

Effect of Warm Pads, Effleurage Massage or Trendelenburg Position in Reducing Shoulder Pain after Gynecological Laparoscopic Operations

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Abstract

Background: shoulder pain is a frequent complaint following gynecological laparoscopic surgery. The aim of this study was to compare the effect of a warm pad, effleurage massage, or Trendelenburg Position for reducing shoulder pain after gynecological laparoscopic operations. A quasi-experimental design was utilized in the current study. **Setting:** The study was conducted at the gynecological unit of the obstetric department at Beni Suef University and Zagazig University Hospitals; during the period from July 2021 to June 2022. a convenience sample of 150 women after gynecological laparoscopic operation were enrolled in the study in the following groups (warm pads group, effleurage massage group, and Trendelenburg Position group). Four instruments were used for data collection. The tool I: A semi-structured interviewing questionnaire, Tool II: Physiologic and behavioral response to pain sheet (PBRPS), and Tool III: Numerical pain rating scale. Tool IV Pregnant Women's satisfaction. **Results:** The study finding revealed that women who use effleurage massage after gynecological laparoscopic operations expressed less shoulder pain intensity than those women in the other 2 groups who use warm pads or Trendelenburg Position after gynecological laparoscopic operations with highly significant differences between the three studied groups regarding all items of the physiological responses with (p equal <0.0001). **Conclusion:** Effleurage Massage revealed a higher effect than both warm pad and Trendelenburg Positions in reducing shoulder pain after the laparoscopic operation. **Recommendation:** Nursing intervention should be updated to include non-pharmacological management of shoulder pain after the laparoscopic operation.

Keywords: Effleurage massage, Trendelenburg Position, Gynecological laparoscopic operation, Warm pad, Shoulder pain.

Introduction

Laparoscopic gynecologic surgery has germinated from a limited surgical procedure utilized only for diagnostic purposes to a major surgical approach for treating a multitude of malignant and nonmalignant pathologies. It presents one of the most common surgical procedures performed by gynecologists, **Zeeni et al. (2020)**. While **Li & Li (2021)** declared that the pain after laparoscopic surgery has not disappeared. Although laparoscopic surgery has established its superiority over laparotomy in terms of developed post-operative pain scores, postoperative shoulder pain stays a major concern following laparoscopic surgeries. Shoulder pain is documented to occur among 35 to 70% of women who perform laparoscopic surgeries **Ko-Iam et al.,(2016)**.

Numerous patients may feel shoulder pain, which is more uncomfortable than abdominal incision and visceral pain and is rarely seen in traditional laparotomy. Because most patients think shoulder pain has nothing to do with surgery, it makes them more anxious. This may lead to discomfort and a poor quality of life after laparoscopic surgery and significantly reduce patient satisfaction. The shoulder pain could be severe, and it is usually alleviated within 24–48 hrs., but rarely persists for over 72 hrs. later surgery. The precise mechanics of this pain remains unclear. The chief hypothesis is the presence of residuary carbon dioxide (CO₂) in the abdominal cavity that cause an irritation of the phrenic nerve and referred pain in the shoulders **Mohamed & Abd Elhady, (2016)**; **Jasim et al., (2017)**; **Zeeni et al. (2020)**. The most frequent side effect of gynecological laparoscopic surgery is shoulder pain. Gas pain is the name for this

kind of discomfort. Initially felt below the belly button, the discomfort subsequently rises to the shoulder. Despite being temporary in most situations, the pain often lasts two to three days (**Jasim et al., 2017**). The ability to control pain is acknowledged as a key indicator of health standards and the caliber of the medical care offered. This makes it impossible to undervalue the significance of effective pain control during the postoperative treatment period. A regular evaluation of the care quality is one of the components of quality development (**Köse Tamer & Sucu Da, 2020**).

For effective women's care, the development of pain management should be updated, as well pharmacological and non-pharmacological approaches regarding pain management should be followed. Likewise, these methods may help reduce pain and it must be encouraged as a part of comprehensive pain management efforts. Therefore, the abilities and preferences of the women regarding the use of non-pharmacological techniques should be interpreted into consideration; it should be underlined for the women that these are used together with medical and pharmacological treatments and the use of non-pharmacological methods should be enclosed to the care plan when women are suitable and willing to perform it. **Mohamed & Abd Elhady, (2016)**.

Warming therapy involves the use of heat to relax the muscles, facilitate blood circulation, and advance metabolism, so pain is relieved. It is inexpensive, saves time, and needs no special training or skills. Moreover, warming therapy arouses a sympathetic reaction that increases blood circulation in areas other than those directly in contact with heat. Warming therapy could also reduce pain by increasing the threshold of pain delivery fibers **Yurdanur, (2012); Suk et al., (2022)**.

