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LAPAROSKOPİK CERRAHİDE SOLUNUM EGZERSİZİNİN AĞRI, BULANTI-KUSMA, SOLUNUM PARAMETRELERİ VE ANKSİYETE ÜZERİNE ETKİSİ

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Öz

Bu araştırmanın amacı laparoskopik cerrahi hastalarına uygulanan solunum egzersizinin ameliyat sonrası ağrı, bulantı-kusma, solunum parametreleri ve anksiyete üzerine etkisini incelemektir. Araştırma randomize kontrollü deneysel tiptedir. Örneklemi 90 hasta oluşturdu. Veriler Bilgi Formu, Görsel Kıyaslama Ölçeği, Durumluk ve Süreklilik Anksiyete Ölçeği, Bulantı-Kusma Değerlendirme Formu ve Solunum İzlem Formu ile toplandı. Verilerin analizinde Fisher Exact, Ki-kare testi, Student t-test, Mann-Whitney U-test, Paired Sample t-test ve tekrarlı ölçümlerde ANOVA testi kullanıldı. Müdahale grubunda, ameliyat sonrası 0. ve 24. saatte ölçülen ağrı, bulantı, durumluk anksiyete puanlarındaki azalma ve SpO_2 değerindeki yükselme istatistiksel olarak anlamlı bulundu. Grup içi karşılaştırmalarda ise müdahale ve kontrol grupları solunum sayıları arasında istatistiksel olarak anlamlı bir farklılık olmadığı buna karşın müdahale grubundaki hastalarda 0. ve 24. saatlerde ağrı puan ortalamaları ve SpO_2 değerleri arasındaki farkın anlamlı olduğu belirlendi. Ameliyat sonrası 24. saatte kontrol grubundaki hastaların Durumluk Anksiyete Ölçek puanının müdahale grubuna göre anlamlı olarak daha yüksek olduğu bulundu. Laparoskopik cerrahide ameliyat sonrası solunum egzersizinin ağrı, bulantı-kusma, solunum parametreleri ve anksiyete üzerinde olumlu etkisinin olduğu belirlendi. Ameliyat sonrası erken dönemde hastaların solunum egzersizini daha etkin bir şekilde yapmaları konusunda teşvik edilmesi önerilmektedir.

Anahtar Kelimeler: Laparoskopik Cerrahi, Solunum Egzersizi, Ameliyat Sonrası Ağrı, Anksiyete, Bulantı, Kusma

THE EFFECT OF RESPIRATORY EXERCISE ON PAIN, NAUSEA-VOMITING, RESPIRATORY PARAMETERS, AND ANXIETY IN LAPAROSCOPIC SURGERY

Abstract

This study aimed to investigate the effect of respiratory exercise on postoperative pain, nausea and vomiting, respiratory parameters, and anxiety in patients undergoing laparoscopic surgery. The study was a randomised controlled experimental study. The sample consisted of 90 patients. Data were collected using the Information Form, Visual Comparison Scale, State-Trait Anxiety Scale, Nausea-Vomiting Assessment Form, and Respiratory Monitoring Form. Fisher's Exact test, Chi-square test, Student t-test, Mann-Whitney U-test, Paired Sample t-test, and repeated measures ANOVA test were used to analyze the data. In the intervention group, the decrease in pain, nausea, and state anxiety scores, as well as the increase in SpO2 value, measured at 0 and 24 hours postoperatively, were statistically significant. In intragroup comparisons, there was no statistically significant difference in respiratory rates between the intervention and control groups. Still, the difference between the mean pain scores and SpO2 values at 0 and 24 hours in the intervention group was found to be significant. It was found that the State Anxiety Scale score of the patients in the control group was significantly higher than that of the intervention group at the 24th postoperative hour. Postoperative respiratory exercise had a positive effect on pain, nausea and vomiting, respiratory parameters, and anxiety in laparoscopic surgery. It is recommended that patients should be encouraged to perform respiratory exercises more effectively in the early postoperative period.

Keywords: Laparoscopic Surgery, Breathing Exercises, Postoperative Pain, Anxiety, Nausea, Vomiting

1. INTRODUCTION

Surgical intervention is a form of treatment that aims to preserve the patient's physiology as much as possible and to normalize body functions impaired by diseases and injuries. This method is preferred due to its positive features, including shorter postoperative recovery times, decreased pain levels, low-stress responses, minimal incisions, high patient satisfaction, and lower morbidity and mortality rates (1). Laparoscopic surgery is performed through small incisions without the need to expose large tissues, which is inevitable in open surgery. As a result, it reduces the patient's hospital stay, increases comfort and quality of life, and provides less immune system suppression. Along with the advantages of laparoscopic surgery, there are common problems such as pain, anxiety, nausea, and vomiting in the early period (2,3). Both pharmacological and non-pharmacological approaches are used to manage these problems. Non-pharmacological methods include preoperative patient education, which can help prevent postoperative problems and facilitate early recovery. These methods also include deep breathing, coughing, in-bed leg movements, turning in bed, mobilization, and pain management, along with an explanation of surgical procedures (4).

