



Effect of Kneading Friction Petrissage Massage on Post Laparoscopic Cholecystectomy Nausea

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Abstract: Background: Postoperative nausea is a common and distressing side effect where 40–70% of patients undergoing laparoscopic cholecystectomy (LC) are most worried about. The study aimed to determine the effect of kneading friction petrissage massage on post laparoscopic cholecystectomy nausea. **Method and Sample:** A quasi-experimental design was conducted at Mansoura University Hospital's Gastrointestinal Surgery Center over eight months. The sample included 64 post laparoscopic cholecystectomy patients having nausea, divided into two groups: the massage therapy group (n=32), and the control group (n=32). The massage therapy group received kneading friction petrissage massage at intervals of 4, 8, and 12 hours post-surgery. Nausea level was measured 2 hours after the surgery before any intervention as well as 4, 8, and 12 hours after the surgery, using a structured interview and visual analog scale. **Results:** There was a significant reduction in nausea in the massage therapy group compared to the control group ($p < 0.001$). **Conclusion:** kneading friction petrissage massage has effective results in reducing post laparoscopic cholecystectomy nausea. **Recommendation:** Kneading friction petrissage massage should be incorporated into post cholecystectomy routine care to alleviate nausea.

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1. Introduction

Since Mouret introduced laparoscopic cholecystectomy (LC) in 1987, it has become the treatment of choice for gallstone disease. When compared to open cholecystectomy, the benefits of LC are well-documented and frequently include shorter ileus, less postoperative discomfort, quicker oral intake, an earlier return to daily activities, and superior esthetic results (Warda, Al-Bahy, El-Ganash, & Elghadban, 2023). According to Mansoura University's Gastrointestinal Surgery Center, there were about 885 individuals who had cholecystectomy in 2023; 863 of these patients underwent LC, while 22 underwent open cholecystectomy (Gastrointestinal Surgery Center office, 2023). An estimated 300,000 LC operations are performed annually in the United States (Ravendran et al., 2024). According to estimations, Turkey conducts an average of 40,000 to 60,000 LC surgeries annually (Bulut & Karabulut, 2023). The Iraqi Ministry of Health reports that there are around 10,000 adults with LC (Ali, Kadhim, & Khachian, 2023).

One of the most prevalent surgical side effects that patients encounter is nausea, which is often identified as a significant factor in patients' discomfort with anesthesia (Davolos, Modolo, Braz, & Nascimento, 2024). Problems including aspiration of the stomach contents, wound disclosure, esophageal rupture, and subcutaneous emphysema might result from this condition, which may delay the patient's discharge. According to reports, between 40% and 75% of people have this problem after LC (Badakhsh, Hamed, & Azizi, 2019). Following a LC, nausea is thought to be caused by splanchnic pressure and manipulations, fast peritoneal distension, and response reflexes that activate neurogenic pathways. Pneumo-peritoneum formation is a crucial aspect of laparoscopy, which causes mechano-receptor stretching, elevated serotonin (5HT) production, and ultimately nausea (Jamtsho et al., 2024).

Postoperative nausea and vomiting (PONV) can be prevented using a variety of methods, including pharmaceutical and non-pharmacological approaches. Corticosteroids like dexamethasone, dopamine antagonists like prochlorperazine and metoclopramide, antihistamines like diphenhydramine, and 5-hydroxytryptamine type 3 receptor antagonists like ondansetron and granisetron are among the often prescribed drugs. On the other hand, these medications may cause negative side effects such as headaches, constipation, high liver enzymes, elevated blood glucose, and changes in blood pressure (Ha, Park, Ko, Park, & Kim, 2024). Recent research has highlighted the importance of non-pharmacological interventions, which have fewer side effects. Acupressure, a classic non-invasive

massage method, is one example of complementary medicine that has been used to treat a variety of ailments. The fact that it is recognized by the World Health Organization as an additional medical profession highlights its importance even more (Imani, Zare, & Khazaei, 2024).

Massage therapy is seen as a vital part of health and well-being and is a type of complementary medicine. Hand massage, a type of reflexology, involves stroking certain parts of the hands with the knuckles, fingers, and blunt to activate the ends of the nerves believed to correspond to different organs in the hands (Ahmed & Abo El-Ella, 2023).