The warming pad has become an established complementary modality in some invasive procedures and an effective tool for reducing pain and anxiety (**Kim et al., 2019**). Massage influences the soft tissues of the body. It is used to relax muscles and to help calm people. There are different massage techniques that may help to reduce pain such as lower

back massage, smooth strokes, also called effleurage, counter pressure, and hip squeezes. Massage stimulates our body to release endorphins, the natural pain-killer, and mood-lifting chemicals produced in the brain (**Choudhary et al., 2021**). The patients were positioned in a Trendelenburg position (20 °) once fully awake and become cooperative in the PACU and retained this position for the first 24 hrs. Trendelenburg position is an easy and safe nonpharmacologic intervention that is beneficial in decreasing postoperative shoulder pain following gynecologic laparoscopic surgery, so it will lead to reducing the amount of analgesic consumption and improve patients' overall satisfaction level with the surgical experience. The Trendelenburg position might reduce pain by decreasing the mechanical pressure exerted by CO₂ on the diaphragm and the upper abdominal muscles. CO₂, famed for its high quality, would also be displaced to the pelvis that has a rich vasculature which in turn speeds up the resorption of pneumoperitoneum **Zeeni et al. (2020)**.

Significance of the study

A common technique for identifying and treating a variety of gynecological disorders is gynecological laparoscopic surgery. This minimally invasive method is less dangerous than open surgery, requires shorter hospital stays (less than 24 hours), and allows women to return to their regular activities sooner (**Yucel & Eyup, 2018**). The most unpleasant side effect of a laparoscopic gynecological procedure is shoulder-tip discomfort (STP). Up to 80% of women globally experience it, and there is a risk of serious morbidity, delayed release, and readmission (**Philip Kaloo et al., 2019**). After laparoscopic surgery, pain frequency in Egypt ranges from 35% to 80%, **Mohamed & Abd Elhady, (2016)**. Despite their ability to cover pain, opioids could have adverse effects such as drowsiness, nausea, vomiting, and gastrointestinal ileus (**Sallama & Ali, 2018**). Warm pads, effleurage massage, and Trendelenburg position are non-pharmacological pain control methods with no adverse side effects that could be used when analgesics are deficient or cannot be used (**Sinha, 2019**). Decreasing this pain to the level at which narcotic analgesics are no longer

needed is an essential step toward performing laparoscopy and enhancing women's recovery. Therefore, the researcher was motivated to investigate the Comparison between the effect of warm pads, effleurage massage, and Trendelenburg position in reducing shoulder pain after gynecological laparoscopic surgeries.

Aim of the study

The aim of this study was to compare the effect of a warm pad, effleurage massage, or Trendelenburg Position for reducing shoulder pain after gynecological laparoscopic operations

Research Hypothesis There is a difference between the warm pads, effleurage massage and Trendelenburg Position regarding reducing shoulder pain after gynecological laparoscopic operations

Method

Research Design: A quasi-experimental design (equivalent group design) was utilized in implementing this study.

Research Settings: This study was conducted at the Obstetric departments in Beni-Suef University Hospital and, Zagazig University Hospitals. The study was implemented during the period from July 2021 to June 2022.

Sample Type: A convenience sample of 150 women after the performance of a gynecological laparoscopic operation fulfilled the following criteria. **Inclusion criteria for the study sample:**

Women's ages should range from 20-50 years old, immediately within 24 hours (after gynecological laparoscopic operations); women should have no medical disorders.

Sample Size: The average sample size was 50 per group. The sample size was calculated by the Epi-Info program at a 95% level of confidence, with an expected frequency = of 50%. Accepted error is = 5%. So, a convincing sample of 150 women was recruited in the study and indiscriminately allotted to 3 groups (G1, G2, and G3) G1: which comprised 50 women who will apply warm pad as pain relief G2: which comprised 50 women who will use effleurage massage as

pain relive and G3: which comprised 50 women who will apply for Trendelenburg Position in the hospital as pain relief. Each of the 150 women was requested to select a piece of paper containing a number (1, 2, or 3), those who selected number 1 were assigned to G1, those who selected number 2 were allotted to G2, and those who chose number 3 were assigned to G3. This technique was utilized to avoid sample contamination and bias.

Tools for data collection: Throughout the course of the present study, data was gathered using instruments that were developed by the researcher and revised by qualified experts, and then tested for validity and reliability. Four instruments were developed and used by the researcher for data collection.

Tool I: A semi-structured interviewing questionnaire. It was developed by the researcher after reviewing the related literature to collect the necessary data about participants. It will include the following parts:

Part (1): Demographic data (age, residence, occupation, and level of education).

Part2: Characteristics of gynecological laparoscopic surgery: concerning basal characteristics of the current gynecological laparoscopic surgery including purpose and duration

Tool II: Physiologic and behavioral response to pain sheet (PBRPS). It was adopted by **Deborah (1984) and Walsh (2001) and El-Naser, El-Razek & Ayoob, (2022).** to measure physiological and behavioral pain responses. It included two parts:

Part 1: Physiological response: - It was used to measure the physiological response to shoulder pain. It consists of two parts: 1) vital signs (blood pressure, temperature, and pulse); and 2) gastrointestinal tract responses like nausea and vomiting. 3) Skin responses like flushing, rash, and diaphoresis.

