

Efficacy of Heat Pads in Reducing Shoulder Pain after Gynecological Laparoscopic Operations

¹Aida A, El-Razek., ²Amira A, El-Naser., ³Jamila G, Ayoob.

¹Professor of Maternal and Newborn Health Nursing Faculty of Nursing, Menoufia University

²Assistant Lecturer of Maternal and Newborn Health Nursing Faculty of Nursing, Menoufia University

³Assistant Professor of Maternal and Newborn Health Nursing Faculty of Nursing, Menoufia University

DOI: <https://doi.org/10.5281/zenodo.6948486>

Published Date: 01-August-2022

Abstract: **Background:** Laparoscopy as a minimal tool can accurately and quickly confirm the diagnosis and reduce both delay in diagnosis and non-therapeutic laparotomy rate. Shoulder pain is a common complaint following gynecological laparoscopic surgery. A heating pad has become an established complementary modality in some invasive procedures and an effective tool for decreasing pain and anxiety. **Design:** A quasi-experimental design (non-equivalent group design) (case & control) was utilized and a convenience sample of 60 women after gynecological laparoscopic operation were enrolled. **Setting:** The current study was conducted at obstetrics and Gynecology departments of two settings in Menoufia governorate: University Hospital and Shebin El-Koom Teaching Hospital. **Results:** The study finding revealed women who used heat pads after gynecological laparoscopic operations had less shoulder pain intensity than those who don't. **Conclusion:** Intensity of pain pre and post heat pad intervention was highly significant. **Recommendation:** Nursing education curriculum should be updated to include non-pharmacological management of shoulder pain after laparoscopic operation.

Keywords: Heat pad, Gynecological laparoscopic operation, Shoulder pain.

1. INTRODUCTION

Laparoscopy is a well-established technique that visualizes the abdominal cavity after insufflation via ports inserted through small incisions. This allows for the introduction of the laparoscope and other instruments for visualization and intervention. Many advanced surgeries are now performed via this approach (Afzal et al., 2021).

A laparoscopy is a minimal tool that can accurately and quickly confirm the diagnosis and reduce both the delay in diagnosis and the non-therapeutic laparotomy rate. The rapidly increasing popularity of laparoscopy may be attributed to several factors, including its applicability, high diagnostic yield, therapeutic management in the same sitting (in cases where the on-table diagnosis is possible), ability to manage most coexisting conditions, low patients' morbidity, and reduced hospital stay and expenditure (Fathy et al., 2019).

One of the greatest transformations in the history of surgery has been the paradigmatic shift away from open surgery and into operative video laparoscopy. Many have described the advent of operative video laparoscopy as a change in surgery. The therapeutic options available to laparoscopic surgeons are many and varied: from simple adhesiolysis to excision of dense endometriotic tissue, and even myomectomy, hysterectomy, and lymphadenectomy are now possible without open surgery (Mohammed et al., 2021).

According to Yousefshahi et al., (2020), laparoscopic shoulder pain is frequent and will resolve spontaneously within a few days. Pain management is successful if the pain medication is taken now of feeling uncomfortable rather than waiting until the pain is severe. For most women, a mixture of non-steroidal anti-inflammatory drugs such as ibuprofen and narcotics is best to manage postoperative pain.

Shoulder pain is familiar and can be carried on by repetitive tasks or postures that frequently expose the body. Pain is commonly felt in the upper outer arm as well as around the shoulder joint. Most shoulder pain is not serious and does not need x-rays or scans to identify the cause. The shoulder is a frequent site for referred pain; it is important to rule out pain originating from further structures. Shoulder pain influences the ability to carry out daily activities (Aleclerc et al., 2018).

Heat therapy, or thermotherapy, is an effective form of pain relief, rehabilitation, and healing. Heat can soothe bodily aches and pains by increasing blood flow and reducing inflammation. Therapeutic heat is used; the stimuli activate the spinal gating mechanism (i.e., the gate control theory of pain (Dehghan & Farahbod, 2014).

Heat therapy is a non-pharmacological approach that involves the application of a heat source to the body to raise tissue temperature. Heat therapy acts on pain and muscle spasms in multiple ways. The application of heat activates temperature-sensitive nerve endings (thermoreceptors), which in turn initiate signals that block the processing of pain signals (nociception) in the lumbar dorsal fascia and spinal cord (Freiwald et al., 2021).

The application of moist heat is a routine therapy in the medical field nowadays. The body's physiological response to moist heat is dilation of the blood vessels, causing an increase in blood flow to the area under treatment. Increased local circulation enhances recovery by flushing away the waste products and bringing in fresh blood cells to the treatment area. Moist heat is useful in treating back pain caused by muscle spasms from strain and tension. It can also temporarily alleviate pain associated with arthritis and musculoskeletal conditions. The increased blood flow can relax muscles in spasm and maintain joint and muscle flexibility (Saranya, 2018).

Electrical heating pads, hot water baths, plasters, and hot packs may be used in superficial heat application. Hot packs are packages filled with silicone gel and used for superficial heat application. They are typically preferred as they are easy to use and cost-efficient. Moist heating pads are electrical heating pads with an external cover that draws moisture from the air. Humidity is heated, and then powered out of the cover and onto the area being treated. A dry heat pad can be converted to a humid heat pad by putting wet cloth on the area being treated, then putting a dry heat pad on it (Songül, 2019).

Deborah, (2018) stated that, many studies have explained the period of heat pads for minor tension. Short amounts of heat therapy may be satisfactory, such as 15-20 minutes. While more intense pain may be needed, longer sessions of heat may be needed, such as 30 minutes - to 2 hours.

Significance of the study

A gynecological laparoscopic operation is a typical method to diagnose and treat various gynecological conditions. Compared to open surgery, this minimally invasive procedure has lower morbidity, reduces hospital stays from one week to less than 24 hours, and allows patients to resume normal activities. (Yucel & Eyup, 2018). Shoulder-tip pain (STP) is the most painful side effect after a gynecological laparoscopic operation. It occurs in up to 80% of women worldwide, with the potential for significant morbidity, delayed discharge, and readmission (Philip Kaloo et al., 2019). In Egypt, 35%-70% of patients feel this pain after an operation. Although opioids are helpful in masking pain, they may lead to adverse effects such as sedation, nausea, vomiting, and gastrointestinal ileus (Sallama & Ali, 2018). Heat pads is non-pharmacological pain control method with no adverse side effects that can be used when analgesics are insufficient or cannot be used (Sinha, 2019). Reducing this pain to the level at which narcotic analgesics are no longer required is an important step toward performing laparoscopy and enhancing women's recovery. Consequently, the researcher was motivated to investigate the efficacy of heat pads in reducing shoulder pain after gynecological laparoscopic operations.

Purpose of the Study

The purpose of the study is to:

Investigate the efficacy of heat pads in reducing shoulder pain after gynecological laparoscopic operations.

Hypotheses of the Study

Women who used heat pads after gynecological laparoscopic operations experienced less shoulder pain than those who do not.

2. METHOD

Research Design:

A quasi-experimental design (non-equivalent group design) (case & control) was utilized in implementing this study.

Research Settings:

The current study was conducted in the Obstetrics and Gynecology departments of two settings in the Menoufia governorate: University Hospital and Shebin El-Koom Teaching Hospital.

