

# The Effect of Jacobson's Progressive Relaxation Technique on Postoperative Pain, Activity Tolerance, and Sleeping Quality in Patients Undergoing Gynecological Surgery

## Abstract

**Background:** Inadequate pain management and sleep disturbances of patients undergoing gynecological surgery are associated with delayed recovery time. This study aimed to assess the effect of Jacobson's Progressive Relaxation Technique (JPRT) on postoperative pain, activity tolerance, and sleeping quality in patients undergoing gynecological surgery. **Materials and Methods:** A randomized controlled clinical trial conducted at Obstetrics and Gynecology Department/Damanhour educational institute, Elbehira, Egypt. The study sample involved 116 patients undergoing gynecological surgery who were equally distributed between intervention and control groups. Data collected from April to September 2019. Four tools were used for data collection: Demographic data interview schedule, pain analog scale, activity tolerance questionnaire, and the Groningen sleeping quality scale. For the intervention group, the women were asked to perform JPRT for 30 min on the second and third postoperative day, three times a day. SPSS 23.0 is used to analyze data using Chi-square, Fisher's exact, independent t-test, and Analysis of Covariance (ANCOVA). A significance level considered at  $p < 0.05$ . **Results:** The study results showed that JPRT significantly improves pain, sleep quality, and activity tolerance mean scores among the intervention group compared to the control group ( $F_1 = 119.13, p < 0.001$ ), ( $F_1 = 361.49, p < 0.001$ ), and ( $F_1 = 157.49, p < 0.001$ ), respectively. ANCOVA results showed that 33% of the decreased pain score, 12% of decreased sleeping quality score, and 26% of improved activity tolerance score are due to JPRT. **Conclusion:** JPRT should be offered as a part of standard postoperative nursing care for patients undergoing gynecological surgery to control pain and improve sleeping quality and activity tolerance.

**Keywords:** *Activities of daily living, pain, postoperative, muscle relaxation, sleep*

## Introduction

Surgical treatment for gynecological patients may be necessary for several causes including the removal of benign or malignant tumors, urogynecological disorders, and management of fertility or ectopic pregnancy problems.<sup>[1]</sup> Gynecological surgery is justified when all conservative treatment methods are exhausted only. Surgical treatment is a leading cause of patient stress as there are many life-threatening complications associated with it. To avoid the complications of surgery, emphasis must be done on preoperative care and patient preparation. Preoperative patient preparation is a vital step that carried out by a specific sequence of measures and procedures.<sup>[2]</sup> The objectives of providing better preoperative care in

gynecologic surgery are to ensure that the patient receives the most appropriate treatment, improve the patient's physical and psychological status, and minimize morbidity and mortality from postoperative complications. It can be achieved through effective preoperative treatment and education. During the preoperative care, the nurse can educate the patient on numerous interventions that can be applied during the postoperative period. Most patients will not be able to learn new techniques due to pain, stress, and activity intolerance during the postoperative period. Consequently, all techniques used in postoperative care should be taught in preoperative. Furthermore, for those discharged without further hospitalization, patient satisfaction mainly depends on preoperative education.<sup>[3]</sup> Gynecological surgery can be a particular challenge for patient experience. Patients

**Heba Abdel-Fatah Ibrahim<sup>1,2</sup>,  
Wafaa Taha Elgzar<sup>2,3</sup>,  
Reda Mhmod Hablas<sup>4,5</sup>**

<sup>1</sup>Department of Obstetrics and Woman Health Nursing, Nursing College, Benha University, Egypt, <sup>2</sup>Department of Maternity and Childhood Nursing, Nursing College, Najran University, KSA, <sup>3</sup>Department of obstetrics and Gynecology Nursing, Nursing College Damanhour University, Egypt, <sup>4</sup>Obstetrics and Gynecologic Nursing, Nursing College, Alexandria University, Egypt, <sup>5</sup>Nursing Department (CAMS) university of Hafr-Al Batin, KSA

**Address for correspondence:**  
Prof. Heba Abdel-Fatah Ibrahim,  
Obstetrics and Woman Health Nursing, Benha University, Benha, Egypt.  
E-mail: hebaesmael18@yahoo.com

Access this article online

Website: [www.ijnmrjournal.net](http://www.ijnmrjournal.net)

DOI: 10.4103/ijnmr.IJNMR\_180\_20

Quick Response Code:



This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: [WKHLRPMedknow\\_reprints@wolterskluwer.com](mailto:WKHLRPMedknow_reprints@wolterskluwer.com)

**How to cite this article:** Ibrahim HA, Elgzar WT, Hablas RM. The effect of Jacobson's progressive relaxation technique on postoperative pain, activity tolerance, and sleeping quality in patients undergoing gynecological surgery. *Iran J Nurs Midwifery Res* 2021;26:295-302.