Part 2: Behavioral response: It was used to measure the behavioral response to shoulder pain. It includes four magnitudes: posture, gross motor activity, facial expression, and verbalization. For each of

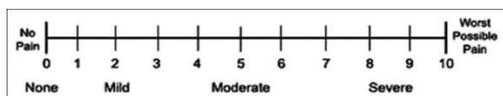
these four major behavioral responses, one of three alternative choices is offered.

The scoring system: Each of the 12 options were scored as either absent (0), (1) for mild, or (2) for severe, for posture, the choice is between relaxed (0) or guarded (1) for tense posture (2). For gross motor activity, the choice is between quiet (0), slightly restless (1), and restless (2). For facial expression, the selection is between no frowning (0), some frowning (1), and constant frowning or grimacing (2). Lastly, for verbalization, the choice is between normal no sound (0), groans/moans (1), and cries (2).

Tool III: Numerical pain rating scale: It was adopted from **Williamson & Hoggart (2005); Hockenberry & Wilson, (2015) and Song et al., (2016); El-Naser, El-Razek & Ayoob, (2022)**. It will be used to assess pain intensity.

The scoring system of the scale:

The scoring system of the scale: Women were informed to choose a number from 1 to 10 that best describes their shoulder pain. A score on the scale is as follows: There is no pain (0), mild pain (1-3), moderate (4-7), and sever pain (8-10)



Tool IV Pregnant Women's satisfaction (Likert - Scale Rating): Adapted from Friedel et al. (2014) it was used to assess Pregnant women's satisfaction levels regarding the intervention used for pain relief. This scale was formed of 5 variables: 1, Pregnant women were comforted by the use of the intervention; 2, it was a positive experience; 3, the intervention is not easy to use; 4, women would not like to use the intervention in the future. The Likert scale consists of 4 statements and was based on five points 1= Completely satisfied, 2= Satisfied, 3= Fair, 4= Dissatisfied, and 5= Completely dissatisfied.

Validity of Tools:

The validity of the tools was assessed by five qualified experts (three experts from the Maternal and Newborn Health Nursing department at the Faculty of Nursing and two physicians from the Obstetrics and Gynecology department at the Faculty of Medicine). They reviewed the tools for content accuracy and internal validity. Also, they were asked to judge the points for completeness and clarity (content validity). Suggestions were incorporated into the tools, and modifications will be made. The percentage of consensus among experts regarding the structured interviewing questionnaire was 96.0%, the postoperative quality of recovery score was 98.0%, and the numerical pain rating scale was 98.0%

Reliability of Tools:

The reliability of the tools was tested statistically by the researcher for testing the internal consistency of the instrument, using Cranach's Alpha test. This method took place through the administration of the same tools to the same studied groups under similar conditions on one or more occasions. Results from recurrent testing were compared.

Administrative approval:

On July 15, 2021, the Faculty of Nursing; Beni Suef University, and Zagazig University received approval from the hearing and ethics committee. An official letter was taken from the Faculty of Nursing, Beni Suef University, and Zagazig University Dean, and submitted to the directors of the Beni Suef University and Zagazig University Hospitals, chairperson of the obstetrics and gynecology departments of Beni Suef University Hospital and Zagazig University Hospital to carry out the study. Official permission was acquired from the directors of the above-mentioned settings to carry out the study. A complete explanation of the study aim was provided to the directors of the study settings.

Ethical Considerations

Approaches to assure the ethical issues were considered in the study regarding confidentiality and informed consent. The researchers introduced themselves to the women after the laparoscopic gynecological operation and explained the aim of the study

and the nature of the study to acquire their acceptance to be recruited in the study as well as to gain their cooperation.

Confidentiality was achieved by locked sheets with the names of the studied women replaced by numbers. All studied samples were informed that the information they provided during the study would be kept confidential and used only for research statistical purposes. After data collection, the results would be presented as group data with no personal participants' information remaining. The participating women were also informed that the results would be presented as a group of data with no personal participants' information remaining.

Subsequently explanations prior to enrollment in the study, informed consent was obtained from all participating women. Each woman was informed that involvement in the study was voluntary and that she could withdraw from the study whenever she decided to do so. Each woman was given the chance to freely refuse participation. They were free to request anything or have questions about the study details.

Pilot study:

A pilot study was carried out to test the applicability of the instruments, the feasibility of the study, and estimate the time needed for data collection. It was conducted on 10% of the total sample which is equal to 15 women. Based on the pilot study findings; the researchers rephrased some questions and sentences and then set the final fieldwork schedule as (factors that affect pain) The sample of the pilot study was excluded from the main sample size based on the changes done.

Study Field Work:

The data was collected in the obstetric ward over a 12-month period, starting from July 2021 to June 2022. Data were collected all over four days a week (Sunday, Monday Tuesday, and Wednesday) from 9 AM to 2 PM according to the availability of participants in both hospitals, Beni Suef and Zagazig University Hospitals. One or two women were interviewed per day according to the availability of women who met the inclusion criteria. This protocol was followed till the

needed number of participants was reached.