Sample Type:

A convenience sample of 60 women after a gynecological laparoscopic operation fulfilled the following criteria.

Inclusion criteria for the sample:

Women's ages should range from 25-55 years, immediately within 24 hours (after gynecological laparoscopic operations); women should have no medical disorders.

Sample Size:

The average sample size was 30 per group. The sample size was calculated using the Epi-Info program at a 95% level of confidence, with an expected frequency = of 50%. Accepted error is = 5%. So, a convince sample of 60 women was recruited in the study and randomly assigned to cases (G1) and control (G2) as G1: which comprised 30 women upon whom heat pad was applied by the researcher; G2: which comprised 30 women who left for routine pain management in the hospital. Each of the 60 women was asked to pick a piece of paper containing a number (1 or 2), those who selected number 1 were assigned to G1, and those who selected number 2 were assigned to G2. This technique was used to avoid sample contamination and bias.

Instruments for data collection:

Throughout the course of the present study, data was collected using instruments that were developed by the researcher and revised by qualified experts, and then tested for validity and reliability.

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

Socio-demographic data (age, residence, occupation, and level of education), **Menstrual history** (Age, frequency, amount, duration, and interval), **Obstetrics history** (gravidity, parity, and abortion), **basal characteristic of current Gynecological laparoscopic operation** (purpose and duration), **basal characteristics of shoulder pain** (site of pain, factors that aggravate pain, and factors that decrease pain).

Instrument II: Physiologic and behavioral response to pain sheet (PBRPS). It was adopted by Deborah (1984) and Walsh (2001) to measure physiological and behavioral pain responses. It included two parts:

Part 1- Physiological response: - It was used to measure the physiological response to 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 reactions like flushing, rash, and diaphoresis.

Part 2-Behavioral response: It was used to measure the behavioral response to pain. It includes four dimensions: posture, gross motor activity, facial expression, and verbalization. For each of these four major behavioral responses, one of three alternative choices is offered.

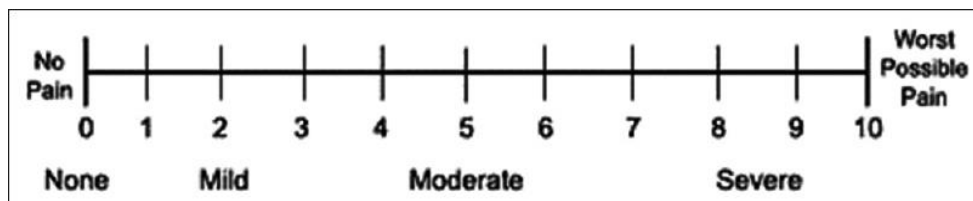
The scoring system:

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

Instrument III: Numerical pain rating scale: It was adopted from Williamson & Hoggart (2005). It will be used to assess pain intensity.

The scoring system of the scale:

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



Administrative approval:

On July 15, 2020, the Faculty of Nursing; Menoufia University received approval from the hearing and ethics committee. An official letter was taken from the Faculty of Nursing, Menoufia University Dean, and submitted to the directors of the study settings, chairperson of the obstetrics and gynecology departments of Menoufia University Hospital and Shebin El-Koom Teaching Hospital to carry out the study. Official permission was obtained from the directors of the above-mentioned settings to carry out the study. A full explanation of the rationale for the present study was provided to the directors of the study settings.

Ethical Considerations

Approaches to ensure the ethical issues were considered in the study regarding confidentiality and informed consent. The researcher introduced herself to the women after the laparoscopic gynecological operation and explained the purpose of the study and the nature of the research to obtain their acceptance to be recruited in the study as well as to gain their cooperation.

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

After explanations prior to enrollment in the study, informed consent was obtained from all women. Each woman was informed that participation in the study was voluntary and that she could withdraw from the study whenever she decided to do so. Each woman was given the opportunity to freely refuse participation. They were free to ask any questions about the study details.

Pilot study:

A pilot study was conducted 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 equaled 6 women. Based on the pilot study results; the researcher rephrased some questions and sentences and then set the final fieldwork schedule as question what are the factors that decrease pain? & what are the factors that increase 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 6-month period, beginning in September 2021 and ending in February 2022. All days of the week except Friday from 1.30 AM or 10.30 AM to 4.30 PM according to availability of participants in both hospitals (University Hospital and Teaching Hospital) and (1 or 2) women per day according to availability of women who met the inclusion criteria). This protocol was followed till the needed number was reached.

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

Interview and assessment phase:

During the initial contact, which occurs in the first hours after the operation in the ward, the researcher greeted the women, introduced herself, and explained the purpose of the research in order to obtain their acceptance and recruit them in this research as well as to gain their cooperation. After taking verbal and written agreement from the women who met the inclusion criteria, each woman was interviewed to collect data related to socio-demographic data (age, residence, occupation, and level of education). Obstetric history (gravidity, parity, and abortion), basal characteristics of current gynecological laparoscopic operation (purpose and duration), basal characteristics of shoulder pain (site of pain, factors that aggravate pain, and factors that decrease pain).

The interview lasted about 30 minutes for each woman; the women were asked in Arabic and documented their answers with the instruments utilized.

Assess post-operation shoulder pain of the studied groups using a numerical pain rating scale in the first hours after the operation before intervention (1st time). Assess current pain, including (frequency pattern location, precipitating and relieving factors), as well as the impact of pain on physiological and behavioral responses. This took about 10 minutes.

Implementation Phase: (for G1)

Started immediately after assessment (pre-intervention) in the first 4 hrs after the operation.

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

The researcher informed the women that shoulder pain is as a complication of laparoscopic surgery and explained to each woman the types and benefits of heat pads, as well as how to do apply heat pads on the shoulder to relieve pain cause by laparoscopic surgery by using cotton or clean towel with warm water (comfortably warm on the shoulder) for 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 to do it every 2 hours for 24-48 hours or until completely relieved.

Preparation of the heat pad

To prepare the heat pad, Soak a clean towel in water until it is completely wet. Use a water boiler to heat the water, then put the towel in a bowl and pour water on it, and then insert it into the plastic bag using a holder. Close the bag containing the towel.

Put the bag on the piece of cloth that was sewed as a pillow. The bag should not be used while it is too hot on the skin so that there is one layer that isolates the heat from your skin.

Apply the wrapped compress to the skin. If the temperature is uncomfortable, allow the compress to cool slightly. Be sure to give the skin a break from the heat every ten minutes, and do not leave the compress on for longer than 20 minutes.



The researcher instructed the women to do this technique every 2 hours after evaluating shoulder pain until completely relieved.

The instructions were through visual pictures of the technique, a demonstration by the researcher, which took 20 minutes; and instructing women on how to prepare a heating pad with other techniques at home through, Cut the fabric to the desired size and fold it in half, making sure all edges match each other. Start sewing the edges on both sides, leaving the third side open. Pour the rice into a bowl and add a few drops of essential oil, then mix them together. Use the funnel to fill three-quarters of the fabric pillow with rice. Sew the left side. When using it, put it in the microwave for a minute or two (roll the pillow in aluminium foil and preheat the oven to 180 degrees). The temperature should be appropriate so that you do not feel uncomfortable, and the pillow remains warm for 30-45 minutes. If a woman doesn't have a microwave, put the pillow in a bowl and then in the oven. Put the pillow on the painful area (the shoulder) and it can be fixed with a long belt for a period of 15-20 minutes. This session lasted about 60 minutes.