Although numerous approaches have substantial benefits in decreasing post laparoscopic nausea, to our knowledge, no previous research investigated the effect of kneading friction petrissage massage, for the alleviation of nausea following laparoscopic cholecystectomy. Consequently, our goal was to evaluate the effect of kneading friction petrissage massage on post laparoscopic cholecystectomy nausea. We hypothesized that kneading friction petrissage massage could reduce post laparoscopic cholecystectomy nausea.

2. Method

Study Design:

This study employed a quasi-experimental research design.

Setting:

The study was conducted at Mansoura University's Gastrointestinal Surgery Center, where patients undergo laparoscopic cholecystectomy. The center provides healthcare services to patients from Mansoura and surrounding areas in Dakahlia Governorate. The surgical department is located on the 2nd and 5th floor of the hospital, each floor consisting of 10 rooms each containing two beds. The nurse-to-patient ratio is 1: 5.

Subjects:

Sample technique:

A purposive sample of 64 post-laparoscopic cholecystectomy patients, who were experiencing nausea, the study participants were divided into two matched groups: Massage therapy group (A), and control group (B). The study included patients of both sexes, between the ages of 20 and 60, who can communicate and who are ready to take part in the study, and excluded those who had postoperative bleeding, postoperative complications requiring mechanical ventilation, postoperative hemodynamic disorders, patients who had respiratory aspiration, patients who had a history of drug abuse, patients whose surgery converted from laparoscopic to open surgery, and uncooperative patients.

Data collection tools:

Data relevant to the study was gathered using two tools:

Tool I:

A structured Interview Questionnaire:

After reviewing pertinent literature, the researcher developed this tool (Bastamizad, Abbasi, Salari & Jalali, 2023). It included the following 2 parts:

Patient's Demographic Data:

This part addressed the personal data of the patients and consisted of 6 items (age, sex, marital status, occupation, educational level, and activity level).

Health Relevant Data:

This part highlighted the patient's medical history, history of previous surgery, smoking, vital signs, post-operative antiemetics, total length of stay, and body mass index.

Tool II:

Visual Analog Scale (VAS):

This tool was originally developed by Price, McGrath, Rafii, & Buckingham, (1983); it has a 10-cm vertical or horizontal line with the maximum and lowest comfort values at either end (0: high comfort, 10: high discomfort). Patients were able to self-report their level of nausea using this scale. The severity of nausea was recorded four times by the participants (2 hours after the surgery, before any intervention, as well as 4, 8, and 12 hours post-procedure). The patient was given this tool to identify the spot on the line that most accurately reflected their level of nausea. The level of nausea was then recorded based on the given number.

Scoring system: For measuring the level of nausea, its total score:

Score (0) = high comfort, score (1-3) = mild nausea, score (4-6) = moderate nausea, score (7-10) = severe nausea.

Process of data Collection:

Phase I: Preparatory phase:

- The Research Scientific Ethical Committee of Mansoura University's Faculty of Nursing provided ethical permission. Following a description of the study's aim, the director of Mansoura University's Gastrointestinal Surgery Center granted formal written consent to operate the study.

- **Tools development:**

- **Tool I:** After reviewing relevant literature, the researcher developed a structured interview questionnaire.
- A panel of five experts from medical-surgical nursing departments assessed the content validity of the created tools, and the required modifications were made.
- Face validity was tested by doing a pilot research on 10% (7) of the study population to make sure the generated tool was feasible, clear, relevant, thorough, error-free, and applicable. The results were then excluded from the study sample.
- Feasibility is determined by an analysis that takes into account all pertinent aspects of a research, such as technical, legal, economic, and scheduling issues, in order to determine the possibility of a successful completion.
- The study tool reliability was assessed to see if all of the items measured the same variable throughout time and how well the conceptual fit of the items was maintained. Cronbach's alpha coefficient test was used to assess the research instruments' internal consistency. It was founded as, ($\alpha = 0.832$).

- **Training course:**

- The researcher took a training course on how to perform kneading friction petrissage massage techniques correctly to ensure effective performance in the massage group.