-The current study was conducted in consecutive phases (Interview and assessment phase, implementation, and evaluation phase).

Interview and assessment phase:

During the first contact, which happens in the first hours after the operation in the ward, the researchers greeted the women, introduced themselves, and explained the purpose of the study in order to obtain their acceptance and recruit them to the study as well as to gain their cooperation. Later, for women who met the inclusion criteria their verbal and written agreement were taken. Each woman was interviewed to gather data related to their demographic characteristics (age, residence, occupation, and level of education), and their basal characteristics regarding the current gynecological laparoscopic operation (purpose and duration) were also collected.

The interview took about 30 minutes for each woman; the women communicated in Arabic and documented their answers with the tools used.

Implementation Phase: (for G1 & G2)

The researcher informed the women that shoulder pain is a complication of laparoscopic surgery. The researchers reassured all women, that all of them had the same: the technique of surgery, doses of anesthetic drugs, and intraoperative measures to drain CO₂ gas from the abdominal wall. Pain score was evaluated for all women in the studied groups at different times, at 4, 6, 12, and 24 hours after laparoscopic surgery. A basal characteristic of shoulder pain was evaluated after 4 hours of surgery, in order to ensure the relieving effect of anesthesia. It was evaluated using the numerical pain rating scale, while the postoperative quality of recovery score was evaluated 24 hours after laparoscopic surgery, for warm pads, effleurage massage, and Trendelenburg Position group.

Nursing intervention for relieving shoulder pain: G1 (Heat pad)

The warm pads were prepared by the researchers by putting hot bran flour into a cotton cloth and were tested to determine its temperature before placing it on the shoulder. Each woman resaved an explanation about the types and benefits of warm pads, as well as

how to apply warm pads on the shoulder to relieve pain caused by the laparoscopic surgery by using cotton or a clean towel with warm water (comfortably warm on the shoulder) immediately postoperatively by 15-20 minutes, then removed and reapplied after 2 hours. The researcher also explained how to prepare a heating pad at home to be put on the shoulder to relieve pain after hospital discharge. The researcher instructed the women how to do it every 2 hours postoperatively for 24-48 hours or until the pain was completely relieved.

At the end of the sessions, each woman was given a booklet with illustrations including (indications of laparoscopic operation; complications of the laparoscopic operation, especially shoulder pain and its types; benefits of a warm pad, and how to apply it at home). The researcher evaluates shoulder pain after the intervention and measures women's physiological and behavioral pain responses using Tool III.

Nursing intervention for relieving shoulder pain (G2, Effleurage massage)

The researchers explained the benefits of effleurage massage and how to perform it or how to be implemented by one of the family

members on the shoulder to relieve pain caused by a laparoscopic procedure for each woman. The woman should lie in the supine position as this is the most comfortable position for the woman. Keeping a good posture is beneficial to both the researchers and the studied woman. The researchers used a wide surface area of the palmar surfaces of the hands and fingers, either with both hands, by the same hand, or by alternating between hands to massage the affected shoulder. The researchers pour the oil into their own hands, never directly on the woman's shoulder. The researchers warm the oil between hands before applying it to the women's shoulders. The researchers began with light contact at the start of the session. This should build up to heavy pressure with slower movements to increase circulation and stretch the tissues. Deeper pressure is always toward the heart to encourage and promote venous return. The researchers should massage the shoulder for 30 minutes.

At the end of the sessions, each woman was given an instruction booklet and trained them on how to assess shoulder pain after the intervention.



Group 3:

The women who were allotted to the Trendelenburg position group were also interviewed in the first 4 hours after the laparoscopic operation. The researchers provided women in group 3 with information about the definition of laparoscopic operation, indications, advantages, the technique of position, and expected complications, especially shoulder pain. The intervention for the women in group 3 was positioned in the Trendelenburg position (20 °) once fully awake and cooperating following the PACU. They retained this posture during the first 24 hrs. postoperatively. The maximum time allowed

for the straight-up position was 3 times intervals over 24- hrs. period every time 15 - min (the first interval being at the time of clear fluid intake at 12 hrs. postoperatively). It is done for all patients postoperatively once they are fully awake.

At the end of the sessions, each woman was given an instruction booklet related to the Trendelenburg position intervention and trained on how to assess shoulder pain after the intervention.

Evaluation Phase

Implementation phase evaluation was accomplished by determining the pain score after intervention (either by a warm pad, effleurage massage, or by Trendelenburg Position). It started 4 hours after the laparoscopic operation and continues every two hours.

Evaluate the effectiveness of the intervention on reducing pain intensity, this post-assessment consumed about 15-20 min for each woman included in the study.

Statistical Analysis:

Data was entered and analyzed by utilizing the SPSS (Statistical Package for Social Science) statistical package version 26. The graphics were done using the Excel program.