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

Group 2:

The women who were assigned to the control group were also interviewed in the first 4 hours after the laparoscopic operation. The researcher provided information to the women about the definition of laparoscopic operation and its indications, advantages, and complications, especially shoulder pain. The researcher did not provide any intervention from the researcher, and they received the routine hospital intervention for relieving pain.

Evaluation Phase

- Evaluation of the implementation phase was accomplished by determining the pain score before and after intervention (heat pad). It started four days after the laparoscopic operation and continues every two hours.
- Evaluate the effectiveness of the intervention on the reduction of pain intensity. This post-assessment consumed about 15-20 min for each woman.

Statistical Analysis:

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

Quantitative data was presented by mean (X) and standard deviation (SD). It was analyzed using the student t-test for comparison between two means and the ANOVA (F) test for comparison between more than two means.

The qualitative data was 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.

3. RESULTS

The present study was carried out to investigate the efficacy of heat pad on reducing shoulder pain after gynecological laparoscopic operations. The results were classified into thirteen tables and two figures. These are the following: The distribution of the studied women based on their socio-demographic characteristics, answered the research hypothesis, and the relationship between the study variables was finally established.

Table (1) showed that there were no significant differences between the case and control groups regarding all items of sociodemographic *characteristics* ($P > 0.05$ for each). 40% of the women in the heat pad group were between the ages of 35 and nearly half (43.3%) of the women in the control groups were between the ages of 26 and 34 years. The mean age among the two groups was 32.3 ± 3.1 years 31.2 ± 2.4 , and 33.7 ± 2.9 years, respectively, and the difference was not significant statistically ($P=0.08$).

Table (2) revealed that there was no significant difference between the **case and control** groups regarding all items of menstrual history ($P > 0.05$ for each), more than half of the heat pad group (66.6%) have a regular period, while the majority of the control group (83.3%) have a regular period. In terms of menstrual interval, more than two-thirds (73.3%) of the heat pad group and the majority of the control groups (86.7%) had a 21–35-day interval.

Table (3) demonstrated that there was no significant difference between the two studied groups regarding all items of obstetric history ($P > 0.05$ for each).

Table (4): Described the fundamental characteristics of current laparoscopic surgery in the case and control groups. Regarding the current causes of operation, (30%) were hysterectomy among the heat pad group, and (43.4 %) others cause among the control group. As regard to the purpose of the operation, half (50%) was diagnostic among heat pad groups.

Table (5) revealed that shoulder pain following a laparoscopic gynecological procedure was common between the case and control groups. More than two-thirds of the heat pad and control group have pain in both shoulders (66.7% and 76.7%) respectively. Concerning recurrence of pain half of the heat pad group has intermediate pain. Regarding factors increasing pain, cough was among more than half of the heat pad, and control groups (62%, and 66.7%) respectively.

Table (6) highlights the efficacy of the heat pad on the physiological responses to shoulder pain pre and post intervention. The post-intervention program revealed a highly significant improvement ($p < 0.0001$) in each item of the physiological responses among the heat pads. The post-heat pad program's temperature range of 37-37.5 was decreased from 73.3% pre-intervention to 20% post-intervention and the difference was highly significant ($P < 0.0001$). The post control program's temperature 37-37.5 was decreased from 46.7% pre intervention to 40% post intervention and the difference was highly significant ($P < 0.0001$).

Table (7) clarified the efficacy of the heat pad on the behavioral responses to shoulder pain pre and post intervention. The post-intervention program revealed a highly significant improvement ($p < 0.0001$) in each of the behavioral items either among the heat pad or control groups. The post heat pad and control groups' verbalization (groans or moans) was 86.7%, 23.3%, and 36.7 % respectively, pre intervention, post intervention and the difference was highly significant ($P < 0.0001$).

Table (8) showed that the intensity of shoulder pain after 8 hours of gynecological laparoscopic operations among the heat pad and control groups demonstrated moderate shoulder pain with (3.3 %, 20%, respectively) before intervention and 0%, 20% respectively after intervention, and the difference was highly significant statistically ($P < 0.0001$). This result supported the first hypothesis of this study, which stated, women who use heat pads after gynecological laparoscopic operations will have less shoulder pain than those who don't.

Table (9) highlights the efficacy of the heat pad, on the behavioral responses to shoulder pain pre and post intervention. The post-intervention program revealed a highly significant improvement ($p < 0.0001$) in each item of the behavioral responses, either among the heat pad, or control groups. The post-heat pads, and control groups' facial expression (some frowning) decreased from 46.7%, and 26.7%, respectively, pre-intervention to 36.7 %, and 43.4% post-intervention and the difference was highly significant ($P < 0.0001$).

Figure.1 highlights the efficacy of the heat pad, on the physiological responses to shoulder pain pre and post-intervention. The post-intervention program revealed a highly significant improvement ($p < 0.0001$) in each item of the physiological responses either among the heat pad or effleurage massage groups. The post-heat pad, and control group pulse 81 – 100 pm decreased from 53.3%, and 46.7% respectively pre intervention to 13.3%, and 13.3% respectively post-intervention and the difference was highly significant ($P < 0.0001$).

Figure (2) showed that women who used heat pad revealed a higher efficacy than the control group in post intervention (46.7% (heat pad group) vs. and 30% (control group) respectively), and the difference was highly significant statistically ($P < 0.0001$). This finding supported the study's third hypothesis, which stated that women who use heat pads after gynecological laparoscopic surgery will have less shoulder pain than women who do not use.

Table (1): Socio-demographic characteristics of the studied women in the case and control groups N = 60)

Socio-demographic characteristics	Heat pad Group (No=30)		Control group (No= 30)		P value
	N0.	%	N0.	%	
Age (Years):					
<25 years	1	3.3	0	0	LR =4.6 P=0.59
26-34 years	9	30	13	43.3	
35 – 40 Y	12	40	13	43.3	
> 40 years	8	26.7	4	13.4	
Mean ± SD	32.3 ± 3.1 Y		33.7± 2.9Y		F=1.4,p=0.08
Educational Level					
Illiterate/Read & Write	9	30	13	43.3	LR =4.1, P=0.26
2ry school or technical diploma	10	33.3	12	40	
University	11	36.7	5	16.7	
Occupation:					
Employee	9	30	5	16.7	X ² =3.4, P=0.69
Housewife	21	70	25	83.3	
Residence:					
Rural	20	66.7	25	83.3	X ² =.08, P=0.77
Urban	10	33.3	5	16.7	
Total	30	100	30	100	

Table (2): Menstrual History of the studied women in the case and control groups (N = 60)

Menstrual history	Heat pad group (No= 30)		Control Group (No= 30)		P value
	N0.	%	N0.	%	
Age (Y) of menarche:					
12 Y	29	96.7	28	93.3	LR =0.49 P=0.78
13-16 Y	1	3.3	2	6.7	
Frequency:					
Regular	20	66.7	25	83.3	LR =2.6,p=0.27
Irregular	10	33.3	5	16.7	
Amount:					
Scanty	3	10	1	3.3	LR =5.8, P=0.09
Moderate	12	40	19	63.4	
Profuse	15	50	10	33.3	
Duration:					
3-5 days	15	50	19	63.3	LR = 3.9, P=0.41
> 5 days	15	50	11	36.7	
Interval:					
<21 days	8	26.7	4	13.3	LR=7.5, P= 0.11
21-35 days	22	73.3	26	86.7	
> 35 days	0	0	0	0	
Total	30	100	30	100	

Table 3: Obstetrical history of the studied women in the case and control groups (N=60).

