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**A study to assess the effectiveness of Progressive Muscle Relaxation exercises on postoperative pain and sleep quality in patients undergoing abdominal surgery in selected hospital NMCH Jamuhar.**

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## **Abstract**

**Background:** Postoperative pain and poor sleep quality are common complications following abdominal surgery, leading to delayed recovery and increased healthcare burden. Non-pharmacological interventions such as Progressive Muscle Relaxation (PMR) may offer effective adjunctive management.

**Objective:** To evaluate the effectiveness of PMR exercises on postoperative pain and sleep quality among patients undergoing abdominal surgery.

**Methods:** A true experimental pre-test–post-test control group design was conducted among 30 patients (15 experimental, 15 control) at a tertiary care hospital. The experimental group received PMR twice daily for three days postoperatively, while the control group received routine care. Pain was assessed using the Numeric Pain Rating Scale (NPRS), and sleep quality was measured using a structured questionnaire. Data were analyzed using paired and unpaired t-tests and chi-square tests.

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**Results:** The experimental group showed a significant reduction in pain scores (mean  $5.00 \pm 1.96$  to  $3.07 \pm 1.71$ ;  $p < 0.001$ ) and improvement in sleep quality (mean  $11.80 \pm 4.44$  to  $9.47 \pm 3.68$ ;  $p < 0.001$ ). Post-test comparisons revealed significantly better outcomes in the experimental group compared to controls (pain:  $p = 0.002$ ; sleep:  $p = 0.007$ ). No significant association was found between outcomes and demographic variables.

**Conclusion:** PMR is an effective, safe, and cost-efficient intervention for reducing postoperative pain and improving sleep quality. It should be incorporated into routine postoperative nursing care.

**Keywords:** Progressive Muscle Relaxation, Postoperative Pain, Sleep Quality, Abdominal Surgery, Nursing Intervention

## Introduction

Abdominal surgery is considered one of the most painful surgical procedures often leading to increased treatment costs and delays recovery, as the site's proximity to the diaphragm and extensive cross-innervations in the area increase the postoperative pain experienced by patients and that should be alleviated as soon and as effective as possible to reduce suffering, to promote the healing process and to prevent complications.

A large number of patient, worldwide, high numbers of patients undergo abdominal surgeries. In United States between 2009 and 2013, there were nearly 10 million discharges associated with an open abdominal surgery (Martin et al.; 2017).

Pain and recovery are essential parts of the surgical patients' experience. Pain is difficult to define because of the complexity of its anatomical and physiological foundations, the individuality of its experience and its social and culture meanings.

Progressive muscle relaxation which based on sound research findings with greater efficacy and less risk of adverse effects can aid in post-problems, relieving side effects of chemotherapy and hemodialysis, decrease postoperative pain and decrease the anxiety level



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of psychiatry patients and cardiac rehabilitation patients (Eliopoulos 2014).

## Need of the Study

Reducing post-operative pain and enhancing quality of recovery after surgery reduces the physiological burden of surgery, improve outcomes, improve post-operative quality of life, decrease hospital length of stay and decreasing costs (El- Shakhs 2015).

Progressive muscle relaxation which based on sound research findings with greater efficacy and less risk of adverse effects can aid in post-problems, relieving side effects of chemotherapy and haemodialysis, decrease postoperative pain and decrease the anxiety level of psychiatry patients and cardiac rehabilitation patients (Eliopoulos 2014).

## Problem Statement

A study to assess the effectiveness of Progressive Muscle Relaxation exercises on postoperative pain and sleep quality in patients undergoing abdominal surgery in selected hospital NMCH Jamuhar.

## Objectives of the Study

1. To assess the level of post-operative pain among patients undergoing abdominal surgery before and after the administration of progressive muscle relaxation exercise.
2. To assess the sleep quality of patients undergoing abdominal surgery before and after the administration of progressive muscle relaxation exercise.
3. To determine the association between post-operative pain and selected demographic & clinical variables.
4. To determine the association between sleep quality and selected demographic & clinical variables.

## Hypothesis

H<sub>11</sub> - There will be a significant difference in the mean post-operative pain scores between the experimental group and the control group.