Quantitative data were presented by mean (X) and standard deviation (SD). The qualitative data were presented as frequency distribution tables, numbers, and percentages. It was analyzed by the chi-square (χ^2) test. However, if the expected value of any cell in the table was less than 5, the Fisher Exact test was used (if the table had 4 cells), or the Likelihood Ratio (LR) test (if the table had more than 4 cells). The level of significance was set as a P value <0.05 for all significant tests. massage the shoulder for 30 minutes.

Results

Table (1) shows that there are no significant differences between the three studied groups regarding all items of demographic characteristics (with $P > 0.05$ for each). While 50% of the women in the heat pad group are between the ages of 30 and 40 years old; 40% of the women in the Effleurage massage group are between the ages of 30 and 40 years old; and nearly half (44%) of the women in the Trendelenburg **Position** group are between the ages of 30 to 40 years old. The mean age among the three groups is: 32.4 ± 3.1 Y, 31.3 ± 2.4 years, and 33.6 ± 2.9 years, respectively, and the difference isn't significant statistically ($P = > 0.05$).

Table (2): shows that, there is no statistically significant difference between the two groups regarding the basal characteristics of gynecological laparoscopic surgery concerning purpose and duration whereas ($p > 0.05$)

Table (3) shows a highly statistically significant differences between the three studied groups regarding all items of physiological responses to shoulder pain (with $p < 0.0001$)

Table (4) clarifies that the distribution of women under the study concerning Behavioral responses between, **the** three groups shows highly statistically significantly differences between the three studied groups regarding all items of the physiological responses (with $p < 0.0001$) **in each of the behavioral items**

Table (5) presents the shoulder pain score at different time interval (at 4,6,8 and 24 hours after laparoscopic surgery), and reveals that, pain score is less than among the warm pad, and Effleurage massage group as compare with the Trendelenburg Position group with a highly statistically significant difference ($p < 0.001$).

Figure (1) shows that women who used Effleurage Massage reveals a higher efficacy than both heat pad and Trendelenburg Position groups on **shoulder pain after 8 hours from gynecological laparoscopic operations** (as 75% from the **effleurage massage**, while 46% women from the warm pad group and 40% from the (Trendelenburg Position group) the difference is highly significant statistically (with $P < 0.0001$). This finding supported the study's third hypothesis, which stated that women who use effleurage massage after gynecological laparoscopic surgery will have less shoulder pain than women who use warm pads and Trendelenburg Position.

Table 6 showed that there is a statistically significant difference between all groups (with p-value < 0.001).

Table (1): Demographic characteristics of the women in the three studied groups (N =150)

Demographic characteristics	Warm pad Group (No=50)		Effleurage massage group (No= 50)		Trendelenburg Position group (No=50)		P value
	N0.	%	N0.	%	N0.	%	
Age (Years):							>0.05
20-	10	20.050.0	12	24.040.0	8	16.044.	
30-	25	30.0	20	36.0	22	0	
40-50	15		18		20	40.0	
Mean ± SD	32.4 ± 3.1 Y		31.3 ± 2.4 Y		33.6± 2.9Y		
Educational Level							>0.05
Illiterate/Read & Write	15	30.0	10	20.0	13	26.0	
Secondary school	17	34.0	27	54.0	20	40.0	
University	18	36.0	13	26.0	17	35.0	
Occupation: Employee Not employee	13 37	26.074.0	8 42	16.0 84.0	10 40	20.0 80.0	>0.05
Residence: Rural Urban	35 15	70.0 30.0	40 10	80.0 20.0	30 20	60.0 20.0	>0.05

Table (2): Distribution of the Studied women according to the basal characteristics of laparoscopic surgery (n=150).

Variable	Warm pad Group (No=50)		Effleurage massage group (No= 50)		Trendelenburg Position group (No=50)		P value
	N0.	%	N0.	%	N0.	%	
Purpose of gynecological laparoscopy							>0.05
Diagnostic	40	80.0	42	84.0	43	86.0	
Curative	10	20.0	8	16.0	7	14.0	
Duration of gynecological laparoscopy in minutes							>0.05
45	10	20.0	8	16.0	12	24.0	
50	25	50.0	22	44.0	20	40.0	
60 -70	15	30.0	20	40.0	18	36.0	

Table (3): Physiological responses to shoulder pain among women in the three groups. warm pad, Effleurage massage and Trendelenburg Position groups(N=150)

Physiological responses	Warm pad Group (No=50)		Effleurage massage group (No= 50)		Trendelenburg Position group (No=50)		P value
	N0.	%	N0.	%	N0.	%	
Temperature:							
< 36.5°C	0	0.0	0	0.0	0	0.0	<0.001
36.5-37 °C	30	60.0	35	70.0	15	30.0	
37 – 37.5°C	20	40.0	15	30.0	35	70.0	
BP:							
<100/70	0	0.0	0	0.0	0	0.0	<0.001
100/70 – 110/80	28	56.0	33	66.0	18	36.0	
120/80 – 130/90	22	44.0	17	34.0	32	64.0	
Pulse:							
< 60pm	0	0.0	0	0.0	0	0.0	<0.001
60 – 80 pm	25	50.0	30	60.0	20	40.0	
81 - 100 pm	25	50.0	20	40.0	30	60.0	
GIT symptoms:							
Yes	14	28.0	5	10.0	20	40.0	<0.001
No	36	72.0	45	90.0	30	60.0	
Skin response							
No	50	100.0	50	100.0	50	100.0	<0.001