Submitted: 12-Jul-2020. Revised: 24-Aug-2020.

Accepted: 26-Mar-2021. Published: 20-Jul-2021.

develop several physical and psychological problems after surgery; psychological problems involve stress, anxiety, loss of control, and body image disturbance. Physical problems include fatigue, activity intolerance, gastrointestinal upset, sleep deprivation, and postoperative pain.<sup>[4,5]</sup>

All patients undergoing gynecological surgery suffer from postoperative pain. This pain is mainly caused by traumatized/affected tissues and nerves due to the surgical intervention. The pain is invisible and becomes known only to the care provider through the subjective experience and behavior of a patient suffering from pain.<sup>[6]</sup> More than 40% of postoperative patients have been reported to have moderate and severe pain intensity despite medical treatment.<sup>[7]</sup> Appropriate pain treatment is vital in preventing negative patient experiences and its associated discomforts or disability. Moreover, inadequate pain management is associated with increased morbidity, significant limitations in daily living activities, anxiety, depression, fatigue, and delayed recovery time.<sup>[8-10]</sup> Furthermore, good sleeping is nearly impossible, and pains lead to poor Quality of Life (QOL) and sleep deprivation in these patients.<sup>[11]</sup> Healthy sleep can affect patient recovery. Sleep deprivation and disturbances are universally reported among gynecological surgery patients. It can cause many adverse effects to patients, decrease immune function, reduce wound healing, increase blood pressure, increase heart contractility, increase stress-induced hormone secretion, and negatively affect patients' QOL and physical activities.<sup>[12,13]</sup> Physical activity is a significant element for postoperative recovery. Furthermore, early ambulation may help to reduce the incidence of postoperative complications such as pneumonia, paralytic ileus, and deep venous thrombosis.<sup>[14]</sup> Also, there is evidence that postoperative physical activity enhances surgical outcomes and shortens the length of hospital stay. Therefore, enhancing postoperative physical activity is an essential component of nursing care.<sup>[15]</sup>

Postoperative nursing care is complex and needs careful design to manage all discomforts that affect patient recovery. It is worth noting that postoperative pain, activity intolerance, and sleep disturbances are the most common discomforts after surgery. If these discomforts are appropriately managed, they will have a significant effect on the speed of the patient's recovery and reducing the length of stay in the hospital. Factually, the relationships among postoperative pain, activity intolerance, and sleep disturbances look like three vertexes of the triangle, so if the pain is properly treated, the activity tolerance and quality of sleep will be enhanced.<sup>[4]</sup> Although pain management is a role of all health care team, nurses have the primary and greatest responsibility. Pain control is an essential part of nursing practice. Left unmanaged pain is considered bad professional conduct or a violation of basic human rights and nursing ethics.<sup>[9,10]</sup> Numerous pharmacological and non-pharmacological methods are used to control and alleviate the above mentioned postoperative discomfort. The

uses of medicine have many adverse effects and increase health care costs. Non-pharmacological methods are safe and do not cause any adverse effects. Many of these methods are parts of alternative and complementary therapy.<sup>[16]</sup> Jacobson's Progressive Relaxation Technique (JPRT), also named progressive muscle relaxation, is one of the non-pharmacological and complementary interventions to overcome the above mentioned postoperative discomfort. Edmund Jacobsen developed it in 1938, based on the principle that muscle tension is a psychological response of the body to disturbing thoughts.<sup>[17]</sup> This intervention aims to help patients recognize the differences between a feeling of tension and a feeling of relaxation in the same muscle group. Therefore, the person will achieve a deep relaxation state in all muscles, as well as understanding the benefits of this relaxation.<sup>[18]</sup> In this technique, each muscle or muscle group is tensed for 5 to 7 s and then relaxed for 20–30 s. Each time, a person can distinguish the tension and relaxation sensation.<sup>[17]</sup> Moreover, during the intervention, the mentor will teach the patient to take deep breaths, keep it during a state of muscle tension, and then exhale during a state of relaxation. Thus, the person gets the benefits of deep breathing exercises. Furthermore, the patient is helped to imagine the energy meridians and how the negative energy is squeezed through the meridians outside the body, leaving it relaxed.<sup>[19]</sup> Jacobson relaxation technique is effortless and used in the treatment of several physical and psychological problems. For examples, it may help distraction of attention, reduce stress, anxiety, and depression,<sup>[20]</sup> improve the quantity and quality of sleep,<sup>[21]</sup> reduce the pain intensity,<sup>[9]</sup> reduce the consumption of analgesics,<sup>[22]</sup> and improve postoperative physical activities.<sup>[4]</sup> Besides, JPRT does not require a specific time or place. Most importantly, JPRT strengthens the therapeutic nurse-patient relationship.<sup>[23]</sup> Despite the importance of JPRT as evidence-based clinical practice in reducing pain and improving sleep quality and activity tolerance among postoperative patients, there is little evidence to assess its effect on postoperative recovery in patients undergoing gynecological surgery in Egypt. Thus, the current study aims to evaluate the effect of JPRT on postoperative pain, activity tolerance, and sleeping quality in patients undergoing gynecological surgery. The study hypothesized that patients who perform the JPRT technique exhibit less postoperative pain, greater activity tolerance, and better sleeping quality than those who did not perform it.