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H<sub>12</sub> - There will be a significant difference in the mean sleep quality scores between the experimental group and the control group.

H<sub>13</sub> - There will be a significant association between post-operative pain levels and selected demographic and clinical variables.

H<sub>14</sub> - There will be a significant association between sleep quality and selected demographic and clinical variables.

### **Operational Definition**

**Progressive Muscle Relaxation Exercises (PMR):** Progressive Muscle Relaxation Exercises refer to a systematic relaxation technique in which the patient sequentially tenses and relaxes major muscle groups for 15–20 minutes twice daily for 3 consecutive postoperative days under the guidance of the researcher

**Postoperative Pain :** Postoperative pain refers to the discomfort or pain experienced by the patient after abdominal surgery, measured using the Numeric Pain Rating Scale (NPRS) ranging from 0–10, where 0 indicates no pain and 10 indicates worst possible pain

**Sleep Quality :** Sleep quality refers to the subjective satisfaction and restfulness of sleep experienced by the patient during the postoperative period. In this study, sleep quality will be measured using a self-structured sleep quality questionnaire developed by the investigator. The tool consists of 9 items and each item is scored on a 4-point scale (0–3). The total score ranges from 0–27. Higher scores indicate poor sleep quality.

**Abdominal Surgery :** Abdominal surgery refers to operative procedures involving abdominal organs such as appendectomy, cholecystectomy, hernia repair, or intestinal



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surgery, performed through open or laparoscopic techniques, after which the patient is admitted to the postoperative ward for recovery.

## Assumptions

- The study assumes that PMR exercise can effectively reduce muscle tension and promote relaxation in patients undergoing abdominal surgery.
- The study assumes that reducing muscle tension through PMR exercise will lead to a decrease in post-operative pain.
- Patients are able to understand and practice PMR exercises effectively.

## Delimitations

- This study is only limited to patient undergoing abdominal surgery.
- The sample size is limited to only 30 patients.
- The study includes only adult patients (18-60 years).
- This study focuses only on Progressive Muscles Relaxation exercises.

## Methodology

### Research Approach

A quantitative research approach was adopted to assess the effect of muscle relaxation exercise on post-operative pain and sleep quality among patients undergoing abdominal surgery.

### Research Design

The present study adopted true - experimental study pre-test and post-test design to evaluate the effectiveness of muscle relaxation exercise on post-operative pain and sleep quality.



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## Research Variables

### Independent Variable

- Muscle relaxation exercise.

### Dependent Variable

- Post-operative pain and sleep quality.

### Demographic Variables

- Age, Gender, Education, Occupation, Area of residence , Monthly income, and Religion

## Study Setting

- The study was conducted in the Narayan Medical College and Hospital, Jamuhar for the pilot study and main study.

## Population

- The study was conducted in the surgical ward of Narayan Medical College and Hospital, Jamuhar.

## Sample & Technique

A total of 30 patients undergoing abdominal surgery were selected using simple random sampling technique was used. Patients who have undergone elective abdominal surgery (e.g., appendectomy, hernia repair, cholecystectomy).

- Experimental group: 15
- Control group: 15

## Inclusion Criteria



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- Patients aged 18–60 years.
- Patients who are alert, conscious, and able to communicate effectively.
- Patients willing to participate in the study

## Exclusion Criteria

- Patients undergoing emergency surgery
- Patients with known psychiatric or chronic pain disorders.
- Patients with severe postoperative complications.

## Data Collection Tools

- Tool I : Demographic Data
- Tool II : Numeric Pain Rating Scale ranging from (0–10)
- Tool III : Self-structured Sleep Quality Questionnaire Score ranging from (0–27)

## Intervention Protocol

The experimental group received PMR:

- Duration: 15–20 minutes
- Frequency: Twice daily
- Period: 3 postoperative days

The control group received routine postoperative care.

## Data Collection

The samples were selected based on the inclusion and exclusion criteria using simple random sampling technique. Baseline data regarding post-operative pain and sleep quality were collected using the Numerical Rating Scale (NRS) for pain and A self-structured sleep quality questionnaire was developed by the investigator to assess sleep quality among postoperative abdominal surgery patients. Post-test assessment of pain and sleep quality was done after the



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intervention using the same tools. The data collection was carried out for a period of one week. The collected data were kept confidential and used only for research purpose.