Obstetric history	Heat pad Group (No= 30)		Control Group (No= 30)		P value
	N0.	%	N0.	%	
Gravity:					
No	2	6.7	10	33.3	LR =10.4 P=0.07
1-2	13	43.3	11	36.7	
≥ 3	15	50	9	30	
Abortion:					
No	24	80	29	96.7	LR =8.2, P=0.09
1-2	6	20	1	3.3	
Parity:					
No	9	30	10	33.3	LR =2.9, P=0.94
1 - 2	10	33.3	13	43.3	
≥ 3	11	36.7	7	23.4	
Type of previous labor (n=58):					
Normal	13	61.9	14	70	LR = 0.16 P=0.92
CS	8	38.1	6	30	
Subtotal	21	100	20	100	
Total	30	100	30	100	

Table (4): Basal characteristics of current laparoscopic gynecological operations in the case and control groups (N = 60)

Current laparoscopic operation	Heat pad Group (No= 30)		Control Group (No= 30)		P value
	N0.	%	N0.	%	
Q1CGLOWhat is the current cause of the operation?					
1-Poly cystic ovarian disease	5	16.7	0	0	LR =14.3 P=0.15
2-uterine fibroid	3	10	3	10	
3-Hysterectomy	9	30	4	13.3	
4-Infertility	6	20	10	33.3	
5-Other	7	23.3	13	43.4	
Q2: Choosing type of operation:					
Yes?	16	55.2	18	60	X ² =3.1, P=0.20 NS
No	13	44.8	12	40	
If yes, Why prefer Laparoscope? (N=45)					
1 -reduction in surgical incision wound	6	37.5	9	50	LR=11.5, P=0.06 NS
2 -rapid recovery time	4	25	1	5.6	
3 -earlier return to daily activities and work	4	25	4	22.2	
4-Others:	2	12.5	4	22.2	
Subtotal	16	100	18	100	
Q3 CGLO How many minutes is this operation taken	1.5±0.7 minutes		1.2±0.4 minutes		F=1.1, P=0.32 NS
Q4 CGLO What is the purpose of the operation?					
1-Diagnostic	15	50	20	66.7	X ² =1.9, P=0.37 NS
2-Curative	15	50	10	33.3	
Total	30	100	30	100	

Table (5): The studied women's shoulder pain after laparoscopic gynecological operations in the case and control groups (N=60)

Feeling shoulder pain after laparoscopic gynecological operation	Heat pad Group (No= 30)		Control Group (No= 30)		P value
	N0.	%	N0.	%	
Do you feel pain after laparoscopic gynecological operation?					
Yes	29	96.7	30	100	LR =2.2 P=0.33
No	1	3.3	0	0	
If yes, where do you feel? (N= 59)					
1- Right shoulder	0	0	3	10	LR=4.2, P=0.38 NS
2- Left shoulder	9	30	4	13.3	
3- Both	20	66.7	23	76.7	
Subtotal	29	100	30	100	
Q3 How many minutes do you feel pain? 10 minutes	4	13.8	1	3.3	LR=8.3, P= 0.08 NS
15 minutes	18	62.1	25	83.4	
20 minutes & more	7	24.1	4	13.3	
Q4 Recurrence pain?					
Permanent	13	44.8	22	73.3	X ² =7.2, P=0.03 S
Intermediate	16	55.2	8	26.7	
Factors decrease pain?					
No	25	86.2	28	93.4	LR=4.5, P=0.34 NS
Warm compressors	1	3.4	1	3.3	
Walking	3	10.4	1	3.3	
Factors increase pain?					
No	3	10.4	3	10	LR=4.2, P=0.65 NS
Walking	4	13.8	6	20	
Movement	4	13.8	1	3.3	
Cough	18	62	20	66.7	
What does the doctor describe for relieving the pain?					
Analgesic	30	100	30	100	NA
Total	30	100	30	100	

NS= Not significant, S= Significant, LR=Likelihood Ratio, NA= Not Applicable

Table (6): Physiological responses to shoulder pain pre and post intervention among heat pad and control groups (N=60)

Physiological responses	Pre- intervention				Post- intervention				χ^2 /LR P value
	Heat pad group (No= 30)		Control group (No= 30)		Heat pad group (No= 30)		Control group (No= 30)		
	N0	%	N0	%	N0	%	N0	%	
Temperature:									$\chi^2= 19.7$ P<0.0001
< 36.5°C	0	0	0	0	0	0	0	0	
36.5-37 °C	8	26.7	16	53.3	24	80	18	60	
37 – 37.5°C	22	73.3	14	46.7	6	20	12	40	
BP:									$\chi^2= 17.6$ P<0.0001
<100/70	0	0	0	0	0	0	0	0	
100/70 – 110/80	6	20	16	53.3	24	80	23	76.7	
120/80 – 130/90	24	80	14	46.7	6	20	7	23.3	
Pulse:									$\chi^2= 23.5$ P<0.0001
< 60pm	0	0	0	0	0	0	0	0	
60 – 80 pm	14	46.7	16	53.3	26	86.7	26	86.7	
81 - 100 pm	16	53.3	14	46.7	4	13.3	4	13.3	

GIT symptoms:									
Yes	9	30	7	23.3	4	13.3	6	20	$\chi^2=15.7$ <0.0001
No	21	70	23	76.7	26	86.7	24	80	
Skin response									
No	30	100	30	100	30	100	30	100	NA
Total	30	100	30	100	30	100	30	100	

NA=Not Applicable

Table (7): Pre and post intervention behavioral responses in heat pad and control groups (N=60)

Behavioral responses	Pre- intervention				Post- intervention				* χ^2 /LR P value
	Heat pad Group (No= 30)		Control Group (No= 30)		Heat pad Group (No= 30)		Control Group (No= 30)		
	N0	%	N0	%	N0	%	N0	%	
Posture:									
Relaxed	0	0	20	66.7	0	0	14	46.7	$\chi^2=23.1$ <0.0001
Guarded	13	43.3	9	30	10	33.3	15	15	
Tense posture	17	56.7	1	3.3	20	66.7	1	3.3	
Gross motor activities									
Quiet	1	33	22	73.3	0	0	11	36.7	$\chi^2=39.4$ <0.0001
Slightly restless	12	40	8	26.7	4	13.3	18	60	
Restless	17	56.7	0	0	26	86.7	1	3.3	
Facial expression:									
No frowning	0	0	22	73.3			16	53.3	$\chi^2=51.3$ <0.0001
Some frowning	14	46.7	8	26.7	11	36.7	13	43.4	
Grimacing	16	53.3	0	0	19	63.3	1	3.3	
Verbalization:									
Normal(no sound)	0	0	23	76.7	1	3.3	19	63.3	$\chi^2=24.6$ <0.0001
Groans or moans	26	86.7	7	23.3	20	66.7	11	36.7	
Cries	4	13.3	0	0	9	30	0	0	
Total	30	100	30	100	30	100	30	100	