## Materials and Methods

This study was conducted from April to September 2019. It was a randomized, controlled trial, which was registered in the Iranian Registry of Clinical Trial with the number IRCT20210131050193N1. The effect of one Independent variable (JPR) on three dependent variables (postoperative pain, activity tolerance, and sleeping quality) has been investigated. This study was carried out at the Obstetrics

and Gynecology Department at Damanhour Educational Institute affiliated to the ministry of health in Elbehira governorate/Egypt.

The study encompassed a convenience sample of 116 patients undergoing gynecological surgery using Epi-Info program which was used to estimate the sample size using the following parameters: expected frequency = 50%, acceptable error = 5%, confidence coefficient = 99%, sample size = 116, and power analysis = 80%. The study participants joined this study according to the following inclusion criteria: patients undergoing abdominal gynecological surgery for benign conditions, being able to differentiate between the different images in visual analog scale, being free from any psychological or mental disorders, taking non-steroidal anti-inflammatory medication as postoperative analgesia, and being enthusiastic about contributing in the study. While drug abusers, alcoholics, those who undergo laparoscopic surgery, drink more than 3 cups of coffee per day, use sleep medications, and had intra or post-operative complications were excluded from the study. Randomization block technique was used to randomly assign participants to the JPRT and control group. The researchers followed six phases to conduct the randomization block technique. First, the researchers made a list that contains numbers from 1 to 116. Second, the researchers made small pieces of papers that contain numbers from 1 to 116. Third, the researchers folded the paper pieces to hide the numbers written on them, and then they were put in a bowl. Fourth, the researchers divided the 116 pieces of papers into six blocks randomly and blindly; the first five blocks involve 20 random numbers, and the last one involves 16 remaining numbers. Fifth, half of the numbers were randomly and blindly selected to the JPRT group from each block, while the residual was allocated to the control group. Sixth, the sequence of cases was recorded in the preset list (the word JPRT or control was written in front of each number) to be taken into consideration when collecting data. The intervention group (G1) included 58 patients who were undergoing JPRT. The control group (G2) involved 58 patients who were undergoing routine hospital care.

The researchers collected data using four instruments: Tool I: Demographic data interviewing sheet. It included age, education, working status, residence, and marital status. In addition, the type of gynecological surgery procedure was also included. Tool II: Pain analog scale: It is a standardized linear scale adopted from McCaffery and Pasero<sup>[24]</sup> to assess the severity of pain. The tool is a horizontal line divided by numbers with equal distances. The tool is a horizontal line divided by numbers from 0 (no pain) to 10 (worst pain) with equal distances (1 cm). Tool III: activity tolerance sheet: the researchers constructed it to evaluate the tolerance of necessary daily life activities next to surgery. The sheet includes seven elements that are rated as follows: (4) performed easily, (3) performed with difficulty,

(2) performed with assistance, and (1) not performed. The overall activity tolerance score ranged from 7 to 28. A high overall score indicates higher activity tolerance. Tool IV: The Groningen Sleep Quality Scale: Meijman *et al.*<sup>[25]</sup> made it to assess the overall quality of sleep. The scale contains fifteen dichotomous questions (yes or no) that evaluate the quality of sleep during the previous night. The first question does not count toward the overall score. The patients scored "1" for the answer "yes" in queries number 2, 3, 4, 5, 6, 7, 9, 11, 13, 14, and 15. Also, they scored "1" for the answer "no" in queries 8, 10, and 12. The overall score ranged from 0 to 14. A higher total scale score indicates poor sleep quality during the night before. All instruments were investigated for content validity by a panel of 5 experts in maternity nursing and biostatistics field. The instrument's reliability was examined with Cronbach's alpha test. Reliability results were 0.760, 0.856, and 0.792 for Tool II, III, and IV, respectively. A pilot study was conducted on 10% of the study sample to confirm the instrument's feasibility. The pilot study participants were excluded from the main sample because of tool modification in the activity tolerance tool.