- **Ethical consideration and human rights:**

The study was approved by the Research Scientific Ethical Committee of Mansoura University's Faculty of Nursing (Ref No. 400- 29/10/2023). The study was conducted in accordance with the Declaration of Helsinki. All pertinent aspects were taken into account. Each patient was fully informed about the study's purpose, nature, risks, benefits, compensation, and alternative treatments before giving their oral and written permission. The participant's participation is completely voluntary, the researcher said. The choice to leave the study at any moment would not impact the participants' care, they were told. Confidentiality, safety, privacy, and anonymity were all assured during the whole study.

Phase II: Operational phase:

- When the necessary approval was obtained the researcher started to collect data. Data collection extended over a period of 8 months, from the beginning of April 2024 to the end of November 2024.
- The study's framework was executed in four phases, which started from the postoperative phase in the surgical ward, as the patient regained consciousness, and ultimately reached a point in which became capable of responding to nursing instructions:
 - A. Assessment phase.
 - B. Planning phase.
 - C. Implementation phase.
 - D. Evaluation phase.

A. Assessment phase:

In order to ensure that every patient met the inclusion criteria, each patient was interviewed separately and the required data was gathered using all study tools. The researcher spent around 15 to 20 minutes questioning patients and completing the questionnaire.

B. Planning phase:

In accordance with the results of the assessment phase, patients who met the requirements for sampling and consented to take part in the research were split into two equal groups: the massage therapy group (A), which received a kneading friction petrissage massage, and the control group (B), which was given standard hospital care.

C. Implementation phase:

For patients in the group (A), the kneading-friction-petrissage massage was explained in a clear and simplified manner, taking into consideration their health condition. After the surgery, the massage was done at regular intervals of 4, 8, and 12. According to (Mottahedi, Shamsi, Babani, Goli, & Rizevandi, 2023), the kneading friction petrissage massage was performed using this protocol as shown by the researcher in Figure (1):

The researcher properly washed her hands, patted them dry with a towel, and then rubbed them with oil.

The massage was applied to the patient's hand. Using one hand to hold the wrist, the massage started by applying direct pressure to the base of each finger before moving in a circular motion with the other hand to the tip.

The palm was kneaded in alternate directions using firm pressure and C-like motions.

From the wrist to the base of each finger, the back of the hand was stretched using forward motions.

The massage proceeded by moving the thumbs in a clockwise and counterclockwise circular motion around the wrist bones.

While the patient's arm was lying flat on the bed, the researcher's palm was used for upward movements from the wrist to below the elbow and downward movements from the elbow to the wrist. Gentle forearm twisting motions was the final technique used in the massage.

In order to avoid any problems during the massage therapy, patients were requested to let the researcher know if they had any risk factors as (blood clots in their hand or arm).

The massage procedure lasted around 30 minutes in a noise-free, peaceful setting three times for a total of 90 minutes.

Using a well-thought-out program, the massage technique was carried out with the proper pressure and rhythm.

- **Petrissage Massage:** Using the fingertips, apply direct pressure gradually and regularly.
- **Friction Massage:** The researcher applies pressure to the area using the front of their fingertips or their palm while rubbing in tiny circles.
- **Kneading Massage:** It resembles twisting and successively alters the direction of compression.
- Only standard hospital treatment was given to patients in the control group (B).

D. Evaluation phase:

This phase aimed to evaluate the effect of massage therapy on the level of nausea, 2 hours post surgery before any intervention and three times post the intervention at 4, 8, and 12 hours in the group A and comparing with the group B at the same times.