Table (4): Distribution of women under the study concerning Behavioral responses Between the three groups (N = 150)

Behavioral responses	Warm pad Group (No=50)		Effleurage massage group (No= 50)		Trendelenburg Position group (No=50)		P value
	N0.	%	N0.	%	N0.	%	
Posture:							
Relaxed	0	0.0	0	0.0	0	0.0	<0.001
Guarded	30	60.0	35	70.0	15	30.0	
Tense posture	20	40.0	15	30.0	35	70.0	
Gross motor activities							
Quiet	28	56.0	34	68.0	20	40.0	<0.001
Slightly restless	22	44.0	16	32.0	25	50.0	
Restless	0	0.0	0	0.0	5	10.0	
Facial expression:							
No frowning	0	0.0	0	0.0	0	0.0	<0.001
Some frowning	31	62.0	38	76.0	27	54.0	
Grimacing	19	38.0	12	24.0	23	46.0	
Verbalization:							
Normal(no sound)	16	32.0	22	44.0	12	24.0	<0.001
Groans or moans	34	68.0	28	56.0	36	72.0	
Cries	0	0.0	0	0.0	2	4.0	

Table (5): Distribution of women under the study concerning shoulder pain at different time of assessment (N = 150)

Shoulder pain	Warm pad Group (No=50)		Effleurage massage group (No= 50)		Trendelenburg Position group (No=50)		P value
	N0.	%	N0.	%	N0.	%	
Intensity of shoulder pain after 4 hours:							<0.001
No	11	22.0	16	32.0	8	16.0	
Mild	12	24.0	19	38.0	10	20.0	
Moderate	27	54.0	0	0.0	32	64.0	
Sever	0	0.0	0	0.0	0	0.0	
Intensity of shoulder pain after 6 hours:							<0.001
No	15	30.0	22	44.0	12	24.0	
Mild	20	40.0	10	20.0	16	32.0	
Moderate	15	30.0	0	0.0	12	24.0	
Sever	0	0.0	0	0.0	0	0.0	
Intensity of shoulder pain after 8 hours:							<0.001
No	20	40.0	28	56.0	17	34.0	
Mild	22	44.0	5	10.0	16	32.0	
Moderate	8	16.0	0	0.0	17	34.0	
Sever	0	0.0	0	0.0	0	0.0	
Intensity of shoulder pain after 24 hours:							<0.001
No	25	50.0	30	60.0	22	44.0	
Mild	18	36.0	2	4.0	20	40.0	
Moderate	7	14.0	0	0.0	8	16.0	
Sever	0	0.0	0	0.0	0	0.0	

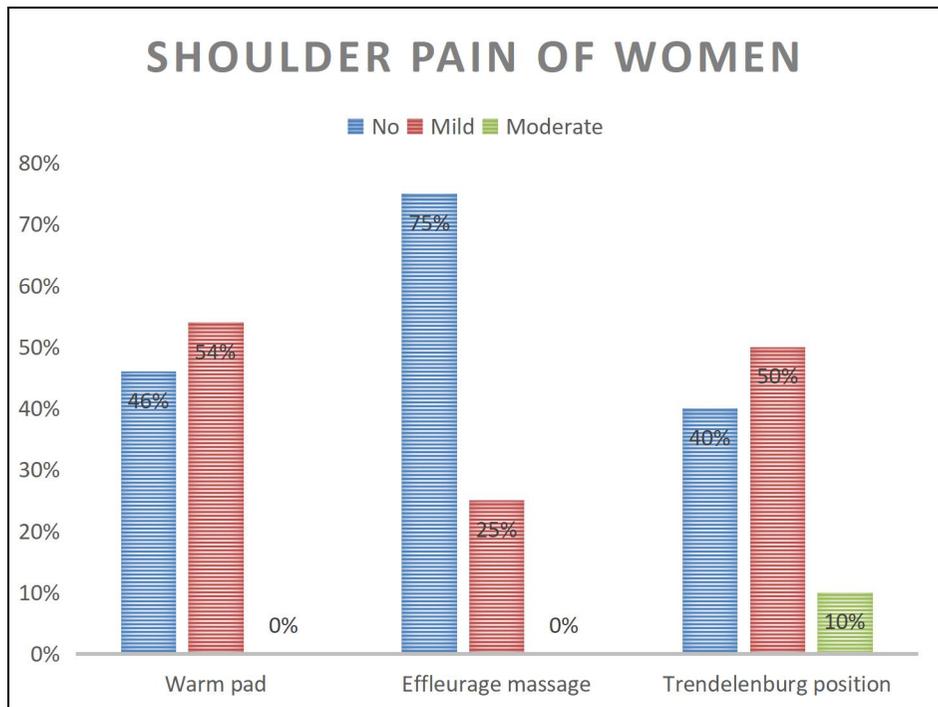


Figure (1): Effect of the warm pad, effleurage massage, and Trendelenburg Position group on total score of shoulder pain after 8 hours of gynecological laparoscopic operations (N=150).