The researchers screened all patients who will undergo abdominal gynecological surgery on the day before the operation. Patient files were examined to ensure that they were eligible for the study. Patients were assigned as an intervention or a control group according to a pre-defined randomization block list. Then, the patients were individually interviewed by the researchers to take their consent after clarifying the study aim. The researchers collected demographic data (the tool I) from both groups immediately after obtaining their consent, while all the baseline data (Tool II, III, and IV) were collected on the second postoperative day (after 24 h of the surgery) and considered as the pre-test.

The patients in the intervention group were explained that the technique involves the systemic sequential tension in specific muscle groups. Inhale deeply, and then hold the breath for 10 s. This tension is then released while exhaling from pursed lips within 10 s slowly. Also, it was explained that the muscles of the body are divided into twelve groups: hands, biceps, and triceps, shoulders, neck, mouth, jaw, eyes and forehead, chest, abdomen, back, thighs, legs, and feet muscles. The researchers helped the patients to sit comfortably in their bed from the beginning till the end of the JPRT session. During the JPRT training session, one of the researchers performed it in front of the patients and requested to re-demonstrate until they mastered the technique. Women were asked to perform this relaxation technique for 30 min after baseline data were collected, on the second and third postoperative day, three times/day at the three shifts (morning, evening, and night) under trainer guidance.<sup>[17]</sup> After completion of the six JPRT sessions (48 h after the baseline assessment), the JPRT pain, activity tolerance, and sleep quality were re-evaluated using tools

II, III, and IV and considered as post-test. In contrast, the patients in the control group were left for routine hospital care without intervention.

Data were analyzed via the Statistical Package for Social Science (SPSS) software, version 23 (SPSS Inc. Chicago, IL, USA). Descriptive statistics as mean and standard deviation were used for reporting normally distributed numerical variables. Numbers and percentages were used to describe categorical variables. The differences of categorical demographic variables among the intervention and control groups were assessed using the Chi-square test or Fisher's exact test. Differences in postoperative pain, activity tolerance, and sleeping quality among the two groups were compared using analysis of variance (ANCOVA) to adjust the effect of the pre-test score. The differences in the analgesic doses were compared using an independent sample t-test. A significance level was considered as  $p < 0.05$ .

### Ethical considerations

Ethical approval from nursing college at Damanhur University and written permission from Damanhur National Medical Institute were obtained before conducting the study. Ethical approval No (02-02-02-2019 EC) was issued on February 02/2019.

In addition to obtaining the above-mentioned approvals, informed consent was obtained from the participants. They were informed that their participation in the study was elective, and they had the decision to refuse participation at any stage of the study without penalties. All patients' data were confidential and used only for research purposes.

### Results

The patients' demographic information ( $n = 116$ ) are clarified in Table 1. There were no significant differences ( $p > 0.05$ ) between the intervention and control group in terms of age, education, working status, residence, and marital status. Likewise, no significant difference ( $p > 0.05$ ) was observed when comparing the types of gynecological abdominal surgical procedures in intervention and control groups.

Postoperative pain score in Table 2 shows a significant reduction in pain mean scores in the intervention group compared to the control group after JPRT ( $F_1 = 119.13$ ,  $p < 0.001$ ). When taking a pre-test as a reference, the pain score significantly decreased ( $F_1 = 55.70$ ,  $p < 0.001$ ) within the intervention group after JPRT, and 33% of the pain reduction was due to JPRT. About 51% of the differences between the two groups was due to JPRT.

Table 3 portrays that activity tolerance mean score increased significantly in the intervention compared to the control group after JPRT ( $F_1 = 157.49$ ,  $p < 0.001$ ). ANCOVA results showed a significant improvement in the intervention group's activity tolerance ( $F_1 = 41.46$ ,

$p < 0.001$ ) when taking the pre-test as a reference. In addition, the effect size shows that 26% of the activity tolerance improvement within the intervention group and 58% of the difference between the two groups were due to JPRT.

Table 4 illustrates that the sleeping quality mean score decreased significantly in the intervention group compared to the control group indicating improved sleeping quality after JPRT ( $F_1 = 361.49$ ,  $p < 0.001$ ). ANCOVA results show that when taking pre-test results as a reference, there was a significant improvement in sleeping quality after JPRT ( $F_1 = 16.37$ ,  $p < 0.001$ ), where 12% of the improvement was due to the intervention.