Respiratory exercise, one of the frequently used non-pharmacological methods, is the first step of relaxation (5). Breathing exercises regulate the respiratory rate and depth, relax the accessory respiratory muscles, and increase the efficiency of breathing. The most commonly used breathing exercises are "pursed-lip" breathing and diaphragmatic breathing (6). The responsibilities of nurses working in surgical clinics include providing respiratory exercise training to patients in the preoperative period and supporting their implementation in the postoperative period (4). It is reported that patients are not ready to learn new information due to pain and other reasons in the postoperative period. Therefore, this training should be completed before surgery. The regular performance of these exercises by the nurse aims to expand the reduced lung capacity during and after surgery, restore the perfusion-ventilation balance and regulate its distribution, increase oxygenation, protect the airways, and ensure that secretions in the airways are expelled more easily with an effective cough (6). In the literature, it has been observed that respiratory exercise training given to patients who have undergone surgical intervention yields positive results in terms of pain and anxiety in various patient groups during the postoperative period (4-6).

In the postoperative period, nurses should be able to identify complications such as nausea and vomiting, pain, and respiratory problems that may occur, plan and apply appropriate pharmacological and non-pharmacological methods, monitor treatment outcomes, and prevent problems by evaluating them correctly. In the literature, there are studies on the effects of respiratory exercise on pain and anxiety, and acupressure applications on nausea and vomiting. To our knowledge, there is no study evaluating the impact of respiratory exercise on multiple variables, including pain, anxiety, nausea and vomiting, and respiratory parameters. In this sense, it was predicted that it would contribute to the literature and clinical applications. This study aimed to determine the effect of respiratory exercise on pain, anxiety, nausea and vomiting, and respiratory parameters in patients undergoing laparoscopic surgery.

2. METHODS

2.1. Study Desing

The study was conducted using a randomized controlled experimental design. The CONSORT diagram of the study is presented in Figure 1.

2.2. Setting and Sample

The study population consisted of patients who underwent cholecystectomy or umbilical hernia repair via laparoscopic surgery in the general surgery clinic of a state hospital located in the Western Black Sea region of Turkey. The research was conducted at the General Surgery Clinic. This

clinic employs 18 nurses and four staff members, with one staff member serving as the supervisor. The clinic has 24 rooms. The rooms where the patients included in the study were admitted were ensured to be similar in terms of their characteristics and comfort level. Patients are transferred from the operating theatre to the clinic after the effects of the anaesthesia have worn off. Pain management in the clinic is based on the principles of pain assessment at 4-6 hour intervals, multimodal analgesia, and early mobilisation. Multimodal analgesia includes paracetamol and non-steroidal anti-inflammatory drugs. Low-dose opioids may be preferred for the management of severe pain. There was no need for low-dose opioids in the patients in the sample.

The study sample consisted of 90 patients aged 18 years and older who volunteered to participate and underwent elective laparoscopic surgery between March 10, 2022, and June 1, 2023. Patients were randomly assigned to 2 groups. Patients were assigned to either the 45-intervention or the 45-control groups by block randomization with a 1:1 ratio, using a computer program (https://www.random.org). The sampling power was calculated to be 0.86, with an error of 0.05 and an effect size of 0.65, according to the post hoc calculation using the G-power 3.1 program. To prevent the two patients included in the intervention and control groups from influencing each other, they were placed in separate rooms.