Table 6: Frequency distribution of the studied groups satisfaction among the three groups (warm pad, effleurage massage, and Trendelenburg Position) regarding shoulder pain after gynecological laparoscopic surgery(n=150)

Variables	Warm pad Group (No=50)		Effleurage massage group (No= 50)		Trendelenburg Position group (No=50)		P value
	N	%	N	%	N	%	
Patients' satisfaction							<0.001
Completely satisfied	25	50.0	35	70.0	15	30.0	
Satisfied	15	30.0	10	20.0	17	34.0	
Fair	10	20.0	5	10.0	13	26.0	
Dissatisfied	0	0.0	0	0.0	5	5.0	
Completely dissatisfied	0	0.0	0	0.0	0	0.0	

statistically insignificant at p-value>0.05

statistically significant at p-value<0.05

highly statistically significant at p-value<0.001

Discussion

Alleviating and enhancing women's recovery from shoulder pain post Gynecological laparoscopic operation is an important goal to be able to perform gynecological laparoscopic surgery as a day case procedure and thus help the women to go home on the same day and in a stable condition with no or minimal assistance and decrease hospital stay. Laparoscopic operation is quickly shifting into the gold standard for the treatment of uncomplicated symptomatic abdominal pathologies. Gynecological laparoscopic surgeries are connected with shoulder pain that may be more discomfort to women than pain at the site of incision (**Ibrahim & Kamal, 2020**). Relieving shoulder pain is an essential role of a gynecological nurse. Among non-pharmacological pain management, there are three methods that could be used for relieving such pain a warm pad, effleurage massage, or Trendelenburg Position.

In the current study finding, no significant differences were found between the warm pads, effleurage massage, and Trendelenburg Position in terms of age, educational level, residence, or occupation. These results are in the same line with **Mohamed & Abd Elhady, (2016)** who performed a study to detect the effect of Heating Pads and Early Mobilization for reducing Postoperative Shoulder Pain and enhancing Recovery of Women undergoing Gynecological Laparoscopic Surgery, they

pointed out that, there was no significant difference between the study and the control group regarding their age, weight, height, and body mass index. Additionally, the current study revealed that the women were matched regarding basal characteristics of the laparoscopic surgery including duration and purpose. These findings were agreed with **El-Naser, El-Razek & Ayoob, (2022)** who carried out a study to evaluate the Efficacy of Heat Pads versus Effleurage Massage in Reducing Shoulder Pain after Gynecological Laparoscopic Operations, they found that there was no significant difference between the heat Pads and effleurage massage groups regarding the time, and the purpose of laparoscopic surgery. Moreover, in the same line with a study conducted in **Auckland by Kaloo et al. (2019)**, who carried out interventions to reduce shoulder pain following gynecological laparoscopic procedures. Their findings revealed that the indications for gynecological laparoscopy are diverse, with some laparoscopies being purely diagnostic, with no operative procedure taking place. On the other hand, these results disagreed with **Leonardo Vieira et al. (2019)** in Brazil, who performed a study titled "The role of laparoscopy in the propaedeutics of gynecological diagnosis" and found that Laparoscopy contributed to diagnosis in 59.6% of infertility cases (with $P > 0.05$), 93.7% among chronic pelvic pain of undetermined origin (with $P < 0.01$) and conclusively elucidated the diagnosis of acute

abdomen and the ruling out of tube-ovarian abscess (with $P < 0.05$). Laparoscopic surgical procedures belong to those with the highest frequency of moderate to severe pain 24 hours postoperatively **Mohamed & Abd Elhady, (2016); Ibrahim and Kamal (2020)**, revealed that studied women reported pain in both shoulders. While in a study done by, **El-Naser, El-Razek & Ayoob, (2022)** who revealed that nearly half of the studied group had pain in both shoulders after a laparoscopic operation. Nevertheless, there are various strategies were advocated to drain CO₂ later post gynecological laparoscopic surgery. Various kinds of literature reviews pointed out that, the shoulder pain remains for a period of a few days, Tsai et al.,(2013). The present study is the first study in Egypt conducted to evaluate the effect of postoperative nonpharmacological strategies such as warm pads, effleurage massage, and Trendelenburg Position to reduce shoulder pain and improve recovery **Mohamed & Abd Elhady, (2016)**.