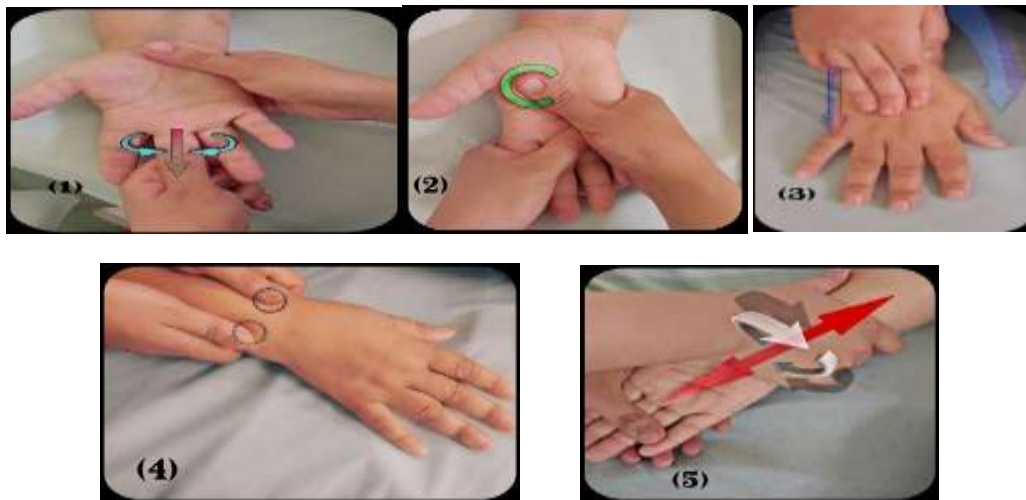


Figure (1): A patient in the massage therapy group (A): (1). finger massage, (2) palm massage, (3) backhand massage, (4) wrist massage, (5) forearm massage.

Statistical analysis

Statistical Package for the Social Sciences, version 26 (SPSS) software was used to arrange, tabulate, and statistically analyze the data that had been gathered (SPSS Inc. Chicago, IL, USA). Both percentage and frequency were used to represent the category variables. Using the mean and standard deviation, the parametric continuous variables were expressed. The Shapiro-Wilk test was performed to examine the data's normality; if "Sig" is less than 0.05, the variable is not normally distributed. When the dependent variable is categorical, two or more independent groups are compared using Pearson's Chi square test (χ^2). When there are many small expected values, the Pearson's Chi square test can be substituted with the Fisher exact test (FET) and the Monte Carlo exact test. When the dependent variable is regularly distributed, the student t-test of significance is employed to assess the differences between two independent groups. To determine if the means of three or more independent groups vary statistically from one another, the ANOVA test of significance is utilized.

3. Results:

Table (1): Shows the distribution of the studied patients according to their demographic characteristics. Regarding gender, it was noticed that females were more prevalent than males where 53.1%, and 59.4% of the massage

group, and control group, respectively were females. Regarding age, the age group of 50 to 60 years represents the highest percentage with a mean age of 43.68 ± 10.47 years for the massage group, and 45.03 ± 9.67 years for the control group. Regarding marital status, 81.3%, & 62.5 of the patients in the massage, and control groups respectively were married. Intermediate education prevailed among the highest percentages of educational levels in the massage, and control groups by about 34.4%, and 40.6% respectively. Regarding occupation, 59.4% of the massage group, and 62.5% of the control group were working. With no statistically significant difference between the two groups regarding all personal data as sex, age, marital status, educational level, and occupation as p-value >0.05 .

Table (2): Reveals health-relevant data of the studied patients. As regards to medical history, 62.5% of the massage group, and 78.1% of the control group hadn't a previous medical history. Concerning previous surgery, 56.3%, & 53.1% of the patients in the massage group and control group, respectively, had no surgical history. Pointing to smoking, a percentage of 65.6%, & 81.3% in the massage group, and control group respectively, weren't smokers. Pointing to BMI, the largest proportion of patients in the massage, and control groups had BMI between 25 and 29.9, which were 50.0%, and 46.9%, respectively. Regarding the indication of the surgery, 93.7%, and 90.6% of the patients in the massage, and control groups respectively had gallstones. 96.9%, and 93.7% of the patients in the massage group, and control group respectively spend one day in the hospital after the surgery. With no statistically significant difference among both groups regarding all health-relevant data such as medical history, previous surgery, smoking, BMI, indication of surgery, and duration of hospital stay after surgery as p-value >0.05 .

Table (3): compares the postoperative nausea level between the two groups throughout the study periods. The data clearly indicates that there was an improvement in nausea levels in the massage group compared to the control group. Notably, 0.0% of patients in all three groups reported no nausea immediately after surgery, whereas 90.6%, and 43.8% of patients reported no nausea 12 hours after surgery in the massage, and control groups, respectively.