P value= Post intervention comparison in heat pad and control groups

Table (8): Shoulder pain rating scale, pre and post intervention among the heat pad and control groups (N = 60)

Shoulder numerical pain rating scale	Pre- intervention				Post- intervention				* χ^2 /LR P value
	Heat pad Group (No= 30)		Control Group (No= 30)		Heat pad Group (No= 30)		Control Group (No= 30)		
	N0	%	N0	%	N0	%	N0	%	
Intensity of shoulder pain after4 hours:									LR=57.8 P<0.0001
No	0	0	0	0	5	16.7	0	0	
Mild	4	13.3	2	6.7	13	43.3	3	10	
Moderate	12	40	7	23.3	11	36.7	7	23.3	
Sever	14	46.7	21	70	1	3.3	20	66.7	
Intensity of shoulder pain after 6 hours:									LR=14.9 P<0.02
No	1	3.3	7	23.3	12	40	7	23.3	
Mild	19	63.4	15	50	16	53.3	15	50	
Moderate	9	30	6	20	2	6.7	6	20	
Sever	1	3.3	2	6.7	0	0	2	6.7	

Intensity of shoulder pain after 8 hours:									
No	11	36.7	9	30	14	46.7	9	30	$\chi^2=23.9$ P<0.0001
Mild	18	60	15	50	16	53.3	15	50	
Moderate	1	3.3	6	20	0	0	6	20	
Total	30	100	30	100	30	100	30	100	

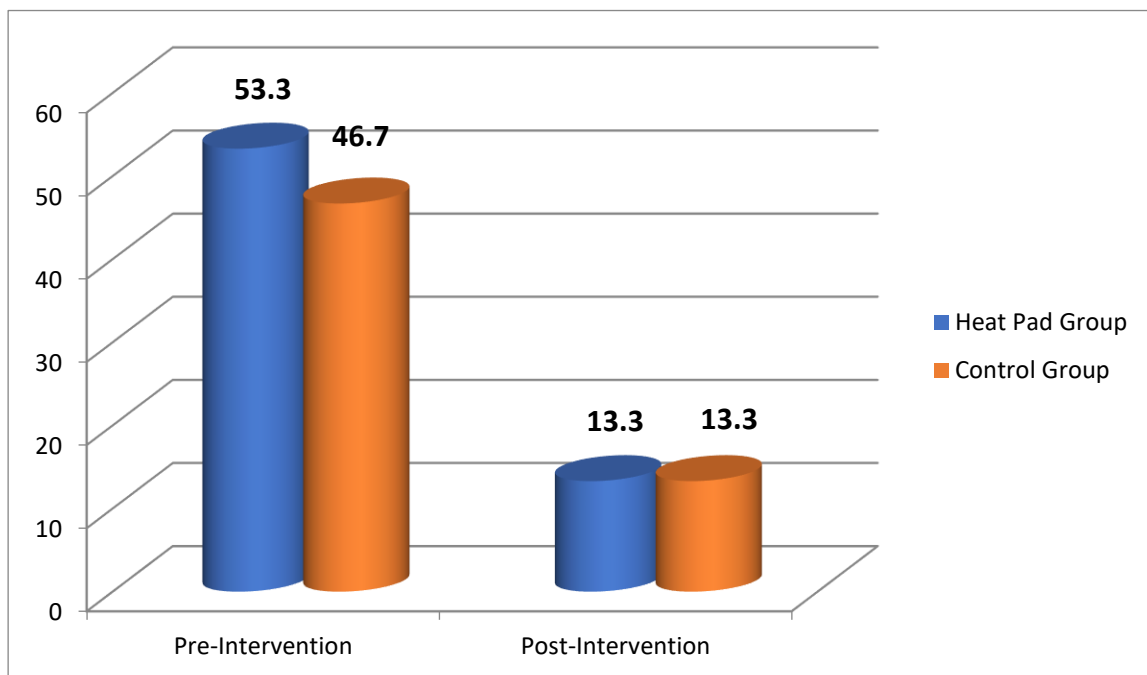


Figure (1): Percentages of pulse among studied groups pre and post-intervention (N=60)

Table 9: Behavioral responses of the studied women before and after the intervention (N=60)

Behavioral responses	Pre- intervention				Post- intervention				* χ^2 /LR P value
	Heat pad Group (No= 30)		Control Group (No= 30)		Heat pad Group (No= 30)		Control Group (No= 30)		
	N0	%	N0	%	N0	%	N0	%	
Posture:									
Relaxed	0	0	20	66.7	0	0	14	46.7	$\chi^2=23.1$ <0.0001
Guarded	13	43.3	9	30	10	33.3	15	15	
Tense posture	17	56.7	1	3.3	20	66.7	1	3.3	
Gross motor activities									
Quiet	1	33	22	73.3	0	0	11	36.7	$\chi^2=39.4$ <0.0001
Slightly restless	12	40	8	26.7	4	13.3	18	60	
Restless	17	56.7	0	0	26	86.7	1	3.3	
Facial expression:									
No Frowning	0	0	22	73.3			16	53.3	$\chi^2=51.3$ <0.0001
Some frowning	14	46.7	8	26.7	11	36.7	13	43.4	
Grimacing	16	53.3	0	0	19	63.3	1	3.3	
Verbalization:									
Normal(no sound)	0	0	23	76.7	1	3.3	19	63.3	$\chi^2=24.6$ <0.0001
Groans or moans	26	86.7	7	23.3	20	66.7	11	36.7	
Cries	4	13.3	0	0	9	30	0	0	
Total	30	100	30	100	30	100	30	100	