### Discussion

The current study findings indicated a significant difference between the intervention and control groups concerning postoperative pain scores, activity tolerance, and sleeping quality mean score after Jacobson's relaxation technique. The mean pain scores decreased significantly in the intervention group after JPRT compared to the control group. Also, the results demonstrated that JPRT reduced postoperative analgesic consumption in the intervention group. The reduction of mean pain scores of patients in the intervention group supports the present study hypothesis, "patients who perform JPRT technique exhibit less postoperative pain than those who do not perform it." Specifically, the study findings indicated that the application of JPRT serves as an effective way to reduce postoperative pain from patients in the intervention group. This technique promotes regular relaxation of major groups of muscles in the body intending to relax mind and body, and decreasing stress response and pain sensation.<sup>[26]</sup>

This result was in the same line with at least four studies. The first study<sup>[22]</sup> evaluated the effect of JPRT with analgesic on postoperative pain in patients undergoing gastrointestinal system surgery. They indicated a significant difference in postoperative pain between the intervention and control groups. They added that JPRT is a proper way to reduce the consumption of analgesics in the postoperative period. The second study<sup>[27]</sup> revealed that the application of JPRT reduced the level of pain in their studied participants. The third study<sup>[28]</sup> carried out a quasi-experimental study on open abdominal surgery patients and showed that JPRT was effective in decreasing postoperative pain. They also added that it helped their patients overcome the worrying feelings and enhance their QOL during postoperative period. The fourth study<sup>[29]</sup> conducted a quasi-experimental study to assess the effect of JPRT in postoperative pain in total knee replacement patients and indicated a significant improvement in postoperative pain after relaxation. The positive effect of JPRT in postoperative pain therapy did not confirm by Bialas *et al.*<sup>[30]</sup> They had performed a nonrandomized pilot study on 104 patients who underwent total endoprosthesis or laminectomy in Germany. This

**Table 1: Demographic characteristics and surgery type among of the study participants (n=116)**

	Intervention group n (%)	Control group n (%)	Significance test	df	p
Age			0.94*	2	0.625
20- <35 year	24 (41.38)	27 (46.55)			
35- < 50 year	24 (41.38)	19 (32.76)			
≥50 year	10 (17.24)	12 (20.69)			
Education			4.95*	1	0.175
Illiterate	15 (25.85)	14 (24.12)			
Read & write	17 (29.30)	11 (18.98)			
Secondary	19 (32.75)	17 (29.31)			
University	7 (12.10)	16 (27.59)			
Working status			1.20 **	1	0.272
Working	47 (81.03)	42 (72.41)			
House wife	11 (18.97)	16 (27.59)			
Residence			1.25 **	1	0.261
Rural	28 (48.28)	22 (37.93)			
Urban	30 (51.72)	36 (62.07)			
Marital Status			2.91*	2	0.109
Married	50 (86.21)	54 (93.10)			
Divorced	3 (5.17)	0 (0.00)			
Widowed	5 (8.62)	4 (6.90)			
Gynecologic abdominal surgery procedure			3.02 *	2	0.388
Total hysterectomy	18 (31.03)	10 (17.25)			
Subtotal hysterectomy	22 (37.93)	26 (44.82)			
Myomectomy	10 (17.25)	12 (20.68)			
Ovarian cystectomy	8 (13.79)	10 (17.25)			

\*Fisher Exact test, \*\*Chi-square test

**Table 2: Visual analog pain scores and analgesic doses before and after JPRT\* among the two groups (n=116)**

Characteristic	Intervention group Mean (SD)	Control group Mean (SD)	F	df	p	Effect size
Before JPRT*	7.89 (2.48)	7.37 (1.95)				
After JPRT*	3.12 (2.40)	6.63 (2.42)				
ANCOVA** (Group as reference)			119.13	1	<0.001***	0.51
ANCOVA** (pre-test as a reference)			55.70	1	<0.001***	0.33
The analgesic doses until the third day	7.65 (0.73)	7.96 (0.72)	t****	(p) 2.28	(0.024***)	

\*Jacobson's Progressive Relaxation Technique; \*\*ANCOVA: Analysis of Variance; \*\*\*Significant at  $p \leq 0.05$ ; \*\*\*\*: independent sample t-test**Table 3: Activity tolerance mean scores before and after JPRT\* among the two groups**

Characteristic	Intervention group Mean (SD)	Control group Mean (SD)	F	df	p	Effect size
Before JPRT*	15.60 (2.12)	15.53 (2.92)				
After JPRT*	20.58 (2.60)	16.03 (2.55)				
ANCOVA** (Group as reference)			157.49	1	<0.001***	0.58
ANCOVA** (pre-test as a reference)			41.46	1	<0.001***	0.26

\*Jacobson's Progressive Relaxation Technique; \*\*ANCOVA: Analysis Of Variance; \*\*\*Significant at  $p \leq 0.05$ **Table 4: Sleeping quality mean scores before and after JPRT\* among the two groups**

Characteristic	Intervention group Mean (SD)	Control group Mean (SD)	F	df	p	Effect size
Before JPRT*	11.46 (3.64)	12.06 (3.21)				
After JPRT*	8.39 (4.32)	11.82 (3.47)				
ANCOVA** (Group as reference)			361.49	1	<0.001***	0.76
ANCOVA** (pre-test as a reference)			16.37	1	<0.001***	0.12

\*Jacobson's Progressive Relaxation Technique; \*\*ANCOVA: Analysis of Variance; \*\*\*Significant at  $p \leq 0.05$

dissimilarity between the current findings and Bialas *et al.*' findings may be attributed to the dissimilarity in the study design and implementation, in addition to the inclusion of heterogeneous patient groups in their study. Hence, further studies are recommended.

