study groups had undergone modified radical mastectomy. Regarding to the site of operation, more than half (60%), (67.5%) of the control and the study groups respectively was right breast. Concerning the current treatment, 62.5% of the control group and 47.5% of the study group receiving chemotherapy. As for comorbid diseases, (17.5%), (12.5%) of the control & study groups respectively have comorbid diseases such as diabetes mellitus, while 32.5% of the control group and 25% of the study group have hypertension.

Also, this table demonstrates that, no statistically significant difference between the two groups as regard health relevant data ($p > 0.05$).

Figure (1) Illustrates that, more than one-third (40% and 42.5%) of the control and study groups respectively, experienced lymphedema symptoms after one year or more following mastectomy meanwhile approximately two thirds of them experienced lymphedema symptoms within the first year of mastectomy.

Figure (2) Demonstrates that, more than two third of the control and study groups (72.5%& 70%) respectively have grade I lymphedema.

Table (3): Displays comparison between the control and study groups as regard lymphedema tracking tool pre and post the intervention, it observed that, pre intervention, there was no significant difference in self-reported lymphedema related symptoms between both groups ($P > 0.05$) value, while post intervention, study reveals significant improvement in all self-reported lymphedema symptoms among the study group compared to the control group (P value <0.05).

Figure (3) Illustrate that there was no significant difference in the severity of lymphedema symptoms between the control and study groups before the intervention, where the total mean scores of lymphedema symptoms severity among the control group and the study group were (9.90±2.15) &(10.05±2.1) respectively, meanwhile, after 12 weeks of the study, there was a significant reduction in lymphedema symptoms severity among the study group, as its total mean score reduced to 2.83±4.11 compared to the control group whose mean score was 8.85±3.2.

Figure (4) Demonstrates that there was no significant difference in the pain intensity between the control and study groups before the intervention, where the pain total mean scores among the control and study groups were (6.15±1.56) &(6.20±1.42) respectively, but after 12 weeks of the intervention reveals that, there was a significant reduction in the pain intensity among the study group, as their total mean score was

2.13±2.47compared to the control group whose total mean score was 5.00±2.47.

Table (1): Patients ' socio demographic characteristics in both groups (N=80)

Variable	Control group		Study group		Test of significance	
	N=40	%	N=40	%	χ^2 / Mc	P
Age (years)						
30- <40	8	20.0	5	12.5	0.936	0.626
40- <50	17	42.5	20	50.0		
50- 60	15	37.5	15	37.5		
Mean ±SD	46.75±5.34		47.50±4.67			
Marital status						
Single	4	10.0	4	10.0	3.224	0.358
Married	23	57.5	28	70.0		
Divorced	5	12.5	1	2.5		
Widow	8	20.0	7	17.5		
Educational level:						
Illiterate	7	17.5	8	20.0	2.171	0.538
Read and write	9	22.5	5	12.5		
Secondary	16	40.0	21	52.5		
Higher education	8	20.0	6	15.0		
Occupation:						
Employed	3	7.5	2	5.0	0.213	0.644
Unemployed	37	92.5	38	95.0		

χ2= Chi-Square test, Mc=Monte Carlo

Table (2): Health-relevant data of the studied patients in both groups (N=80)

Variable	Control group		Study group		Test of significance	
	N=40	%	N=40	%	χ^2 / Mc	P
Breast cancer stage						
Second degree	21	52.5	17	42.5	0.802	0.370
Third degree	19	47.5	23	57.5		
Date of Mastectomy						
< 1 year	22	55.0	22	55.0	0.202	0.977
1-<2 years	7	17.5	6	15.0		
2-<5 years	7	17.5	9	22.5		
≥5 years	4	10.0	3	7.5		
Type of Operation:						
Total (simple) mastectomy	0	0.0	1	2.5	1.091	0.779
Modified radical mastectomy	28	70.0	28	70.0		
Skin sparing mastectomy	6	15.0	6	15.0		
Nipple sparing mastectomy	6	15.0	5	12.5		
Site of Operation						
Right breast	24	60.0	27	67.5	0.487	0.485
Left breast	16	40.0	13	32.5		
Current treatment						

Chemotherapy	25	62.5	19	47.5	2.075	0.354
Hormonal therapy	7	17.5	8	20.0		
None	8	20.0	13	32.5		
Suffering from chronic disease#						
No	26	65.0	30	75.0	0.952	0.329
DM	7	17.5	5	12.5	0.392	0.531
Hypertension	13	32.5	10	25.0	0.549	0.459