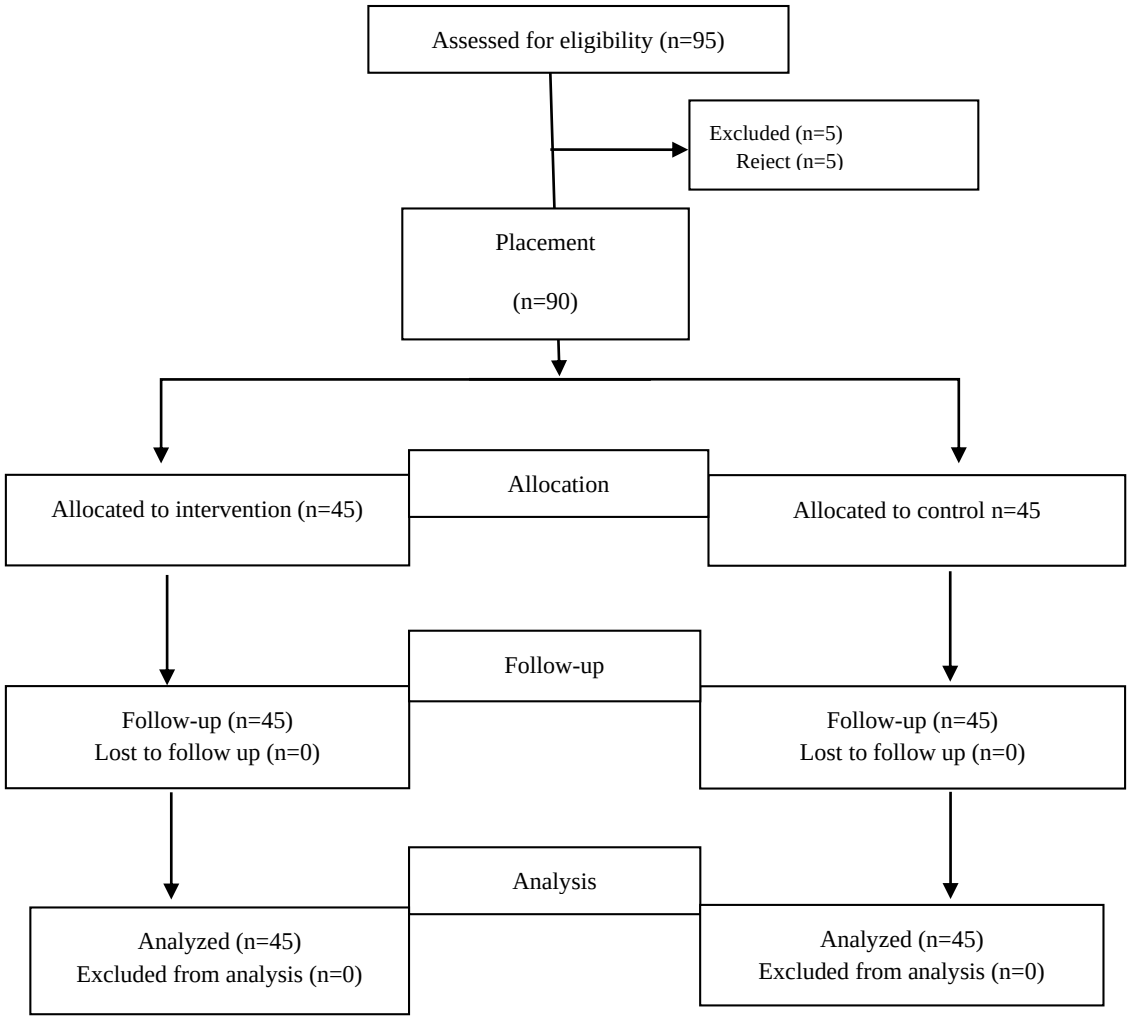

Figure 1: CONSORT diagram of the study

2.3.Measurements/Instruments

Information Form: This form, which was prepared in line with the relevant literatüre (5), includes questions regarding the descriptive characteristics of the patients; gender, age, marital status, educational status, motion sickness, body mass index (BMI), smoking status, chronic disease, presence of allergy, history of surgical intervention, history of nausea-vomiting associated with previous surgical intervention, ASA (American Society of Anaesthesiologists) score, and surgical intervention.

Visual Analogue Scale (VAS): Consists of a 100 mm long line. It indicates the extremes of pain sensation, ranging from "no pain" (i.e., no pain) at one end of the line to "unbearable pain" (i.e., the most severe pain possible) at the other end. The patient is asked to point to a point indicating the current level of pain. This point is given a numerical value corresponding to the level of pain perceived by the patient. The VAS provides quick access to the results and does not direct the patient due to the absence of numbers on it. Depending on these features, the visual comparison scale is among the most widely used scales.

Nausea and Vomiting Evaluation Form: A form for evaluating nausea was created based on relevant literature (7). In this form, nausea was assessed using the Visual Analogue Scale. The Visual Analogue Scale is a measurement tool developed by Price et al. in 1983, used to present data that cannot be evaluated numerically. At one end of a horizontal line with a length of 10 cm, "I have no nausea" and at the other end, "I have very severe nausea" are placed. The patient is asked to indicate which end of the line represents the severity of nausea. The distance from the point where nausea is absent to the point marked by the patient indicates the severity of the patient's nausea. In the evaluation of vomiting, it was classified as either "present" or "absent".

Respiratory Monitoring Form: This form records the number and type of respirations and oxygen saturation values of patients after surgical intervention. The same digital saturation device was used to measure the saturation value of the patients in the intervention and control groups.