The results of the current study indicated that after Jacobson's relaxation training, activity tolerance significantly increased in the intervention group compared to the control group. Furthermore, ANCOVA results showed a significant improvement in the intervention group's activity tolerance ( $p < 0.001$ ) when taking the pre-test as a reference. In addition, the effect size shows that 26% of the activity tolerance improvement within the intervention group is due to the JPRT. Furthermore, when taking the control group as a reference, there is a significant improvement in the intervention group activity tolerance ( $p < 0.001$ ), where 58% of the differences between the two groups are due to the intervention. Similar findings have been shown in the study by Ismail and Elgzar<sup>[4]</sup> who had conducted a randomized controlled clinical trial to evaluate the effect of JPRT on pain and physical activities after cesarean section. They revealed a significant improvement in physical activity after JPRT. They emphasized that severe activity limitation was significantly reduced within the intervention group after JPRT, while it was noticeable in 70% of the control group. The findings as mentioned earlier appear to be logical and in line with Pereira *et al.*<sup>[31]</sup> and Borges *et al.*<sup>[32]</sup>; they had emphasized that postoperative pain mainly affects the performance of daily life activities such as sitting, standing, walking, and performing personal hygiene. Generally, if the patient is in pain, she will avoid any physical activity to reduce pain. Therefore, if JPRT can assist in pain reduction, the activity tolerance will be improved.

Moreover, the findings of our study portray that JPRT can improve the sleeping quality of patients undergoing gynecological surgery. These results may be attributed to the fact that the JPRT technique improves sleep quality by relaxing the body, keeping blood pressure normal, stimulating blood circulation, and ensuring muscle relaxation. In addition, the practice of the JPRT technique facilitates the passage to the parasympathetic nervous system, thereby ensuring physical and mental relaxation.<sup>[33]</sup> In this regard, Harorani *et al.*<sup>[23]</sup> assessed the effectiveness of JPRT on sleep quality in burn patients. Their findings revealed that JPRT is an effective way to improve sleep quality. They found a significant improvement in sleep quality scores in the study group after the intervention. Also, Mateu *et al.*<sup>[34]</sup> had confirmed the effectiveness of JPRT in reducing the severity of low-back pain, improving the QOL and sleep, and decreasing pain comorbidities.

Furthermore, many studies showed that JPRT increases sleeping quality in chronic obstructive pulmonary disease

patients.<sup>[35,36]</sup> JPRT has also been effective in post-cesarean section sleeping quality.<sup>[4]</sup> The findings obtained by Roozbahani *et al.*<sup>[33]</sup> also suggested that JPRT enhances sleeping quality among adolescent students. Moreover, JPRT was effective in treating insomnia in the elderly.<sup>[37]</sup> In addition, Dayapoğlu and Tan<sup>[38]</sup> studied the efficacy of JPRT on sleeping quality in multiple sclerosis patients. Although the efficacy of JPRT has been confirmed in several types of research, further studies are needed with a focus on explaining all dimensions of this technique to other groups of patients. JPRT combined the benefits of many other relaxation techniques. Therefore, the merging of JPRT in the postoperative nursing care may omit the need to use the other relaxation technique. JPRT is considered to have comprehensive benefits to postoperative patients. It helps to decrease pain, stress, and anxiety, improve muscle oxygenation, and remove oxidation. Therefore, it should be merged to postoperative nursing protocols. Furthermore, it may be used by nurses themselves to decrease nursing burnout as elaborated by Silveira *et al.*<sup>[39]</sup> They studied the impact of JPRT on workplace stress among nurses. They concluded that JPRT significantly reduced the average stress and promoted the sense of wellbeing at the workplace. They further added that JPRT is simple, costless, self-administered, effective, and needs little time to perform and improve work activities among nurses. Based on the current study findings, the study hypothesis was accepted. Patients who perform the JPRT technique exhibit less postoperative pain, greater activity tolerance, and better sleeping quality than those who did not perform it.

This study has some limitations. First, although the use of the double-blinded technique would have been ideal for a randomized controlled clinical trial, this was not possible in this study due to the interventions nature. The researchers who conducted the interventions and data collection for post-intervention pain, sleeping quality, and activity tolerance, as well as the patients were not blinded. Second, the research reflects only one geographical area in Egypt; therefore, further studies should include larger samples from different geographical areas.