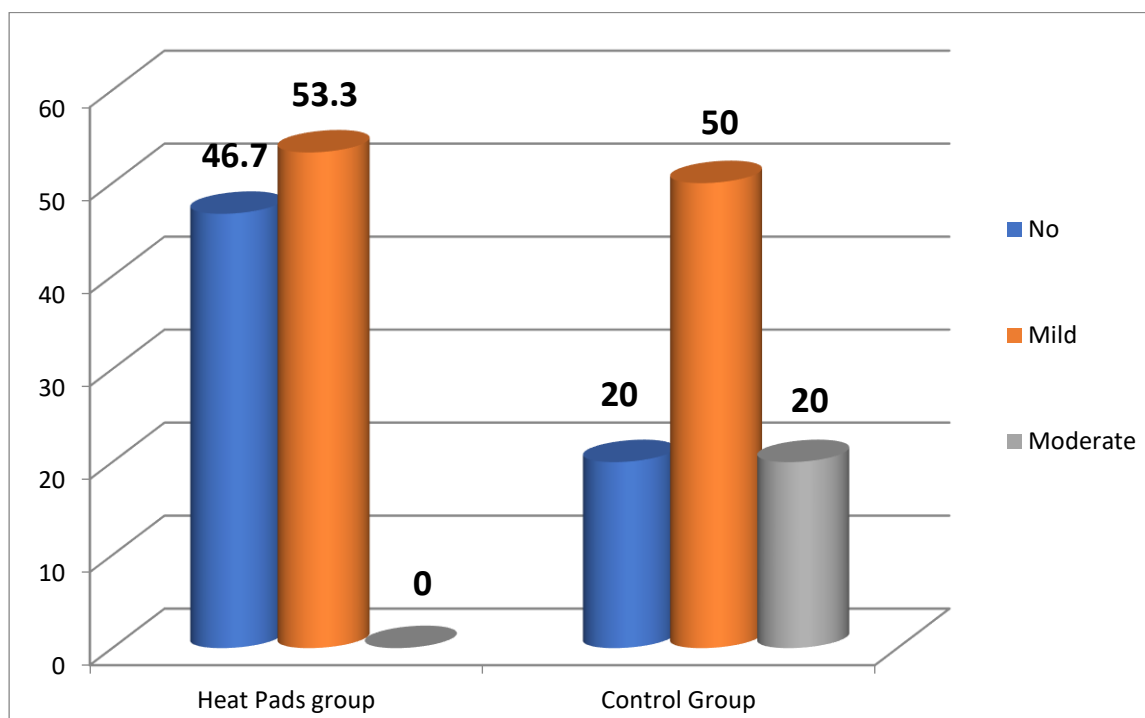


Figure (2): Effect of the heat pad, and control group on the post-intervention total score of shoulder pain after 8 hours of gynecological laparoscopic operations (N=60)

4. DISCUSSION

Laparoscopic operation is quickly shifting into the gold standard for treatment of uncomplicated symptomatic abdominal pathologies. Gynecological laparoscopic surgeries are associated with shoulder pain that may be more discomfort to women than pain at site of incision (Ibrahim & Kamal, 2020). Relieving of shoulder pain is a vital role of a gynecological nurse. Among non-pharmacological pain management is use of heat pad.

Discussion encompasses distribution of the studied women according to their socio-demographic characteristics, answered the research hypothesis and finally relation between the study variables

Socio-demographic characteristics

Before discussing the results, the light should be directed to socio-demographic characteristics of the studied groups which have been answered in table (1). The result of the present study showed that there were no significant differences between the two studied groups regarding all items of socio-demographic characteristics in terms of age, educational level, residence, occupation. ($p > 0.05$ for each). The mean ages among the two groups are: 32.3 ± 3.1 Y, 31.2 ± 2.4 year, and 33.7 ± 2.9 year respectively. These findings are in the same line with Fouad et al. (2017) who conducted a study; The role of local Anesthesia Instillation in Pain Alleviation Post Laparoscopy, they pointed out that non statistically significant between group A and group B as regarding age when p -value > 0.05 . Regarding education, residence and occupation, majority of studied groups were secondary education, housewives and from rural areas. That result comes in agreement with study conducted in Egypt by Ibrahim Aziza, Mohammed Rehab (2016) who investigated heating pads and early mobilization for reducing Postoperative Shoulder Pain and enhancing Recovery of Women undergoing Gynecological Laparoscopic Surgery. As all groups were secondary education, housewives and live in rural areas.

Concerning menstrual and obstetric history, the result of the present study showed that there were no significant differences between the two studied groups regarding all items of menstrual history (age of menarche, amount, duration, and interval). As they have a regular menstrual cycle. As regards the amount and interval of time, they have moderate amounts with 21–35-day intervals. The present result is like that of a study by Ibrahim & Kamal (2020), who investigated the effects of effleurage massage versus warm application on shoulder pain among postoperative women with gynecological laparoscopic surgery and found that age of menarche was $11 < 16$, the amount of menstruation was moderate among 70% and 65% of

both groups, and the interval of menstruation was 21-35 days. This harmony helps in understanding forthcoming results in this present study. It gives a logical rationale for the positive effect of heat pad and effleurage massage on shoulder pain intensity.

Regarding obstetric history (gravidity, parity, abortion, and type of previous labor), the majority of the heat pads group were 1-2 gravida, and this result was rationalized by the fact that the majority of them were under diagnostic laparoscopy for infertility. The findings of the present study were like those of a study conducted by Ibrahim & Kamal, (2020). Their findings showed that there were no significant differences between the reproductive histories of the two groups. Also, this was in the line of study that was conducted by Coulibaly et al. (2020) in Mali, who conducted a role of laparoscopic surgery in the management of female infertility at the department of gynecology of the hospital du Mali. Their findings revealed that 63.11% were primiparous. This rate was high.

In contrast, Ibrahim & Kamal (2020) in Egypt investigated the effect of warm application on shoulder pain among postoperative women with gynecological laparoscopic surgery. Their findings revealed that most of the studied groups were nullipara.

Basal characteristics of the current laparoscopic operation

The current study revealed that nearly half of the group's infertility was the current cause of operation in terms of basal characteristics of current laparoscopic surgery. This was supported by Mahran et al. (2017) who investigated whether laparoscopy still has a role in modern fertility practice. The study included 600 women who underwent laparoscopy and hysteroscopy during the study period. The causes of infertility were identified by laparoscopy and hysteroscopy.

On the other hand, this disagreed with Leonardo Vieira et al. (2019) in Brazil, who conducted the study "The role of laparoscopy in the propaedeutics of gynecological diagnosis" and found that laparoscopy contributed to diagnosis in 59.6% of infertility cases ($P > 0.05$), in 93.7% of chronic pelvic pain of undetermined origin ($P < 0.01$) and conclusively elucidated the diagnosis of acute abdomen and the ruling out of tubo-ovarian abscess ($P < 0.05$).

Furthermore, the current finding revealed that most of the studied groups were undergoing diagnostic laparoscopic surgery as a purpose of operation; this may be explained by the fact that one of the most common reasons for surgery was infertility. The findings are also in line with a study conducted in Auckland by Kaloo et al. (2019), who conducted 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.

This is also supported by Rowbotham (2019), who examined the laparoscopic diagnosis and treatment of nontraumatic acute abdominal pain in women, and found that in 70% of the cases, the preoperative diagnosis was confirmed by diagnostic laparoscopy.

The investigator's point of view is that the purpose of laparoscopic operation is diagnostic as laparoscopy is more accurate for unknown diagnosis as it allows more visualization of internal organs and tissue. Most of the studied women had infertility, so their purpose was to identify certain causes of infertility.

The present study revealed that nearly half of the studied group had pain in both shoulders after a laparoscopic operation. The findings of the present study were like those of a study conducted in Egypt by Ibrahim & Mohammed (2016) to investigate the effects of heating pads and early mobilization for reducing postoperative shoulder pain and enhancing recovery of women undergoing gynecological laparoscopic surgery, which revealed that studied women reported pain in both shoulders. Also, it was similar to the study conducted by Ibrahim and Kamal (2020), who revealed that the site of pain was in both shoulders.

Also, this matches with the study of Li & Li (2021) in China, who investigated whether the risk of shoulder pain after laparoscopic surgery for infertility is higher in thin patients and found that half of the patients (92/186, 49.4%) had bilateral shoulder pain.

This may be rationalized due to an irritative effect of carbonic acid on the peritoneum and diaphragm that results in tearing of blood vessels, traction of nerves (phrenic nerve), which is a bilateral nerve. It arises in the neck and descends vertically through the thorax to end in the diaphragm.