## Data Analysis

- Descriptive statistics (mean, SD, percentage)
- Paired t-test (within group)
- Unpaired t-test (between groups)
- Chi-square test (association)

## Ethical Considerations

Approval was obtained from IEC, NNC, GNSU. Written consent was collected from the sample.

## Result

**Section A:** Description of Demographic variable. The Experimental group is primarily aged 31–45 (46.7%), while the Control group is more heavily concentrated in that same bracket at 73.3%. There is a notable difference here; the Experimental group is predominantly Female (73.3%), whereas the Control group is more balanced but leans Male (46.7% vs. 53.3% Female). In the Experimental group, 40% have higher education. In contrast, the largest segment of the Control group has Secondary education (40%). Most participants in the Experimental group are Homemakers (73.3%), while the Control group is more evenly split between Homemakers (40%) and Skilled workers (46.7%). Both groups are overwhelmingly from Rural areas (80% Experimental, 93.3% Control). The Experimental group has a slight majority earning 20,001–40,000 (53.3%), whereas the Control group is mostly in the Below 20,000 bracket (80%). Both groups are 100% Hindu.



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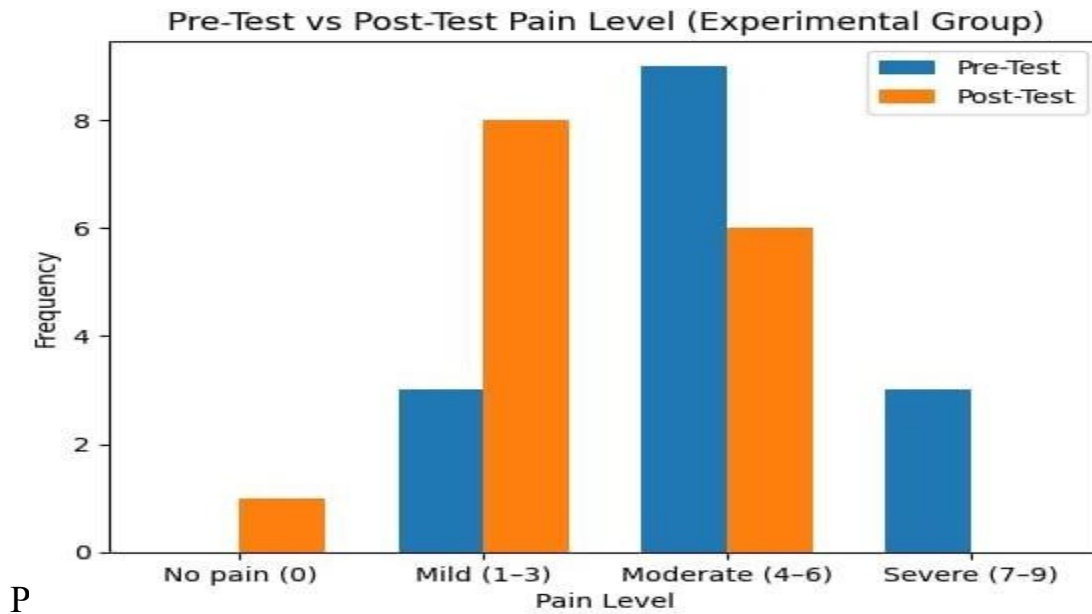
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Section B : Compare the pre-test & post-test level of pain in patients undergoing abdominal surgery in the study group.

Pain Level	Pre-Test (%)	n	Post-Test (%)	n	Mean Pre	Mean Post
No pain (0)	0 (0%)		1 (6.7%)			
Mild (1–3)	3 (20.0%)		8 (53.3%)			
Moderate (4–6)	9 (60.0%)		6 (40.0%)			
Severe (7–9)	3 (20.0%)		0 (0%)			
<b>Total / Mean ± SD</b>	15 (100%)		15 (100%)		5.00 ± 1.96	3.07 ± 1.71