## Conclusion

Based on the study results, it can be concluded that JPRT significantly decreased postoperative pain scores among the intervention compared to the control group. Furthermore, there was a significant difference between both groups after JPRT regarding activity tolerance. After JPRT, the sleeping quality mean score decreased significantly in the intervention group, indicating better sleeping quality compared to the control group. It is recommended that Jacobson's progressive relaxation intervention be offered as a part of standard nursing care for patients undergoing gynecological surgery in hospitals. It should also be taught to all women who are admitted to gynecology departments and outpatient clinics to expand its use. Further research

should be applied to replicate the present study in different geographical areas, a larger sample, and other operation types.

### Acknowledgments

The authors would like to thank the patients for their willingness to contribute to this study.

### Financial support and sponsorship

Nil.

### Conflicts of interest

Nothing to declare.

### References

- Porter SB. Tidy's Physiotherapy (Fifteenth Edition), USA. Elsevier Ltd; 2013.
- Lilić G, Živadinović R, Petrić A, Lilić V. Preoperative preparation of patients for gynecologic surgery. *Scientific Journal of the Faculty of Medicine in Niš* 2011;28:125-133.
- Nelson G, Altman AD, Nick A, Meyer LA, Ramirez PT, Ahtari C, *et al.* Guidelines for postoperative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations--Part II. *Gynecol Oncol* 2016;140:323-32.
- Ismail NIA, Elgzar WTI. The effect of progressive muscle relaxation on post cesarean section pain, quality of sleep and physical activities limitation. *Int J Stud Nurs* 2018;3:14-29.
- Jones CH, O'Neill S, McLean KA, Wigmore SJ, Harrison EM. Patient experience and overall satisfaction after emergency abdominal surgery. *BMC Surg* 2017;17:76.
- Coghill RC. Individual differences in the subjective experience of pain: New insights into mechanisms and models. *Headache* 2010;50:1531-5.
- Mercadante S, David F, Villari P, Spedale VM, Casuccio A. Methadone versus morphine for postoperative pain in patients undergoing surgery for gynaecological cancer: A randomized controlled clinical trial. *J Clin Anesth* 2019;61:109627.
- Gan TJ. Poorly controlled postoperative pain: Prevalence, consequences, and prevention. *J Pain Res* 2017;10:2287-98.
- Wang WY, Ho ST, Wu SL, Chu CM, Sung CS, Wang KY, *et al.* Trends in clinically significant pain prevalence among hospitalized cancer patients at an academic hospital in Taiwan: A retrospective cohort study. *Medicine* 2016;95:e2099.
- Woo A, Lechner B, Fu T, Wong CS, Chiu N, Lam H, *et al.* Cut points for mild, moderate, and severe pain among cancer and non-cancer patients: A literature review. *Ann Palliat Med* 2015;4:176-83.
- Longley L, Simons T, Glanzer L, Du C, Trinks H, Letzkus L, *et al.* B Evaluating sleep in a surgical trauma burn intensive care unit: An elusive dilemma. *Dimens Crit Care Nurs* 2018;37:97-101.
- Chen P, Yao H, Su W, He Y, Cheng K, Wang Y, *et al.* Sleep deprivation worsened oral ulcers and delayed healing process in an experimental rat model. *Life Sci J* 2019;232:116594.
- Kuettling DLR, Feisst A, Sprinkart AM, Homs R, Luetkens J, Thomas D, *et al.* Effects of a 24-hr-shift-related short-term sleep deprivation on cardiac function: A cardiac magnetic resonance-based study. *J Sleep Res* 2019;28. doi: 10.1111/jsr.12665.
- Kreutzer L, Minami C, Yang A. Preventing venous thromboembolism after surgery. *J Am Med Assoc* 2016;315:2136.
- van der Meij E, van der Ploeg HP, van den Heuvel B, Dwars BJ, Meijerink WJH, Bonjer HJ, *et al.* Assessing pre-and postoperative activity levels with an accelerometer: A proof of concept study. *BMC Surg* 2017;17:56.
- Najafi Ghezeli T, Mohades Ardebili F, Rafii F, Manafi F. The effect of massage on anticipatory anxiety and procedural pain in patients with burn injury. *World J Plastic Surg* 2017;6:40-7.
- Jacobson E. Progressive muscle relaxation. *Interview behavior. J Abnorm Psychol* 1938;75:18.
- Peciuliene L, Perminas A, Gustainiene L, Jarasiunaite G. Effectiveness of progressive muscle relaxation and biofeedback relaxation in lowering physiological arousal among students with regard to personality features. *Procedia Soc Behav Sci* 2015;228-35. doi: 10.1016/j.sbspro. 2015.09.064.
- Avianti N, Desmaniarti Z, Rumahorbo H. Progressive muscle relaxation effectiveness of the blood sugar patients with type 2 diabetes. *Open J Nurs* 2016;6:248-54.
- Essa RM, Ismail MIA, Hassan NI. Effect of progressive muscle relaxation technique on stress, anxiety, and depression after hysterectomy. *J Nurs Educ Pract* 2017;77-86. doi: 10.5430/jnep.v7n7p77.
- Aksu NT, Erdogan A, Ozgur N. Effects of progressive muscle relaxation training on sleep and quality of life in patients with pulmonary resection. *Sleep Breath* 2018;22:695-702.
- Hasanpour-Dehkordi A, Solati K, Tali SS, Dayani MA. Effect of progressive muscle relaxation with analgesic on anxiety status and pain in surgical patients. *Br J Nur* 2019;28:174-8.
- Harorani M, Davodabady F, Masmouei B, Barati N. The effect of progressive muscle relaxation on anxiety and sleep quality in burn patients: A randomized clinical trial. *Burns* 2019;46:1107-13.
- McCaffery M, Pasero C. Pain: Clinical Manual. *Numeric Pain Rating Scale*. 2<sup>nd</sup> ed. Mosby; 1999. p. 67.
- Meijman TF, de Vries-Griever AH, de Vries G. The Evaluation of the Groningen Sleep Quality Scale. *Groningen: Heymans Bulletin*; 1988. (HB 88-13-EX)
- McGuigan FJ, Lehrer PM. Progressive relaxation: Origins, principles, and clinical applications. In: Lehrer PM, Woolfolk RL, Sime WE, editors. *Principles and Practice of Stress Management*. 3<sup>rd</sup> ed. New York, NY: The Guilford Press; 2007. p. 57e87.
- Varghese J. The effectiveness of progressive muscle relaxation therapy on postoperative pain. *Int J Nurs Med Invest* 2018;3:49-51.
- Devi R, Saharia HK. Effect of progressive muscle relaxation on post-operative analgesia. *Int J Med Res Rev* 2017;5:113-8.
- Lim YC, Yobas P, Chen H. Efficacy of relaxation intervention on pain, self-efficacy, and stress-related variables in patients following total knee replacement surgery. *Pain Manag Nurs* 2014;15:888-96.
- Bialas P, Kreutzer S, Bomberg H, Gronwald B, Schmidberger Fernandes S, Gottschling S, *et al.* Progressive muscle relaxation in postoperative pain therapy. *Schmerz* 2020;34:148-55.
- Pereira TRC, Souza FG, Beleza ACS. Implications of pain in functional activities in immediate postpartum period according to the mode of delivery and parity: An observational study. *Braz J Phys Ther* 2017;21:37-43.
- Borges N, Pereira L, de Moura L, Silva T, Pedrosa C. Predictors for moderate to severe acute postoperative pain after cesarean section. *Pain Res Manag* 2016;5783817. doi: 10.1155/2016/5783817.
- Roobahani T, Nourian M, Saatchi K, Moslemi A. Effects of