Table (1): Demographic characteristics of the studied patients (n=64)

Variable	Massage group		Control group		Significance test (P)
	N=32	%	N=32	%	
Sex					
Male	15	46.9	13	40.6	$X^2= 0.254$ (0.612)
Female	17	53.1	19	59.4	
Age (Years)					
20 to less than 30	5	15.6	2	6.3	Mc= 1.448 (0.694)
30 to less than 40	7	21.9	8	25.0	
40 to less than 50	9	28.1	10	31.3	
50 to 60	11	34.4	12	37.5	
Mean \pm SD	43.68 \pm 10.47		45.03 \pm 9.67		t=0.533 (0.569)
Marital status					
Single	4	12.5	2	6.3	Mc= 7.116 (0.066)
Married	26	81.3	20	62.5	
Widow	2	6.3	4	12.5	
Divorced	0	0.0	6	18.8	
Educational level					
Illiterate	7	21.9	5	15.6	$X^2= 3.300$ (0.348)
Read and write	6	18.8	2	6.3	
Intermediate education	11	34.4	13	40.6	
Higher education	8	25.0	12	37.5	
Occupation					
Work	19	59.4	20	62.5	$X^2=0.066$ (0.798)
Not work	13	40.6	12	37.5	

X^2 : Pearson Chi-Square

Mc: Monte Carlo test

F: One Way ANOVA

Table (2): Health relevant data of the studied patients (n=64)

Variable	Massage group		Control group		Significance test (P)
	N=32	%	N=32	%	
Medical history					
No	20	62.5	25	78.1	X ² = 0.333 (0.546)
Yes	12	37.5	7	21.9	
If yes type #	N=12		N=7		
Hypertension	7	21.9	5	15.6	X ² = 0.410 (0.522)
Respiratory disease	2	6.3	0	0.0	FE= 2.065 (0.151)
Diabetes Mellitus	4	12.5	4	12.5	X ² =0.000 (0.1000)
Previous surgery					
Yes	14	43.8	15	46.9	X ² = 0.063 (0.802)
No	18	56.3	17	53.1	
Current smoking					
Yes	11	34.4	6	18.8	X ² = 2.003 (0.157)
No	21	65.6	26	81.3	
Body mass index					
18.5-24.9	2	6.3	5	15.6	Mc= 1.472 (0.479)
25-29.9	16	50.0	15	46.9	
30 and more	14	43.8	12	37.5	
Indication of surgery					
Gallstones	30	93.7	29	90.6	Mc= 1.017 (0.601)
Biliary dyskinesia	0	0.0	1	3.1	
Gallbladder Polyps	2	6.3	2	6.3	
Duration of hospital stay after the surgery					
One day	31	96.9	30	93.7	FE= 0.350 (0.554)
Two days	1	3.1	2	6.3	

More than one answer X²: Pearson Chi-Square Mc: Monte Carlo test FE: Fisher Exact test**Table (3):** Comparison of nausea level between the studied groups throughout the study periods (n=64)

Nausea	Massage group		Control group		Significance test (P)
	N=32	%	N=32	%	
Immediate after surgery					
Mild	14	43.8	17	53.1	MC= 3.376 (0.158)
Moderate	17	53.1	11	34.4	
Severe	1	3.1	4	12.5	
4hrs after surgery					
No nausea	2	6.3	0	0.0	MC= 6.279 (0.043)*
Mild	27	84.3	22	68.7	
Moderate	3	9.4	10	31.3	
8hrs after surgery					
No nausea	14	43.7	2	6.3	MC= 12.574 (0.002)**
Mild	18	56.3	29	90.6	
Moderate	0	0.0	1	3.1	
12hrs after surgery					
No nausea	29	90.6	14	43.8	X ² = 11.470 (0.001)**
Mild	3	9.4	18	56.2	

X²: Pearson Chi-Square

Mc: Monte Carlo test

* statistically significant at p<0.05

** highly statistically significant at p<0.001

Figure (2) represents the nausea mean scores among the studied groups throughout the study periods. There were no significant differences between the massage group and the control group immediately after the surgery (p-value = 0.878), while it was noticed that the massage group average nausea score was significantly lower than the control group at 4 hours, 8 hours, and 12 hours post-surgery as (p-value <0.001).