State-Trait Anxiety Scale: It is a widely used measure of state and trait anxiety. A Turkish adaptation study was conducted by Öner and Le Compte (1998). The total score of the State-Trait Anxiety Scale varies between 20 and 80. The higher the scale score, the higher the anxiety level and the higher the scale score. As a result of the analyses conducted, the internal consistency coefficients of the scale were found to be between 0.83 and 0.92 for the State Anxiety Scale and between 0.86 and 0.92 for the Trait Anxiety Scale (8). In this study, the Cronbach's α coefficient obtained for the State Anxiety Scale was 0.702, and the Cronbach's α coefficient for the Trait Anxiety Scale was 0.654. The scale consists of 40 statements in total. In the State Anxiety Scale, the four options are None (1), Some (2), A lot (3), and Completely (4). In the Trait Anxiety Scale, four options were scored as: Rarely (1), Sometimes (2), Very often (3), and Almost always (4). The total score between 0 and 19 obtained from the scale indicates that there is no anxiety; the total score between 20 and 39 indicates mild anxiety, the total score between 40 and 59 indicates moderate anxiety, and the score between 60 and 79 indicates intense anxiety. A total score of 60 and above indicates that the individual needs professional help.

2.4. Data Collection

Patients hospitalized one day before the operation were informed about the study, and a voluntary consent form was obtained. The intervention group received training in respiratory exercises. Patients in the control group received routine nursing care provided in the hospital. This care did not include a protocol for breathing exercises. Demographic and clinical characteristics of all patients were evaluated preoperatively. Postoperatively, the pain, nausea level, and anxiety level of all patients were assessed, and the presence of vomiting was questioned. The saturation value was

measured with pulse oximetry. Respiratory exercises were demonstrated to the patients in the intervention group by the researcher, and their practice was supported. The exercise was performed 5 times per hour during the awake period of the patients in the intervention group by expanding the chest cage and flattening the diaphragm with a deep breath through the nose at the time of inhalation, holding the breath in for 3-4 seconds, and gradually exhaling through the mouth at the time of exhalation. When the patient arrived at the general surgery clinic from the operating theatre, it was considered to be 0 hours. Pain, nausea, and respiratory values of all patients were monitored at 0, 2, 6, 12, and 24 hours within 24 hours postoperatively. The presence or absence of vomiting was assessed between 0-2nd hour, 2-6th hour, 6-12th hour, and 12-24th hour postoperatively. The anxiety level of all patients was re-evaluated at the 24th postoperative hour.

2.5. Data Analysis

Statistical analyses were performed with the IBM SPSS (Statistical Package for the Social Sciences for Windows, Version 21.0, Armonk, NY, IBM Corp.) package program. Descriptive statistics (mean, standard deviation, frequency, and percentage) were used. Fisher Exact, Chi-square test, Student t-test, Mann-Whitney U-test, Paired Sample t-test, and repeated measures ANOVA test were used in statistical analyses. Statistical significance was determined as $p < 0.05$.

2.6. Ethical Considerations

This study was approved by the Social and Human Sciences Board of the Bartın University (Approval no. 12.03.2022-SBB-0086). Institutional permission was obtained from the Provincial Health Directorate to which the relevant hospital was affiliated. Patients were informed about the study, and their informed consent was obtained before participation. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki. Clinical trial ID: NCT05624346.

3. RESULTS

In the study, it was found that there was no statistically significant difference between the groups in terms of gender, marital status, level of education, motion sickness, smoking, chronic disease, allergy, history of surgical intervention, history of nausea-vomiting after previous surgery, surgical intervention, ASA score, age and BMI and the groups had similar characteristics ($p>0.05$, Table 1).

Table 1. Comparison of Demographic and Clinical Characteristics of the Patients

Variable	Control Group n	%	Intervention Group n	%	*p*	χ^2
Gender						
Men	19	42.2	14	31.1	.382*	0.77
Women	26	57.8	31	68.9		
Marital Status						
Single	4	8.9	4	8.9	>.999**	0
Married	41	91.1	41	91.1		
Level of education						
Literate	5	11.1	2	4.4		
Primary/secondary	25	55.6	21	46.7	.223**	0
education	13	28.9	21	46.7		
High school	2	4.4	1	2.2		
Associate's/Bachelor's						
Motion sickness						
Yes	10	22.2	9	20.0	>.999*	0
No	35	77.8	36	80.0		
Smoking					.502*	0.45

Yes	13 28.9	17 37.8		
No	32 71.1	28 62.2		
Chronic disease				
Diabetes Mellitus	7 15.5	7 15.5	>.999*	0
Hypertension	13 28.9	12 26.7	>.999*	
Heart failure	4 8.9	1 2.2	.361**	
Other***	3 6.7	3 6.7	>.999**	
None	18 40	22 48.9		
Allergy				
Yes	1 2.2	0	>.999*	0
No	44 97.8	45 100.0		
History of surgical intervention			.485*	0.49
Yes	34 75.6	30 66.7		
No	11 24.4	15 33.3		
History of nausea and vomiting after previous surgery			.282*	1.16
Yes	15 33.3	21 46.7		
No	30 66.7	24 53.3		
Surgical intervention				
Cholecystectomy	41 91.1	45 100.0	.666*	0
Umb. Hernia Repair	4 8.9	0		
ASA				
ASA 1	9 20.0	17 37.8	.131	4.062
ASA 2	33 73.3	27 60.0		
ASA 3	3 6.7	1 2.2		

p*: Pearson Chi-square Test, p**: Fisher Exact Test, X^2: Chi-Square Test, ASA: American Society of Anesthesiologists Classification