In the current study, the score of shoulder pain was evaluated at time intervals; baseline pain characteristics were evaluated immediate post 4 hours after surgery, 6, 8, and 24 hours, it shod that, there was reduced in shoulder pain among women using warm pads, effleurage massage or Trendelenburg Position group. These findings support the current study hypothesis; regarding the application of warm pads, effleurage massage, and Trendelenburg Position which could relieve shoulder pain. In addition, these study findings are in agreement with **El-Naser , El-Razek & Ayoob, (2022)** who pointed out that the effleurage massage revealed a higher efficacy than both heat pads in reducing shoulder pain after the laparoscopic operation. From the researcher's point of view, this result is due to the vasodilatation effect of heat receptors. The warm pads are cheap and easy to use and it has a minimum amount of side effects when used regularly. This may be due to the physiological effects of warm application to increase blood flow and metabolism, and increased elasticity of connective tissue **Mohamed & Abd Elhady , (2016)**. Additionally, the present study finding was supported by a similar study conducted in Europe by **Ron Clijsen et al. (2022)**, who

investigated Local Heat Applications as a Treatment of Physical and Functional Parameters in Acute and Chronic Musculoskeletal Disorders or Pain. Their results discovered that local head application (LHA) had a pain-relieving effect immediately after the intervention compared with pharmacologic therapy in acute and chronic conditions. Also, the present study is in harmony with the study done by **Nourian et al. (2016); El-Naser , El-Razek & Ayoob, (2022)**, who found that the effleurage massage reduced hospitalization anxiety, pulse rate, and blood pressure. The researchers recommended that nurses should use massage to reduce pain and anxiety among school-age children at the hospital and among women after gynecological laparoscopic surgery as it has no side effects and can be done easily. To boot, also **(Aydemir, et al.,2018; Zeeni et al.,2020)** reported that the Trendelenburg position displaces retained CO₂ gas towards the pelvis and away from the diaphragm, so reducing phrenic nerve irritation and hence shoulder, as well as quicker resorption of the soluble CO₂ gas in a highly vascular area which is the pelvis. These results are in disagreement with **Kaloo et al.,2014)**, who stated that the Trendelenburg position is not listed as one of the possible interventions to reduce the pain of women after gynecological laparoscopic surgery.

This may be due to the physiological effects of warm pads, effleurage massage, and Trendelenburg Position to increase blood flow and metabolism, as well increasing the elasticity of connective tissue. Neural transduction of warm pads and effleurage massage are mediated by Transient Receptor Potential Vanilloid 1 (TRPV1) receptors, which are ion channels activated by noxious heat. The TRPV1 receptors are attending in primary afferent neurons, the spinal cord, and throughout the brain. Activation of TRPV1 receptors within the brain may play an antinociceptive descending pathways **Mohamed & Abd Elhady , (2016)**.

The present study findings answered the study hypotheses. Regarding women who use warm pads, effleurage massage, and Trendelenburg position after gynecological laparoscopic surgery will have a few shoulders pain, women who use effleurage massage after

gynecological laparoscopic surgery will have less shoulder pain than those who use Trendelenburg Position. Also, women who use effleurage massage after gynecological laparoscopic operations will have less shoulder pain than women who use warm pads.

There was a highly significant difference between all groups regarding women's satisfaction with the p -value = < 0.001 . The present study revealed that warm pads and effleurage massage groups had more satisfaction than women in the Trendelenburg position group. While in the effleurage massage group more than half of the women in the group reported that they were completely satisfied when compared with other groups. The researchers explain these results as effleurage massage more save, inexpensive, easy, and reduces pain and anxiety in a safe way resulting in an early passage of CO_2 gas, less hospital stay, and minimal pain score and complications, with less cost to hospitals (Ibrahim & Kamal 2020); (Türkmen & TunaOranb, 2021).

Conclusion

Based on the current study findings, it can be concluded that the application of warm pads, effleurage massage, and Trendelenburg Position are effective non-pharmacological interventions for reducing postoperative shoulder pain and improving recovery in women undergoing gynecological laparoscopic surgery. There was a highly significant improvement in each item of physiological and behavioral response among the warm pads, effleurage massage, and Trendelenburg position groups. Also, effleurage massage had a higher efficacy regarding relieving pain than both warm pads and Trendelenburg Position groups after gynecological laparoscopic surgery and the difference was statistically highly significant

Recommendations:

- The application of warm pads, effleurage massage, and Trendelenburg Position is an effective non-pharmacological intervention for relieving shoulder pain and improving postoperative recovery, which requires to be evaluated in the further research study.

- Nurses should Encourage women to implement effleurage massage regularly after hospital discharge to promote more comfort.
- Effleurage massage and heat pads should be recommended in the hospital routine as non-pharmacological management for shoulder pain post gynecological laparoscopic surgery.
- Training programs should be provided to maternity nurses regarding the implementation and benefits of effleurage massage.

Further research is needed to:

Assess women's satisfaction level regarding the use of effleurage massage for relieving shoulder pain after a laparoscopic operation.

Train Maternity nurses to use non-pharmacological shoulder pain management methods following a laparoscopic procedure.

Apply Effleurage massage and heat pads for relieving shoulder pain and enhancing recovery among women undergoing laparoscopic surgery.

Replicate the current study in various settings and with different samples

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