**Table 1 : Compare the pre-test & post-test level of pain in the study group.**



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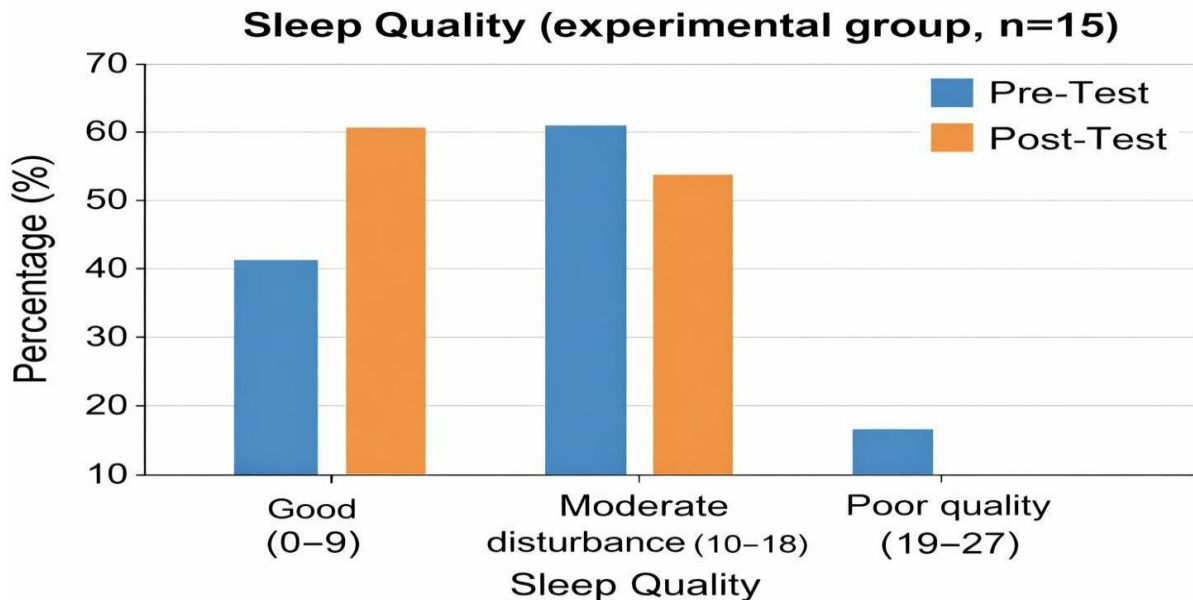
**Fig 1 : Compare the pre-test & post-test sleep quality in the study group.**

The pre-test, the majority of patients in the experimental group had moderate pain (60.0%), followed by mild (20.0%) and severe pain (20.0%). None had no pain. After the administration of PMR, the post-test showed a marked shift: 53.3% had only mild pain, 40.0% had moderate pain, 6.7% had no pain, and none had severe pain. The mean pain score reduced from  $5.00 \pm 1.96$  to  $3.07 \pm 1.71$ . The paired t-test revealed a t-value of 5.209 with  $p < 0.001$ , indicating a very highly significant reduction in postoperative pain following PMR. Hence,  $H_{11}$  is accepted.

Section B : Compare the pre-test & post-test sleep quality in patients undergoing abdominal surgery in the study group.

Sleep Quality	Pre-Test (%)	n	Post-Test (%)	n	Mean Pre	Mean Post
Good (0–9)	4 (26.7%)		8 (53.3%)			
Moderate disturbance (10–18)	9 (60.0%)		7 (46.7%)			
Poor quality (19–27)	2 (13.3%)		0 (0.0%)			
<b>Total / Mean <math>\pm</math> SD</b>	15 (100%)		15 (100%)		11.80 $\pm$ 4.44	9.47 $\pm$ 3.68

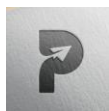
**Table 2 : Compare the pre-test & post-test level of pain in the study group.**



**Fig 2 : Compare the pre-test & post-test sleep quality in the study group.**

The pre-test, 60.0% of experimental group patients had moderate sleep disturbance, 26.7% had good sleep, and 13.3% had poor sleep quality. Following PMR intervention, 53.3% had good sleep quality, 46.7% had moderate disturbance, and none had poor sleep quality. The mean sleep quality score improved from  $11.80 \pm 4.44$  to  $9.47 \pm 3.68$ . The paired t-test yielded a t-value of 4.546 with  $p < 0.001$ , indicating a very highly significant improvement in sleep quality. Hence,  $H_{12}$  is accepted.