χ2= Chi-Square test, Mc=Monte Carlo, t=Student t test # More than one answer

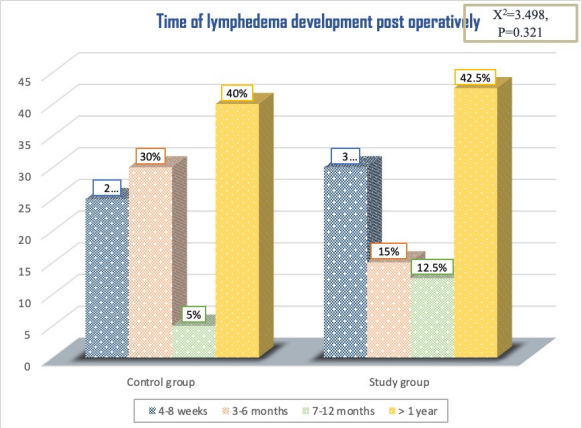

Figure (1): Time of lymphedema development post operatively in the control and study groups

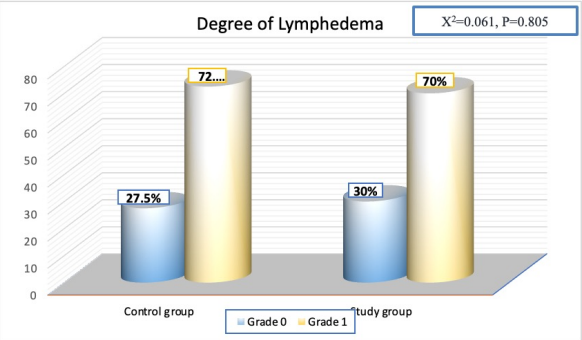

Figure (2): Degree of Lymphedema in the control and study groups

Table (3): Comparison between the control and study groups as regard lymphedema tracking tool pre and post the intervention

Lymphedema related symptoms	Time	Control group		Study group		Test of significance	
		N=40	%	N=40	%	χ^2	P
Arm swelling	Pre	29	72.5	28	70.0	0.061	0.805
	Post	25	62.5	6	15.0	**19.013**	**<0.001****
Indentation of the skin on pressure in the affected arm	Pre	29	72.5	28	70.0	0.061	0.805
	Post	25	62.5	5	12.5	**21.333**	**<0.001****
Feeling of heaviness in the affected arm and breast	Pre	40	100.0	39	97.5	1.013	0.314
	Post	36	90.0	13	32.5	**27.860**	**<0.001****
Feeling of tension in the affected arm	Pre	28	70.0	35	87.5	3.660	0.056
	Post	24	60.0	6	15.0	**17.280**	**<0.001****
Feeling of numbness in the affected arm	Pre	33	82.5	36	90.0	0.949	0.330
	Post	29	72.5	10	25.0	**18.061**	**<0.001****
Feeling of tingling in the affected arm	Pre	34	85.0	37	92.5	1.127	0.288
	Post	28	70.0	7	17.5	**22.400**	**<0.001****
Tenderness of the affected arm	Pre	39	97.5	40	100.0	1.013	0.314
	Post	38	95.0	21	52.5	**18.660**	**<0.001****
Feeling of burning sensation in the affected arm	Pre	34	85.0	37	92.5	1.127	0.288
	Post	33	82.5	7	17.5	**33.800**	**<0.001****
Arm weakness (arm resistance exercise)	Pre	38	95.0	37	92.5	0.213	0.644
	Post	32	80.0	10	25.0	**24.261**	**<0.001****
Clothing, or jewelry don't fit as normal.	Pre	26	65.0	21	52.5	1.289	0.256
	Post	22	55.0	8	20.0	**10.453**	**0.001****
Feeling of restricted mobility of the affected arm	Pre	34	85.0	36	90.0	0.457	0.499
	Post	31	77.5	8	20.0	**26.467**	**<0.001****
Veins can't be seen	Pre	32	80.0	28	70.0	1.067	0.302
	Post	31	77.5	12	30.0	**18.152**	**<0.001****

$\chi 2$= Chi-Square test, , **Statistically significant (P < 0.01)

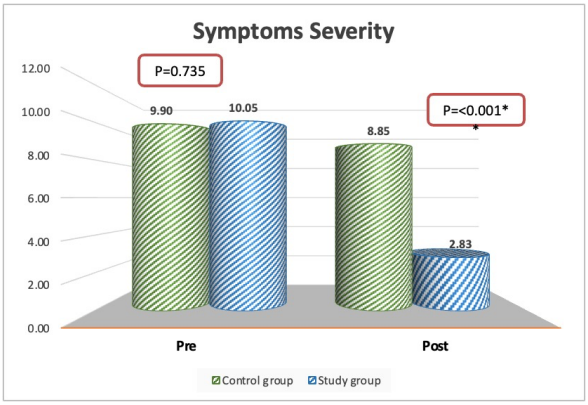

Figure (3): Comparison of the total mean scores of lymphedema symptoms severity between the control and study groups pre and post the intervention