Answer to Research hypothesis No. 1 (physiological response to shoulder pain (heat pad))

The finding of the present study represented a highly significant improvement in each item of physiological responses among heat pad groups. The post-heat pad program's blood pressure 120/80-130/90 was decreased from 80% pre-intervention to 20% post-intervention and the difference was highly significant ($P < 0.0001$) as both pain intensity and its physiological parameters are two sides of one coin. This is rationalized as the stimulation of the central nervous system due to pain is accompanied by physiological changes.

Kim et al. (2018) examined the effects of a heating pad on anxiety, pain, and distress during a urodynamic study in female patients with stress urinary incontinence and reported that heating treatments improve psychological and physiologic parameters.

Also, this finding is similar to that of Sukkwon (2022) in Asia, who conducted a study of Effects of Heating Therapy on Pain, Anxiety, Physiologic Measures, and Satisfaction in Patients Undergoing Cystoscopy and the results revealed that decreased systolic and diastolic blood pressure (BP) and pulse rate after the procedure were significantly higher in the experimental group than in the control group.

This matches with the study of Brunt et al. (2016), who conducted a study of passive heat therapy improves endothelial function, arterial stiffness, and blood pressure in sedentary humans and found that it reduced or improved aortic pulse wave velocity from 7.1 ± 0.3 to 6.1 ± 0.3 m s⁻¹ ($P = 0.03$), and mean arterial blood pressure from 83 ± 1 to 78 ± 2 mmHg ($P = 0.02$).

Heating therapy could reduce the resting heart rate and noradrenaline release and also decrease the BP by improving the endothelium-dependent dilatation, arterial stiffness, and intima media thickness. In addition, heating therapy showed positive effects on the cardiovascular system (Brunt et al., 2016).

In contrast, Kim et al. (2019), who examined the use of a heating pad to reduce anxiety, pain, and distress during cystoscopy in female patients at Korea University Guro Hospital, reported that no significant differences were noted between the two groups regarding pre-procedural parameters, including systolic and diastolic BP, and pulse rate.

Behavioral response to shoulder pain (heat pad)

The findings of the present study represented highly significant improvement in each item of behavioral responses among the heat pad groups as the post-heat pad and control groups' verbalization (groans or moans) was 86.7%, and 23.3% respectively pre-intervention to 66.7 %,36.7% post-intervention, and the difference was highly significant ($P < 0.0001$). This study was supported by Sukkwon (2022), who carried out a study in Asia revealing that heating therapy during cystoscopy is a convenient and effective nursing intervention that decreases pain and anxiety and enhances patient satisfaction.

Also, these results agreed with Ibrahim & Mohammed (2016), who observed that postoperative quality of recovery, including emotional state, was higher among heat pad groups compared with control, with a highly statistically significant difference and consequently behavioral state.

From the investigator's point of view, it may be that a noxious stimulus induces a behavioral response, but a heat pad induces blood supply and promotes relaxation and so feels comfortable that and improves behavioral response.

Intensity of shoulder pain after a gynecological operation (heat pad)

The present study revealed that the difference between the intensity of pain before and after intervention was highly significant as heat pad and control groups, demonstrated moderate shoulder pain with (3.3 %, and 20%, respectively) before intervention and 0%, 20% respectively after intervention and the difference was highly significant statistically ($P < 0.0001$).

This finding is similar to a study conducted in Egypt by Ibrahim & Mohammed, (2016) to investigate the use of heating pads and early mobilization for reducing postoperative shoulder pain and enhancing recovery of women undergoing gynecological laparoscopic surgery who evaluated the score of shoulder pain at time intervals and showed that there was reduced among heat pads and the early mobilization group.

It 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 findings revealed that local head application (LHA) had a pain-relieving effect immediately after the intervention compared with pharmacologic therapy in acute and chronic conditions.

Also, Kaur et al. (2020) in India evaluated the effectiveness of warm compression on the lumbo-sacral region in terms of labor pain intensity and labor outcomes among nulliparous women: an interventional study. Their findings revealed that after 30 minutes of second- and third-time warm compression, the experimental group's mean labor pain intensity score (6.34, 8.30) was lower than the control group's (7.20, 8.89), which was statistically significant at the 0.05 level of significance. These results signify that warm compression was effective to reduce labor pain. Further, both groups did not differ in terms of the duration of the first stage of labor ($P=0.51$)

This matches with a study of the use of a heating pad to reduce anxiety, pain, and distress during rigid cystoscopy in female patients by Kim et al. (2019), who found that the mean pain scores for the experimental group (3.8 ± 1.6) were significantly lower than those for the control group (6.4 ± 1.9 , $p < 0.001$) and showed remarkable and statistically significant beneficial effects of using a heating pad to reduce female patients' anxiety, pain, and distress during rigid cystoscopy.

This is rationalized as warm application has a sedative effect. It causes vasodilatation of the blood vessels, increasing blood flow, promoting relaxation and consequently reducing pain intensity.

Also, the physiological effects of heat application increase metabolism and elasticity of connective tissue. Neural transduction of heat is mediated by Transient Receptor Potential Vanilloid 1 (TRPV1) receptors, as they are ion channels activated by noxious heat. The TRPV1 receptors are present in primary afferent neurons, the spinal cord, and the brain. Activation of TRPV1 receptors within the brain also modulates antinociceptive descending pathways (Palazzo et al., 2016).

5. CONCLUSION

According to the study findings, it was concluded that:

There was no statistically significant difference between the two studied groups regarding all items of socio-demographic characteristics. Most participants were under diagnostic laparoscopic surgery. Most of the study group had pain in both shoulders.

There was highly significant improvement in each item of physiological and behavioral response among the heat pad groups. The intensity of pain before and after heat pads intervention was highly significant and this answered hypothesis one.

6. RECOMMENDATIONS

Based on the findings of the present study, the following recommendations were suggested:

- The nursing education curriculum should be updated to include non-pharmacological management methods for shoulder pain after laparoscopic surgery.
- Heat pads should be recommended in the hospital routine.
- Training programs should be provided to maternity nurses regarding the implementation and benefits of heat pads.

Further research is needed to explore

- Assess women's satisfaction regarding the use of heat pads for relieving shoulder pain after a laparoscopic operation.
- Heat pads and early mobilization for relieving shoulder pain among women undergoing laparoscopic surgery.

REFERENCES

- [1] Afzal B, Changazi S.H., Hydlar Z, Siddique S, Rehman A, Bhatti S,(2021): Role of Laparoscopy in Diagnosing and Treating Acute Nonspecific Abdominal Pain 2021 Oct; 13(10): e18741.
- [2] Aleclerc J-F, Chastang, I, Niedhammer, M-F, & Landre. Y, (2018): Incidence of shoulder pain in repetitive work, Available at Science International Journal of Surgery, 12 (12), p:1258-1261
- [3] Brunt VE, Howard MJ, Francisco MA, Ely BR and Minson CT. (2016): Passive heat therapy improves endothelial function, arterial stiffness and blood pressure in sedentary humans. *Physiol.*; 594(18):5329e42.