Figure (3): displays the postoperative antiemetic dosage between the studied groups. The massage group significantly received a lower dose of antiemetic in comparison to the control group.

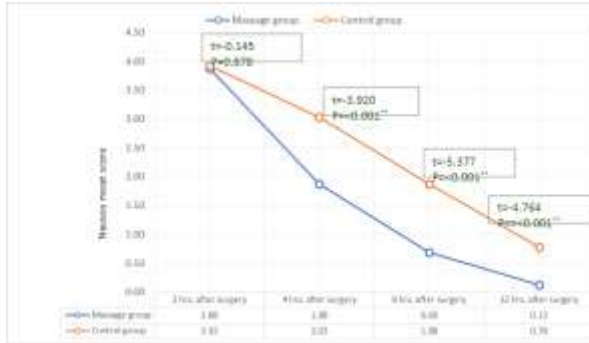


Figure (2): Nausea mean scores between the studied groups throughout the study periods
** Highly statistically significant at p<0.001

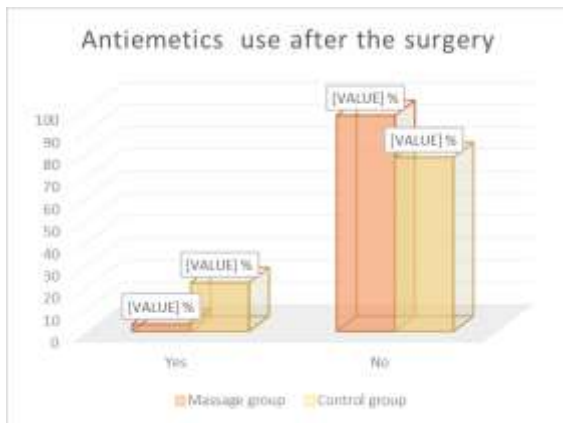


Figure (3): Post-operative antiemetic dosage between the studied groups

4. Discussion

During a laparoscopy, vagal stimulation from the pneumoperitoneum may cause nausea (Lakshmi, Nanjundappa, & Kulkarni, 2024). Since the pharmacological methods have numerous side effects, recent research has highlighted the importance of non-pharmacological interventions, which have fewer side effects (Imani et al., 2024). One type of complementary medicine is massage therapy which improve psychological, and physiological well-being (Ahmed & Abo El-Ella, 2023). Therefore; this quasi-experimental study highlights the effect of massage therapy on the level of nausea among post laparoscopic cholecystectomy patients.

The current study showed that most participants were females, aged between 50 and 60 years, and around three-quarters were married. Over one-third had intermediate education, and more than half were employed. The majority had no previous medical history, with hypertension being the most common among those who did. Over one-third had undergone previous surgeries, and nearly three-quarters were non-smokers. Half of the patients had a BMI between 25 and 29.9 kg/m². Most underwent laparoscopic cholecystectomy due to gallstones. These findings align with several regional and international studies, with variations explained by biological, cultural, and methodological factors. No significant differences were found between the study and control groups in terms of sociodemographic characteristics or medical history.

The present study's findings revealed that despite the progressive reduction of nausea in the two groups (massage and control) at the four times of measurements, this reduction in the massage group was more prominent and faster

than in the control group. It was noticed that the massage group's average nausea score was significantly lower than the control group's at 4 hours, 8 hours, and 12 hours post-surgery. Consequently, it might be said that the massage therapy aids in diminishing nausea among patients over time. Regarding the massage's impact, this study discovered that it significantly reduced the nausea mean score. Consistent with Behzadi & ALAEE (2020), Çankaya & Saritaş (2018), who discovered that massage was linked to a notable reduction in the occurrence of nausea. The results of the current investigation concur with those of Moghadam, Manzari, Ghaleenow, & Sanchooli (2021) that showed the positive effect of massage on reducing the severity of nausea in post laparoscopic cholecystectomy patients.