	X±SD	**X±SD**	***p****	**t**
Age	52.69±14.46	49.16±11.39	.192	851.000
BMI	29.89±5.21	28.53±2.79	.165	840.500

Note. BMI: Body Mass Index, SD: Standard Deviation, *p: Mann U Test, t: Independent groups t-test, p**: Fisher Exact Testi, Other***: Chronic obstructive pulmonary disease, rheumatoid arthritis, vertigo

It was determined that there was a statistically significant difference in the pain scores of the groups at the 2nd hour, 6th hour, 12th hour, and 24th hour postoperatively, and the pain scores of the intervention group were lower (p<.05). In the first 24 hours after the operation, pain scores of both groups decreased significantly (p<.05). Nausea scores at 6th and 12th hours were significantly higher in the control group (p<.05). In both groups, a significant difference was found in intra-group mean nausea scores at all time points (p<.001, Table 2).

Table 2. Comparison of Pain and Nausea Scores of Intervention and Control Groups

Variable	**Control Group**		**Intervention Group**		***p***	**t***
	X ± SD	Median (Min-Max)	X ± SD	Median (Min-Max)		
Pain at 0th hour	7.69 ± 1.46	8 (3 - 10)	7.18 ± 1.5	7 (4 - 10)	.093	809.500
Pain at 2nd hour	6.78 ± 1.78	7 (2 - 10)	5.64 ± 1.71	6 (2 - 9)	.003	645.500
Pain at 6th hour	4.87 ± 1.6	5 (2 - 8)	3.18 ± 1.9	3 (0 - 6)	<.001	548.000
Pain at 12th hour	2.51 ± 1.24	2 (0 - 5)	0.76 ± 1.09	0 (0 - 3)	<.001	342.000
Pain at 24th hour	1.73 ± 1.12	2 (0 - 4)	0.04 ± 0.3	0 (0 - 2)	<.001	265.500
Difference**	p:.002 F: 280.494		p: <.001 F: 350.789			
Nausea at 0th hour	2.62 ± 2.98	0 (0 - 8)	2.67 ± 2.57	2 (0 - 8)	.780	1045.500
Nausea at 2nd hour	1.4 ± 2.27	0 (0 - 8)	1.13 ± 1.7	0 (0 - 6)	.890	998.000
Nausea at 6th hour	0.93 ± 1.88	0 (0 - 8)	0.22 ± 0.77	0 (0 - 4)	.023	825.000
Nausea at 12th hour	0.64 ± 1.28	0 (0 - 4)	0.18 ± 0.83	0 (0 - 4)	.018	839.500

Nausea at 24th hour	0.07 ± 0.45	0 (0 - 3)	0.0 ± 0.0	0 (0 - 0)	.317	990.000
Difference	p: <.001 F: 16.992		p: <.001 F: 35.332			

Note. SD: Standard Deviation, Min: Minimum, Max: Maximum, F: Repeated measures ANOVA test, p: Mann U Test, t: Independent groups t-test

It was determined that there was a statistically significant difference in the SpO_2 scores of the groups at the 2nd hour, 6th hour, 12th hour, and 24th hour postoperatively, and the SpO_2 scores of the intervention group were higher (p<.05). A significant difference was found in SpO_2 values in all periods in both groups (p<.001). A significant increase was observed in SpO_2 values across all periods in the intervention group, with higher mean levels compared to controls (p<.001). It was determined that the respiratory rate of the patients in the control group was significantly higher in the first 12 hours (p<.005). There was no difference in the intragroup respiratory rate evaluation performed in both groups at all time points (p>.005, Table 3).

Table 3. Comparison of Intervention and Control Groups According to SpO2 and Respiratory Values

Variable	Control Group		Intervention Group		*p*	t
	X ± SD	Median (Min-Max)	X ± SD	Median (Min-Max)		
SpO_2 at 0th hour	94.82 ± 1.3	95 (92 - 97)	94.69 ± 2.18	95 (88 - 98)	.710	1057.500
SpO_2 at 2nd hour	94.8 ± 1.38	95 (92 - 98)	95.44 ± 1.85	96 (90 - 98)	.013	1315.500
SpO_2 at 6th hour	94.98 ± 1.37	95 (92 - 98)	96.27 ± 1.62	97 (93 - 98)	<.001	1479.000
SpO_2 at 12th hour	95.31 ± 1.36	95 (93 - 98)	96.78 ± 1.61	97 (93 - 99)	<.001	1538.000
SpO_2 at 24th hour	95.58 ± 1.37	95 (93 - 98)	97.11 ± 1.45	98 (94 - 99)	<.001	1574.500
Difference	p:<0.001 F: 25.641		p:<0.001 F: 111.676			
Respiratory rate at 0th hour	19.84 ± 2.1	20 (15 - 23)	18.53 ± 2.34	18 (16 - 30)	<.001	1430.500
Respiratory rate at 2nd hour	19.82 ± 1.91	20 (16 - 23)	18.4 ± 1.51	18 (16 - 22)	<.001	1456.000
Respiratory rate at 6th hour	19.84 ± 1.69	20 (16 - 22)	18.58 ± 1.48	19 (16 - 20)	<.001	1457.000
Respiratory rate at 12th hour	19.64 ± 1.26	20 (16 - 22)	18.82 ± 1.35	19 (16 - 21)	.002	1364.500
Respiratory rate at 24th hour	19.62 ± 1.09	20 (17 - 22)	18.89 ± 1.34	19 (16 - 21)	.008	1302.000
Difference	p:.102 F: 2.525		p:.375 F:0.969			