International Journal of Novel Research in Healthcare and Nursing

Vol. 9, Issue 2, pp: (187-204), Month: May - August 2022, Available at: www.noveltyjournals.com

- [4] Coulibaly B., TraoréA., Abdoulaye M. Camara, KanéB., SangaréA. and TembinéK.,(2020): Role of Laparoscopic Surgery in the Management of Female Infertility), 10, 1430-1440 <https://www.scirp.org/journal/ojog> ISSN Online: 2160-8806 ISSN Print: 2160-8792
- [5] Deborah B.,(1984) : the measurement of clinical pain. Journal of Nursing Research. ; 33(3): 152-56.<https://doi.org/10.1097/00006199-198405000-0000>
- [6] Dehghan M. and Farahbod F.,(2014): The Efficacy of Thermotherapy and Cryotherapy on Pain Relief in Patients with Acute Low Back Pain, A Clinical Trial StudyJournal of Clinical and Diagnostic Research 8(9):10.
- [7] Doborah Wather Spoon ,(2018):How to make homemade Heating pad , Avaliable at <http://www.healthline.com/pain-relief/How-to-make-homemade-Heating-pad#modal-close>
- [8] Fathy M., Hamdy E. and Mohamed H., (2019): clinical pathway of Post operative nursing care forwomen undergoing gynecological operations at Port Said Hospital Vol 6, No3
- [9] Fouad M. Zaki, Abd El Hameed M. Nasr Al Deen and Mohamed A. Mamdouh,(2017): The Role of local Anesthesia Instillation in Pain Alleviation Post Laparoscopy, The Egyptian Journal of Hospital Medicine Vol.68 (3),1425-1435
- [10] Freiwald J, Magni A, FanloP and Paulino E.,(2021): A Role for Heat Therapy in Low Back Pain in Modern Clinical Practice, vol. 5
- [11] Ibrahim A. Mohamed and Mohammed R. Abd Elhady,(2016): Heating Pads and Early Mobilization for reducing Postoperative Shoulder Pain and enhancing Recovery of Women undergoing Gynecological Laparoscopic Surgery, IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320–1959.
- [12] Ibrahim A. and Mohamed R., (2016): Heating pads and early Mobilization for reducing postoperative Shoulder pain and enhancing Recovery of Women undergoing Gynecological Laparoscopic Surgery, Vol (5), No (1),PP 10-16.
- [13] Ibrahim H and Kamal W.,(2020): Effect of effleurage massage versus warm application on shoulder pain among postoperative women with gynecological laparoscopic surgery Vol. 10, No. 4
- [14] Kaloo P, Armstrong S, Kaloo C and Jordan V.,(2019): Interventions to reduce shoulder pain following gynaecological laparoscopic procedures.Cochrane Database Syst Rev1CD011101
- [15] Kaur Jasvir , Sheoran Poonam, Kaur Simarjeet and Jyoti Sarin,(2020): Effectiveness of Warm Compression on Lumbo-Sacral Region in Terms of Labour Pain Intensity and Labour Outcomes among Nulliparous: an Interventional Study 9(1):9-12. doi: 10.34172/jcs.2020.002. eCollection 2020 Mar
- [16] Kim JW, Kim HJ, Park YJ, Kang SG, Park JY and Bae JH, (2018): The effects of a heating pad on anxiety, pain, and distress during urodynamic study in the female patients with stress urinary incontinence. Neurourol Urodyn.;37(3): 997e1001.
- [17] Kim, H. J., Kim, J. W., Park, H. S., Moon, D. G., Lee, J. G., & Oh, M. M. (2019). The use of a heating pad to reduce anxiety, pain, and distress during cystoscopy in female patients. *International urogynecology journal*, 30(10), 1705-1710.
- [18] Leonardo Vieira Elias, Vitória Cristina Bortolani, Carlos Roberto Padovani, Daniel Spadoto-Dias, and Rogério Dias., (2019): The role of laparoscopy in the propaedeutics of gynecological diagnosis14(4):463–469
- [19] Li, X., and Li, K. (2021). Time characteristics of shoulder pain after laparoscopic surgery. JSLs: Journal of the Society of Laparoscopic & Robotic Surgeons, 25(2).
- [20] Mahran Ahmad , Abdelraheim Ahmed R , Abdelrahman Eissa and Mohamed Gadelrab ,(2017): Does laparoscopy still has a role in modern fertility practice? 12):787-794
- [21] Mohammed H. Msebah, Momen M. Mohammed and Amr Ahmed F.(2021): Analysis of Diagnostic and Operative Laparoscopy with or without hysteroscopy Research Article Analysis of Diagnostic and Operative Laparoscopy with or without hysteroscopy Vol. 32, No. 1, 2021, pages (26-30).

- [22] Palazzo E, Rossi F and Maione S.(2016); Role of TRPV1 receptors in descending modulation of pain. Mol Cell Endocrinol;286: S79–83
- [23] Philip Kaloo, Sarah Armstrong, Claire Kaloo and Vanessa Jordan .,(2019) :Interventions to reduce shoulder pain following gynaecological laparoscopic procedures, Issue 1. Art. No.: CD011101
- [24] RonClijsen,RahelStoop,DirkAerenhouts,PeterClarys,CarlinaDeflorin and JanTaeymans,(2022): Local Heat Applications as a Treatment of Physical and Functional Parameters in Acute and Chronic Musculoskeletal Disorders or Pain, Volume 17, Issue 5,, Pages 438-44
- [25] Rowbotham R., (2019): Laparoscopic diagnosis and treatment of nontraumatic acute abdominal pain in women. J Laparoendosc Adv Surg Tech A.;10(1):41–45.
- [26] Sallama H and Ali SH.,(2018) : Effect of intraperitoneal and incisional port site lidocaine on pain relief after gynecological laparoscopic surgery: A randomized controlled study.,101 ,pp .5-22
- [27] Saranya, R (2018) An Experimental study to Compare the effect of Dynamic Muscular Stabilization Technique (DMST) and Yoga Therapy along with Moist Heat Therapy on health status and Pain in Postural Low Back Pain patients. Masters thesis, K.G. College of Physiotherapy, Coimbatore.
- [28] Sinha A.,(2019): principle and practice of therapeutic massage. New Delhi. Jypee.; 108-9
- [29] Songül K., (2019): Application of heat and a home exercise program for pain and function levels in patients with knee osteoarthritis: A randomized controlled trial Vol.25,No.5.PP.15-20
- [30] SukKwon O. BokyeongKwon, JihyeKim and HwanKim B.,(2022): Effects of Heating Therapy on Pain, Anxiety, Physiologic Measures, and Satisfaction in Patients Undergoing Cystoscopy<https://doi.org/10.1016/j.anr.2022.02.002>
Get rights and content
- [31] Williamson, A and Hoggart ,B.,(2005) : Pain : a review of three commonly used pain rating scale . J Clin Nurs 14(7): 798-804
- [32] Yousefshahi F, Predescu O, Colizza M and Asenjo JF., (2020): Postthoracotomy ipsilateral shoulder pain: a literature review on characteristics and treatment. Pain Res Manag. doi: 10.1155/2016/3652726. 3652726
- [33] Yucel K and Eyup K ., (2018) : Post-laparscopic cholecystectomy pain, effects of preincisional infiltration and intraperitoneal levobupivacaine 0.25%o pain control –arandimised prospective double blinded placebo-controlled trial., 42,pp.80-85