- progressive muscle relaxation on sleep quality in pre-university students: A randomized clinical trial. *Sci J Hamadan Nurs Midwifery Fac* 2016;24:16-23.
34. Mateu M, Alda O, Inda MD, Margarit C, Ajo R, Morales D, *et al.* Randomized, controlled, crossover study of self-administered Jacobson relaxation in chronic, nonspecific, low-back pain. *Altern Ther Health Med* 2018;24:22-30.
  35. Chegeni PS, Gholami M, Azargoon A, Pour AHH, Birjandi M, Norollahi H. The effect of progressive muscle relaxation on the management of fatigue and quality of sleep in patients with chronic obstructive pulmonary disease: A randomized controlled clinical trial. *Complement Ther Clin Pract* 2018;31:64-70.
  36. Yilmaz CK, Kapucu S. The effect of progressive relaxation exercises on fatigue and sleep quality in individuals with COPD. *Holistic Nurs Pract* 2017;31:369-77.
  37. Jayarathne W, Zoysa PD. The impact of a progressive muscular relaxation exercise programme for reducing insomnia in an elderly population: Results from a preliminary study at two elderly homes in the Colombo District of Sri Lanka. *Sri Lanka J Soc Sci* 2016;39:47-52.
  38. Dayapoğlu N, Tan M. Evaluation of the effect of progressive relaxation exercises on fatigue and sleep quality in patients with multiple sclerosis. *J Altern Complement Med* 2012;18:983-7.
  39. Silveira EA, Batista KM, Grazziano ES, Bringuete ME, Lima EF. Effect of progressive muscle relaxation on stress and workplace well-being of hospital nurses. *Enfermeria Global* 2020;58:485-93.