Section C : Comparison of pre-test & post-test level of pain and sleep quality between study and control groups (N=30)



Group	Pre-test Mean±SD	Post-test Mean±SD	t-value	p-value / Interpretation
Experimental (n=15)	5.00 ± 1.96	3.07 ± 1.71	3.515	p = 0.002 (HS**)
Control (n=15)	5.80 ± 2.11	5.40 ± 1.92		

**Table 3 : Unpaired t-test comparisons of pre-test & post-test pain scores between study and control groups (N=30)**

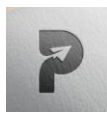
The table shows that the study group demonstrated a reduction in mean score from  $5.00 \pm 1.96$  in the pre-test to  $3.07 \pm 1.71$  in the post-test, with a highly significant difference ( $t = 3.515$ ,  $p = 0.002$ ). In contrast, the control group showed only a slight decrease from  $5.80 \pm 2.11$  to  $5.40 \pm 1.92$ , indicating minimal change. This suggests that the intervention was effective in the study group.

Group	Pre-test Mean±SD	Post-test Mean±SD	t-value	p-value / Interpretation
Experimental (n=15)	11.80 ± 4.44	9.47 ± 3.68	2.918	p = 0.007 (HS**)
Control (n=15)	14.00 ± 4.34	13.60 ± 4.07		

**Table 4 : Unpaired t-test comparisons of pre-test & post-test sleep quality between study and control groups (N=30)**

The table shows that the experimental group had a reduction in pain score from  $11.80 \pm 4.44$  in the pre-test to  $9.47 \pm 3.68$  in the post-test. The obtained t-value was 2.918 with a p-value of 0.007, indicating a highly significant difference. This suggests that the intervention was effective in reducing pain among the participants.

Section D : Associate the pre-test & post-test level of pain and sleep quality in patients



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undergoing abdominal surgery in the study group and control group.

Group	Pre-test Mean±SD	Post-test Mean±SD	t-value	p-value / Interpretation
Experimental (n=15)	5.00 ± 1.96	3.07 ± 1.71	3.515	p = 0.002 (HS**)
Demographic Variable	Mild (1-3)	Moderate (4-6)	Severe (7-9)	Chi-square / Interpretation
<b>Age</b>				
18–30 years	2	4	1	$\chi^2=4.82$ , p=0.309 No Significant association
31–45 years	8	8	1	
46–60 years	4	2	0	
<b>Gender</b>				
Male	5	5	1	$\chi^2=1.24$ , p=0.538 Not Significant
Female	9	9	1	
<b>Area of Residence</b>				
Rural	11	13	2	$\chi^2=2.15$ , p=0.341 No Significant association
Urban	3	1	0	
<b>Monthly Income</b>				
Below ₹20,000	7	10	2	$\chi^2=0.89$ , p=0.0641 No



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₹20,001–₹40,000	7	4	0	Significant association
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Table 5 presents the association between post-operative pain and selected demographic variables using the chi-square test. The analysis indicates that there is no statistically significant association between post-operative pain levels and demographic variables such as age ( $\chi^2=4.82$ ,  $p=0.309$ ), gender ( $\chi^2=1.24$ ,  $p=0.538$ ), area of residence ( $\chi^2=2.14$ ,  $p=0.341$ ), and monthly income ( $\chi^2=0.89$ ,  $p=0.641$ ) at  $p < 0.05$  level.

Demographic Variable	Good (0–9)	Moderate (10–18)	Poor (19–27)	Chi-square / Interpretation
<b>Age</b>				
18–30 years	3	3	1	$\chi^2=5.10$ , $p=0.277$ Not Significant
31–45 years	9	8	1	
46–60 years	2	3	0	
<b>Gender</b>				
Male	4	6	1	$\chi^2=1.57$ , $p=0.456$ Not Significant
Female	10	8	1	
<b>Area of Residence</b>				
Rural	12	12	2	$\chi^2=0.58$ , $p=0.748$ Not Significant
Urban	2	2	0	
<b>Monthly Income</b>				