These results are congruent with Badr, Abdalla, Gaafer, & Kamel (2024), study showed that, in comparison to the control group, patients who received massage treatment experienced a marked reduction in their nausea and vomiting. Similarly to a study by Gür, Öztekin, Öztekin, & Yalçın (2024), in the intervention group, where the PC6 acupuncture point was stimulated, there was a noteworthy decrease in the incidence of PONV and the usage of antiemetic medications. Regarding the beneficial effect of massage on nausea, these findings may be justified as, muscle manipulation affects neuronal activity (sub-cortical nuclei) in the central nervous system and parasympathetic nervous system, as well as local blood flow, oxygen, and lymph drainage. Furthermore, the limbic system, vomiting center, and higher cortical areas of the brain receive endorphins, hormones, and neurotransmitters that are innervated and released by the gastrointestinal tract.

The results of the current investigation indicate that the massage group received a significantly lower dose of antiemetics in comparison to the control group. In line with a study conducted by Leanne Atkins, Abeer Hussain & DCLinP, (2023), at Saudi Arabia, on the impact of listening to the Qur'an on the postoperative care of patients undergoing laparoscopic cholecystectomy, the intervention group's demonstrated that patients' bodily comfort increased while they listened to the Qur'an. Like massage therapy, listening to the Qur'an is seen as a kind of relaxation.

According to the researcher, the massage effects in reducing nausea likely support lowering the dose of antiemetic medications given to patients. Additionally, massage promote relaxation, which may improve circulation and muscle relaxation, reduce surgical-related stress and discomfort, and, as a result, lower the feeling of nausea.

Limitations of the study

The major drawbacks of this study were the small sample size and the absence of long-term follow-up because patients were only monitored for 12 hours.

Conclusion:

The results of the present study show that kneading-friction-petrissage massage had a positive effect on post-laparoscopic nausea.

Recommendations:

The same study could be replicated on a large sample size of patients with different age groups, and in a different clinical setting.

Massage therapy should be incorporated into post-cholecystectomy routine care to alleviate nausea.

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Authors' contributions

Each author helped in the design, data gathering, analysis, and writing of the publication. Every author has read and approved the finished product.

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Data availability

All data involved in this study can be obtained from the corresponding author upon reasonable request.

Declarations**Ethics approval and consent to participate**

The study was approved by the Research Scientific Ethical Committee of Mansoura University's Faculty of Nursing (Ref No. 400- 29/10/2023). Written informed permission was acquired by each subject. The Declaration of Helsinki was followed when conducting the study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