Note. SD: Standard Deviation, Min: Minimum, Max: Maximum, F: Repeated measures ANOVA test, p: Mann U Test, t: Independent groups t-test

It was determined that there was a significant difference in respiratory types between the groups at the 0th postoperative hour. While 87.5% of the patients with tachypnea were in the intervention group, 12.5% were in the control group (p=.003). It was observed that the number of patients with tachypnea and dyspnea decreased in the intervention group. All patients showed normal respiratory characteristics after the 12th postoperative hour. It was determined that vomiting was very rare in patients in both groups, with a lower rate observed in the intervention group. No vomiting was observed after the 6th postoperative hour. It was determined that there was no significant difference between the groups according to vomiting rates (p>.05). As part of routine clinical care, all patients received antiemetics at 0 hour. Subsequent doses were administered as needed. None of the patients received antiemetic treatment between 12-24 hours. There was no statistically significant difference between the groups (p>.05, Table 4).

Table 4. Comparison of Respiratory Type, Vomiting, and Antiemetic use Rates of Intervention and Control Groups

Variable	Control Group n	%	Intervention Group n	%	*p*	χ^2
Respiratory types at 0th hour						
Dyspnea	19	54.3	16	45.7	.003*	11.334
Normal respiration	24	61.5	15	38.5		
Tachypnea	2	12.5	14	87.5		
Respiratory types at 2nd hour						
Dyspnea	13	65.0	7	35.0	.053*	5.531
Normal respiration	32	48.0	34	52.0		
Tachypnea	0		4	13.0		
Respiratory types at 6th hour						
Dyspnea	5	100.0	0		.056**	5.294
Normal respiration	40	47.0	45	53.0		
Tachypnea	0		0			
Respiratory types at 12th hour						
Dyspnea	0		0		-	-
Normal respiration	45	50.0	45	50.0		
Tachypnea	0		0			
Respiratory types at 24th hour						
Dyspnea	0		0		-	-
Normal respiration	45	50.0	45	50.0		
Tachypnea	0		0			
Vomiting at 0th hour						
Yes	7	15.6	6	13.3	.764*	0.900
No	38	84.4	39	86.7		
Vomiting between 0th and 2nd hour					.500*	0.212
Yes	3	6.7	2	4.4		
No	42	93.3	43	95.6		
Vomiting between 2nd and 6th hour					.500**	1.011
Yes	1	2.2	0			
No	44	97.8	45	100.0		
Vomiting between 6th and 12th hour					-	-
Yes	0		0			
No	45	100	45	100		
Vomiting between 12th and 24th hour					-	-
Yes	0		0			
No	45	100.0	45	100.0		
Antiemetic use at 0th hour						
Yes	45	100.0	45	100.0	-	-
No	0		0			
Antiemetic use between 0th and 2nd hour					.494*	2.045
Yes	0		2	4.4		
No	45	100.0	43	95.6		
Antiemetic use between 2nd and 6th hour	25	55.6	15	33.3	.056**	4.500
Yes	20	44.4	30	66.7		
No						
Antiemetic use between 6th and 12th hour	6	13.3	1	2.2	.110*	3.873
Yes	39	86.7	44	97.8		
No						

Antiemetic use between 12th and 24th hour	0		0		-	-
Yes	45	100.0	45	100.0		
No						

Note. *p: Pearson Chi-square Test, **p: Fisher Exact Test, X^2: Chi-Square Test

At 24 hours postoperatively, the control group had significantly higher state anxiety scores than the intervention group (p<0.001). It was found that intra-group state anxiety scores decreased significantly in both groups evaluated at 0 and 24 hours postoperatively (p<0.001). Trait anxiety scores were similar in both groups (p>.005, Table 5).