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Below ₹20,000	8	9	2	$\chi^2=1.02$ , $p=0.600$ Not Significant
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Table 6 shows that there is no statistically significant association between sleep quality and selected demographic variables including age ( $\chi^2=5.10$ ,  $p=0.277$ ), gender ( $\chi^2=1.57$ ,  $p=0.456$ ), area of residence ( $\chi^2=0.58$ ,  $p=0.748$ ), and monthly income ( $\chi^2=1.02$ ,  $p=0.600$ ) at  $p < 0.05$  level. Hence,

### **Discussion**

The present study was executed to assess the effectiveness of Progressive Muscle Relaxation (PMR) exercises on post-operative pain and sleep quality among patients undergoing abdominal surgery at Narayan Medical College and Hospital, Jamuhar. The findings of the study reveal that PMR exercises are highly effective in reducing postoperative pain and improving sleep quality.

### **Discussion according to objectives**

#### **Objective 1: Assessment of Post-Operative Pain**

The study found that before PMR intervention, 60.0% of the experimental group had moderate pain and 20.0% had severe pain. After the three-day PMR programme, 53.3% had only mild pain, and none had severe pain. The mean pain score showed a statistically significant reduction from  $5.00 \pm 1.96$  to  $3.07 \pm 1.71$  (paired  $t = 5.209$ ,  $p < 0.001$ ). These findings are strongly supported by the literature.

#### **Objective 2: Assessment of Sleep Quality**

In the experimental group, 13.3% had poor sleep quality and 60.0% had moderate disturbance



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in the pre-test. After PMR, 53.3% achieved good sleep quality, and none had poor sleep quality. The mean sleep score improved significantly from  $11.80 \pm 4.44$  to  $9.47 \pm 3.68$  (paired  $t = 4.546$ ,  $p = 0.001$ ). The control group showed no meaningful improvement.

## Objective 3 & 4: Association with Demographic Variables

Chi-square analysis revealed no statistically significant association between post-operative pain or sleep quality and selected demographic variables including age, gender, area of residence, and monthly income (all  $p > 0.05$ ).

## Conclusion

Progressive Muscle Relaxation is an effective, non-invasive, and economical intervention for postoperative care. Its integration into routine nursing practice can enhance patient recovery and reduce dependency on pharmacological management.

## Recommendations

- A similar study can be conducted with a larger multi-stage sample size.
- A similar study can be conducted in different settings (community hospitals, ICU step-down units).

## Limitations

- The sample size was limited to 30 patients (15 per group), limiting generalizability.
- The data collection period was limited to one week.
- The study was conducted in a single hospital setting.

## References

1. Apfelbaum JL, Chen C, Mehta SS, Gan TJ. Postoperative pain experience: results from a national survey. *Anesth Analg.* 2003;97(2):534–40.



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2. Kehlet H, Dahl JB. The value of multimodal analgesia in postoperative pain treatment. *Anesth Analg.* 1993;77(5):1048–56.
3. Gan TJ. Poorly controlled postoperative pain: prevalence, consequences, and prevention. *J Pain Res.* 2017;10:2287–98.
4. Chou R, Gordon DB, de Leon-Casasola OA, et al. Management of postoperative pain: clinical practice guideline. *J Pain.* 2016;17(2):131–57.
5. McCaffery M, Pasero C. *Pain: clinical manual.* 2nd ed. St Louis: Mosby; 1999.
6. Polit DF, Beck CT. *Nursing research: generating and assessing evidence for nursing practice.* 11th ed. Philadelphia: Wolters Kluwer; 2021.
7. Creswell JW, Creswell JD. *Research design: qualitative, quantitative and mixed methods approaches.* 5th ed. Thousand Oaks: Sage; 2022.
8. Kothari CR. *Research methodology: methods and techniques.* 3rd ed. New Delhi: New Age International; 2019.
9. Sharma SK. *Nursing research and statistics.* 3rd ed. New Delhi: Elsevier; 2018.
10. Jacobson E. *Progressive relaxation.* Chicago: University of Chicago Press; 1938.
11. Conrad A, Roth WT. Muscle relaxation therapy for anxiety disorders: a systematic review. *J Anxiety Disord.* 2007;21(3):243–64.