References

- Ahmed, S. H., & Abo El-ella, M. M. (2023).** Effect of Hand Massage on alleviating Pain after Abdominal Surgery. *Tanta Scientific Nursing Journal*, 30(3), 116-126.
- Ali, N. M., Kadhim, A. J., & Khachian, A. (2023).** Vibration and Exercise Maneuvers to Minimize Patients' Shoulder Pain Post laparoscopic cholecystectomy: A Randomized Clinical Trial. *Iraqi National Journal of Nursing Specialties*, 36(2), 110-116.
- Badr, E. A., Abdalla, H. M., Gaafer, Y. A. E., & Kamel, M. Y. (2024).** Effect of peppermint inhalation versus Swedish massage on chemotherapy induced-nausea and vomiting in children with leukemia: Multi-arm randomised trial design. *Journal of Pediatric Nursing*, 77, 140-151.
- Badakhsh, M., Hamed, A., & Azizi, S. (2019).** Effect of Metatarsus Reflexology Massage in Laparoscopic Cholecystectomy Nausea: A Randomized Clinical Trial. *World*, 12(3), 117.
- Bastamizad, N., Abbasi, P., Salari, N., & Jalali, R. (2023).** Comparing the effect of incentive spirometry and deep breathing exercises on the level of shoulder pain and nausea following laparoscopic cholecystectomy surgery: a clinical trial study. *Gastroenterology Nursing*, 46(1), 14-22.
- Behzadi, S. H., & ALAEE, K. F. (2020).** The effects of foot reflexology massage on chemotherapy-induced nausea and vomiting in children suffering from cancer.
- Bulut, G., & Karabulut, N. (2023).** The effects of breathing exercises on patients having laparoscopic cholecystectomy surgery. *Clinical nursing research*, 32(4), 805-814.
- Çankaya, A., & Sarıtaş, S. (2018).** Effect of classic foot massage on vital signs, pain, and nausea/vomiting symptoms after laparoscopic cholecystectomy. *Surgical Laparoscopy Endoscopy & Percutaneous Techniques*, 28(6), 359-365.
- Davolos, F. J. C., Modolo, N. S., Braz, L. G., & Nascimento, P. D. (2024).** Palonosetron versus ondansetron for prophylaxis of postoperative nausea and vomiting in laparoscopic cholecystectomy: a non-inferiority randomized controlled trial. *Brazilian Journal of Anesthesiology*, 74(1), 744216.
- Gür, S., Öztekin, S. D., Öztekin, İ., & Yalçın, O. (2024).** The effects of Korean hand acupressure on postoperative pain, nausea, vomiting, and retching after thyroidectomy: A randomized controlled study protocol. *Journal of Education and Health Promotion*, 13(1), 347.
- Ha, N. Y., Park, M. J., Ko, S. J., Park, J. W., & Kim, J. (2024).** Effect of herbal medicine on postoperative nausea and vomiting after laparoscopic surgery: A systematic review and meta-analysis. *Medicine*, 103(23), e38334.
- Imani, B., Zare, F., & Khazaei, S. (2024).** Comparing the effects of acupressure and aromatherapy with peppermint essential oil on the quality of recovery of patients undergoing laparoscopic cholecystectomy: A randomized controlled trial. *Journal of Herbmmed Pharmacology*, 13(1), 111-119.
- Jamtsho, P., Dorjey, Y., Dorji, N., Tshering, S., Wangmo, K. P., Dorji, T., ... & Tshering, J. (2024).** Factors associated with postoperative nausea and vomiting after laparoscopic cholecystectomy at the National Referral Hospital, Bhutan: a cross-sectional study. *BMC anesthesiology*, 24(1), 248.
- LAKSHMI, B., NANJUNDAPPA, R., & KULKARNI, V. (2024).** Effect of 5% Dextrose Infusion on Postoperative Nausea and Vomiting in Patients undergoing Laparoscopic Cholecystectomy: A Randomised Controlled Study. *Journal of Clinical & Diagnostic Research*, 18(1).
- Leanne Atkins, B. S. N., Abeer Hussain, B. S. N., & DClinP, K. L. A. (2023).** The effects of listening to the Qur'an in the postoperative management of the patients undergoing laparoscopic cholecystectomy in the day surgery unit. *Journal of PeriAnesthesia Nursing*, 38(1), 58-62.

- Moghadam, E. S., Manzari, Z. A. H. R. A. S. A. D. A. T., Ghalenow, H. R., & Sanchooli, H. N. (2021).** Comparing the effect of hand and foot reflexology massages on the severity of nausea, vomiting and ileus in patients after abdominal surgery. *Pakistan Journal of Medical & Health Sciences*, 15(6), 1589-1593.
- Mottahedi, M., Shamsi, M., Babani, S. F., Goli, S., & Rizevandi, P. (2023).** Comparing the effect of transcutaneous electrical nerve stimulation and massage therapy on post laparoscopic shoulder pain: a randomized clinical trial. *BMC Musculoskeletal Disorders*, 24(1), 764.
- Price, D. D., McGrath, P. A., Rafii, A., & Buckingham, B. (1983).** The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. *Pain*, 17(1), 45-56.
- Ravendran, K., Elmoraly, A., Kagiosi, E., Henry, C. S., Joseph, J. M., Kam, C., & Joseph, J. (2024).** Converting From Laparoscopic Cholecystectomy to Open Cholecystectomy: A Systematic Review of Its Advantages and Reasoning. *Cureus*, 16(7).
- Warda, H. H., Al-Bahy, A. M., El-Ganash, A. E. A. M., & Elghadban, H. M. (2023).** Mini-Laparoscopic Cholecystectomy Versus Conventional Laparoscopic Cholecystectomy. A Prospective Randomized Control Study. *The Egyptian Journal of Hospital Medicine*, 90(2), 3350-3358.

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