Table 5. Comparison of State and Trait Anxiety Scale Means in the Intervention and Control Groups

Scale	Control Group		Intervention Group		*p*	t
	X ± SD	Median (Min-Max)	X ± SD	Median (Min-Max)		
State Anxiety Scale at 0th hour	41.93 ± 6.18	43 (28 - 53)	39.6 ± 5.79	39 (29 - 49)	.068*	774.500
State Anxiety Scale at 24th hour	40.91 ± 4.66	42 (29 - 50)	33.62 ± 4.43	33 (28 - 47)	<.001*	278.500
Difference	p: <0.001** t: 50.881		p: <0.001** t: 58.888			
Trait Anxiety Scale	35.89 ± 8.53	34 (15 - 66)	34.47 ± 7.09	33 (25 - 54)	.392**	0.727

Note. SD: Standard Deviation, Min: Minimum, Max: Maximum, *p: Mann U Test, **p: Independent groups t-test

4. DISCUSSION

Consistent with previous findings, patients undergoing laparoscopic surgery frequently experience postoperative pain, anxiety, and nausea (5). Postoperative pain, anxiety, nausea, and vomiting are the most common complications experienced by patients (2,3). Although it is stated that the pain level of patients after laparoscopic surgery is low, the procedure is not painless. The literature reports that the incidence of postoperative pain is high, and when looking at all retrospective data, 31-75% of patients have experienced moderate to severe postoperative pain for more than 40 years (5).

Many pharmacological and nonpharmacological methods are used to relieve pain and anxiety in postoperative patients (2,5). In this randomized controlled study, breathing exercises, which can be used safely as a nonpharmacological method, were preferred, and patients were allowed to perform them. According to research, postoperative pain is often caused by tissue damage. Reflex muscle contraction causes a limitation of movement, and the metabolic process is inhibited due to tissue ischemia (9). In this sense, it is predicted that respiratory exercise may reduce pain, nausea, and anxiety by contributing to tissue oxygenation. In this study, which evaluated the effect of respiratory exercise on pain levels after laparoscopic surgery, we found that the change in the mean pain score of patients in the intervention group was greater than that of patients in the control group. The mean pain level in the intervention group was 7.18±1.5 at the 0th hour postoperatively, and the pain was relieved entirely at the 24th hour. This was 7.69±1.46 at 0 hours and 1.73±1.12 at 24 hours in the control group. This improvement in pain scores may be attributed to the regular practice of breathing exercises. Chen et al. (2022) examined the effect of psychological intervention on pain level in patients undergoing laparoscopic surgery and found that while the preoperative pain levels of the

patients were similar, the pain level of the patients who received psychological intervention after surgery was much lower (10). In this study, when compared with other studies in the literatüre (1,5), it is seen that the postoperative pain level of the patients is lower. The results of the research, conducted in conjunction with developments in information and technology, also demonstrate success in pain management. Non-pharmacological interventions, such as breathing exercises that nurses can perform independently, play an important role in pain management. (11).

The mechanisms that increase the severity of pain in surgical patients also cause nausea and vomiting, which continues to be a common problem (12). In their study on surgery, Amirshahi et al. (2020) evaluated 23 studies conducted on 22,683 participants in different countries from 2002 to 2018 (13). The results of the study reported that the overall prevalence of postoperative nausea and vomiting was 27.7% worldwide. In the study of Yayla et al., vomiting was observed in more than half of the patients in the 2nd hour after surgery (3). In this study, it was determined that there was a significant difference in nausea and vomiting in patients after respiratory exercise. No vomiting was observed in either group after the 6th hour of surgery. Arslan and Çelik (2024) reported that nausea and vomiting in the postoperative period are factors that reduce patient care quality and satisfaction (14). Nurses can manage postoperative nausea and vomiting with pharmacological and non-pharmacological methods. In this study, considering that the effect of anesthesia dissipates slowly, it was observed that the mean nausea scores of the control group were higher than those of the intervention group at the 6th and 12th hours after surgery. This difference may be attributed to the improved oxygenation and reduced sympathetic activation that breathing exercises provide.