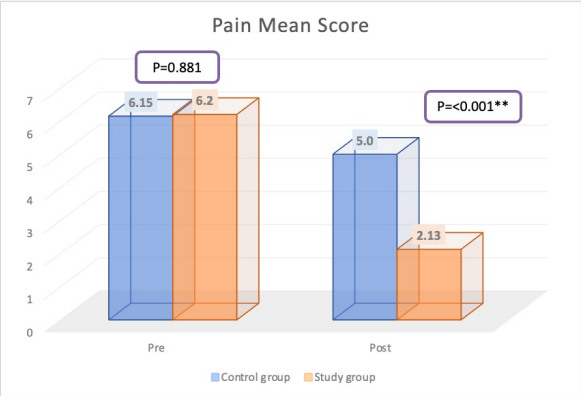

Figure (4): Comparison of total mean scores of pain intensity between the control and study groups pre and post the intervention

Discussion

The current study represented that approximately more than one third of the control group and half of the study group were between 40 to less than 50 years old. This finding was in the same line with Seraj et al. (2024) who found that more than 40% of lymphedema patients aged between 40 and 50 years old. Also, this finding came in agreement with Ren et al. (2022) who reported that lymphedema burden is higher among Black younger women (less than 50 years of age).

This may be due to the fact that Egyptian women in their 40s are considered the center and pillar of their families; they often juggle work, family, and household responsibilities. This leads to overuse of the affected arm in performing their duties, thus increasing the risk of developing or worsening lymphedema, unlike foreigners who receive all kinds of support during their illness (Elkafrawi& Refai, 2022). However, this finding contradicts the finding of Sali, (2024) who reported that the mean age of lymphedema patients was 55 years old.

As regards marital status, the results of the current study revealed that more than one half of the control group and less than three quarters of the study group were married. These results are consistent with Dizer et al. (2025) who stated that the majority of post mastectomy female patients who complained from arm lymphedema were married. This may be due to the burden of married women caring for their family, which causes their arms to be under stress, hence increasing the risk of lymphedema (Natarajan et al., 2023). In contrast, the study conducted by Mohammed, (2023) denoted that more than half of lymphedema female patients were single.

Regarding the onset of lymphedema postoperatively, the current study showed that approximately two thirds of the control and study groups experienced lymphedema within the first year of mastectomy. These results came in agreement with Gallegos-Alvarado et al. (2024) who revealed that two third of BC survivors had lymphedema 6th months post-mastectomy, while these results were inconsistent with Chitapanarux et al. (2025) who reported that upper extremity lymphedema is a late side effect that typically develops from 2 to 5 years after BC treatment.

According to the researcher's point of view, lymphedema may occur early post mastectomy, but it isn't diagnosed earlier due to insufficient awareness about post mastectomy lymphedema among patients and the medical field as a whole. As BC survivors may experience earlier symptoms of lymphedema, such as a feeling of heaviness & tightness, but these symptoms are often ignored because they are preoccupied with cancer and its consequences instead of its symptoms. In addition, the lack of recognition of lymphedema as a medical pathology within the general medical community leads to a lack of monitoring and follow-up of BC survivors to detect this condition in the earlier stages. This point is also supported by Bowman & Rockson (2024) who discovered that most BC patients experience greater delays between symptom onset and diagnosis of post mastectomy lymphedema.

Regarding the lymphedema symptoms, the present study revealed that there was a significant improvement in all self-reported lymphedema symptoms among the study group post intervention compared to the control group. These results are congruent with a study conducted in Egypt by Sobh et al. (2023) who reported that there was statistically significant improvement in the total mean score of lymphedema related symptoms among lymphedema patients after receiving cryotherapy intervention. This

came also in accordance with Hill et al. (2024) Who reported that cold therapy has been shown to alleviate the symptoms of lymphedema by reducing limb volume and discomfort.

In addition to pain management, the results of the present study showed that there was a significant reduction in the pain intensity among the study group compared to the control group. This finding is consistent with Stachyrak et al. (2024) who stated that cryotherapy acts as analgesia, it can effectively reduce chronic pain associated with various diseases.

Also, this finding supported by Pouedras et al. (2021) who reported that 'historically, treatment based on local cryotherapy was first described by Hippocrates for its analgesic, anti-edematous and muscle relaxing properties". It could be used due to many mechanisms including slowing nerve conduction velocity (NCV), vasoconstriction, leading to decreased blood flow and thus less pain and edema.

From the researcher point of view, the effectiveness of cryotherapy on pain intensity in this study is primarily due to most participants experiencing mild to moderate pain, as research indicates that ice packs are generally more effective for relieving mild to moderate pain compared to severe pain; severe pain often requires a multi-faceted management approach, including pain medication, physical therapy, and other interventions (Greenhalgh, 2023).

Conclusion:

The current study concluded that the topical cryotherapy is an effective intervention in improving the lymphedema symptoms among BC survivors with lymphedema.

Recommendations: Based upon findings of the present study, the following suggestions can be recommended**:**

- Raising the awareness of all BC survivors regarding the importance of contacting their healthcare providers immediately as lymphedema symptoms arise to prevent its progression to irreversible condition.
- The same study could be replicated on a large sample size of patients.
- Oncology Units should support the nonpharmacological intervention such as cryotherapy in improving lymphedema symptoms in the routine care for BC survivors with early stages lymphedema to prevent its progression to the late and irreversible stages

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