Breathing exercises must be performed regularly by patients to prevent respiratory complications in the postoperative period. In this study, the patients in the intervention group performed regular breathing exercises for 24 hours postoperatively. Failure to treat postoperative pain in a timely and adequate manner leads to chronic pain, respiratory problems, immobilization, and decreased patient comfort and satisfaction (14). In this study, we compared the SpO2 values of the patients and found no significant difference between the groups at the 0th hour after surgery. However, significant differences were observed at the 2nd, 6th, 12th, and 24th hours. An analysis of the intra-group evaluations revealed a substantial difference between the two groups, with the intervention group demonstrating a greater change. After anesthesia, contraction of the respiratory muscles, affecting the diaphragm, increases smooth muscle tone in the bronchioles and affects part or all of the lungs, which may lead to various respiratory complications (15). As a result of these possibilities, dyspnea, tachypnea, an increase or decrease in respiratory rate due to increased heart rate, and a reduction in the patient's saturation due to decreased oxygenation can be observed. In this study, it was observed that the respiratory rate of the intervention group was significantly lower than that of the control group in all periods. In the study by Bulut and Karabulut (2023), it was found that the mean respiratory rate score in the laparoscopic surgery group, which performed respiratory exercises, was higher than that in the control group on the 1st postoperative day (4). In this study, 87.5% of the patients with tachypnea in the 0th hour after surgery were in the intervention group, while 12.5% were in the control group. The respiratory patterns of all patients in the intervention group returned to normal after the 6th hour of the operation, whereas the respiratory patterns of 5 patients in the control group continued to exhibit dyspnea. At the 12th and 24th hour after the operation, respiratory patterns were standard in both groups. In the post-anesthesia period, the use of deep breathing exercises and a gradual cough technique is one of the effective methods to ensure that secretions are cleared from the respiratory tract (6). Vahedian et al. (2021) found a significant decrease in the number of respirations between the intervention group and the control group, who performed respiratory exercises, among patients undergoing major abdominal surgery, while no significant difference was found between the groups (16). Qin et al. (2021) also reported that the laparoscopic colorectal surgery patient group who performed respiratory exercises had better arterial oxygenation on days 1 and 4, a shorter hospital stay, and higher patient satisfaction (6). Yadav et al.

found that deep breathing exercise and incentive spirometry improved lung function in patients undergoing laparoscopic cholecystectomy (17).

Minimally invasive surgeries, including laparoscopic surgery, cause less postoperative anxiety than traditional surgeries. Gamel and Mohammed (2022) reported that postoperative anxiety scores were significantly higher in the control group than in the intervention group, in which early ambulation and respiratory exercise were performed. Preoperative respiratory training has been shown to improve postoperative anxiety levels (18). In this study, it was found that the difference in pre- and post-test anxiety scores was significant in both groups, and the anxiety levels of the patients in the intervention group were lower. This difference may be due to regular breathing exercises affecting the decrease in anxiety scores of the intervention group. The significant reduction in anxiety scores in the control group may be related to regular care and treatment practices in the preoperative and postoperative processes and frequent visits from the research nurse.

There are also findings in the literature that attentive care provided by nurses may increase the clinical effectiveness of minimally invasive surgery and help patients achieve a satisfactory recovery both physically and mentally (19). In the preoperative and early postoperative periods, the patient should be evaluated as a whole, mentally and physically, and all problems should be addressed. As a result of this study, it was observed that regular breathing exercises in the intervention group accelerated recovery, increased oxygenation, reduced pain and nausea, and relieved anxiety. In the control group, it was found that the nurse researcher's frequent visits had a positive effect on the patients.

Limitations of the Study

The study is limited to volunteer patients who were hospitalized in the surgery clinic between September 1, 2022, and June 1, 2023, and underwent elective laparoscopic surgery, and who are over 18 years of age. The results of the study cannot be generalized for patients undergoing different surgical procedures.

5. CONCLUSIONS AND RECOMMENDATIONS

Respiratory exercise is an effective non-pharmacological nursing intervention that may alleviate postoperative pain and anxiety, reduce nausea and vomiting, and improve respiratory function in patients undergoing laparoscopic surgery. Additionally, it is expected to contribute to the research being conducted on this subject.

In line with these results;

- It is essential to teach breathing exercises, which are one of the nonpharmacological methods, to patients who will undergo laparoscopic surgery and to support them in their application.
- Enhancing the training of nurses to enable them to teach respiratory exercises effectively.
- Developing institutional protocols to ensure standardized training of healthcare professionals in respiratory exercise implementation is advised.

"Laparoskopik Cerrahide Solunum Egzersizinin Ağrı, Bulantı-Kusma, Solunum Parametreleri ve Anksiyete Üzerine Etkisi" Başlıklı Makalenin Araştırma ve Etik Beyanı Bilgileri	
Bu çalışma "Araştırma ve Yayın Etiği" değerlerine uygun olarak hazırlanmış ve intihal kontrol programında kontrol edilmiştir. Çalışmanın tüm sorumluluğu yazar(lar)a aittir.	
Bilgilendirme	Bu çalışma "Laparoskopik Cerrahide Solunum Egzersizinin Ağrı, Anksiyete, Bulantı-Kusma ve Solunum Parametreleri Üzerine Etkisi" başlıklı yükseklisans tezinden üretilmiştir
Yazar Çıkar Çatışması Beyanı	Yazarlar arasında çıkar çatışması yoktur.
Finansal Destek	Çalışmada herhengi bir finanasaldestek alınmamıştır.
Yazar Katkı Oranı Beyanı	Yazarlar veri toplama dışında eşit oranda katkıda bulunmuşlardır.
Teşekkür	Çalışmayı destekleyen herhangi bir kurum/proje yoktur.
Etik Kurul Onay Belgesi	Etik Kurul onayı alınmıştır.
Ölçek İzni	Ölçek açık erişimdedir.

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