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Research Article

An Experimental Study to Assess the Effectiveness of Progressive Muscle Relaxation Technique on Post-operative Pain Management in Patients Undergoing Abdominal Surgery in Gauhati Medical College and Hospital, Guwahati, Assam

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ABSTRACT

Background: Effective pain management is essential in the post-operative period to ensure that patients do not experience unnecessary distress or suffering and to minimize potential complications. One of the most simple and easy learned techniques for relaxation is progressive muscle relaxation (PMR) technique. **Aim:** This study aims to assess the effectiveness of PMR technique on post-operative pain management in patients undergoing abdominal surgery in Gauhati Medical College and Hospital, Guwahati, Assam. **Materials and Methods:** A quasi-experimental, pretest-post-test control group design was selected for the study. Convenient sampling technique was used to select 40 patients in the experimental and control groups by simple randomization. Analysis and interpretation: **Results:** The findings of the study revealed that on pre-test assessment, it was observed that in day 1, majority of patients had moderate pain both in the experimental and control groups, that is, 90% and 85%, respectively. In day 2 also, majority of patients in both the experimental group and control group had moderate pain, that is, 75% and 65%, respectively. In day 3, majority of patients had mild pain in both the experimental group and control group, that is, 95% and 85%, respectively. It was found that there was no significant association between the selected variables and level of pain in patients undergoing abdominal surgery. The pre-test and post-test observation on the 1st and 2nd post-operative day by paired t-test was significant ($P < 0.05$) in the experimental group. On the 3rd post-operative day, t value was significant in both the experimental and control groups ($P < 0.01$). **Conclusion:** It can be concluded that PMR technique was effective in reducing level of post-operative pain on the 1st and 2nd post-operative days after abdominal surgery.

Keywords: Abdominal surgery, Effectiveness, Pain, Physiological parameters, Progressive muscle relaxation

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Introduction

Pain is a complex, multidimensional experience. It is a major problem that causes suffering and reduces quality of life. Pain is one of the major reasons that people seek health care. The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Lewis *et al*., 2011).[1] Many factors are known to affect the experience of pain, including gender, age, culture, and previous experiences,

the meaning the pain has to the individual experiencing it, tempered with a range of psychological factors, the most predominant of which is individual coping skills (Mackintosh, 2007).[2]

The term abdominal surgery broadly covers surgical procedures that involve opening the abdomen. Diseases affecting the abdominal cavity are dealt with generally under their own names (e.g., appendicitis).

Post-operative pain is an acute pain beginning with surgical trauma, tapering off gradually and ending with tissue recovery. In spite of the development of new pain control methods and medication and the adoption of guidelines for pain care by many hospitals, post-operative pain is still a problem for many patients. According to current pain-related studies, more than 75% of patients experience pain after surgery, about 40–80% of patients experience moderate-to-severe pain, and as many as 40–50% of patients do not receive proper post-operative pain management. Improper pain control not only increases the burden of many organs but also limits the patient's activity, increases post-operative morbidity, affects physical recovery and the patient's emotional state after surgery, and is more likely to extend the length of stay and medical costs (Arslan and Çelebioğlu, 2004).[3]

One of the most simple and easy learned techniques for relaxation is progressive muscle relaxation (PMR) a widely used procedure today that was developed by Jacobson in the year 1930. PMR involves the tensing and relaxing the muscles. The use of this tension/relax method is intended to help differentiate between when a muscle is tensed and when it is relaxed. This recognition will allow an individual to reduce muscle tension when it occurs during stress. PMR is based on the principle that when the muscles are relaxed, the mind will relax. Typically, a session of PMR will begin at the extremities and gradually move across the whole body (Lewis *et al*., 2011).[1]

Objectives of the study

The objectives of the study were as follows:

i. To assess the level of pain in patients undergoing abdominal surgery
ii. To determine the effectiveness of PMR technique on pain management in patients undergoing abdominal surgery
iii. To determine the association between the level of pain and selected variables such as age, sex, education, occupation, religion, marital status, type of anesthesia, type of surgery, and family support in patients undergoing abdominal surgery
iv. To correlate the physiological parameters such as pulse, respiration, and blood pressure with the level of pain in patients undergoing abdominal surgery in the experimental group.

Assumptions

- Patients who have undergone abdominal surgery will have moderate-to-severe pain
- Patients will be cooperative
- Patients treated with PMR technique will have influence on level of post-operative pain.

Hypotheses

- H_{01}: There is no significant difference between level of mean pain score in the experimental and control groups
- H_{02}: There is no significant association between the level of mean pain scores with their selected variables in the experimental group on day 1
- H_{03}: There is no significant correlation between the level of mean pain scores and physiological parameters in the experimental group in day 1.

Delimitations

The study is delimited to

- The patients who had undergone abdominal surgery in Gauhati Medical College and Hospital, Guwahati, during the data collection period
- The data collection period is limited to 5 weeks
- The study sample size will be 40 selected post-operative patients (20 in the experimental group and 20 in the control group).

Limitation

Limitation of the study

Association of level of pain with type of anesthesia and family support could not be computed because all patients underwent surgery under general anesthesia and had positive family support.

Materials and Methods

Research approach

Evaluative research approach was selected for the present research study, as it was found to be most suitable for studying the problem under study.

Research design

In the present study, quasi-experimental research design was used to observe the effectiveness of PMR on pain management in patients undergoing abdominal surgery.

The time series design was selected by the researcher to measure the effects of treatment over long period of time. In

this research study, time series research design was adapted to observe the effectiveness of PMR on pain management for a period of 3 days successively. The research design for the present study has been given below:

Setting

The main study was conducted in the general surgical wards of Gauhati Medical College and Hospital (GMCH), Guwahati, Assam, after obtaining approval from the Institutional Ethical Committee.

Population

In this study, the selected target population was the post-operative patients who underwent elective open abdominal surgery and were admitted in general surgery wards in GMCH, Guwahati, Assam.

Sample size

Forty post-operative patients with elective open abdominal surgery who were admitted in the general surgery wards in GMCH, Guwahati, Assam

Sampling technique

The technique that was adopted for the present study was convenient sampling method. Simple randomization was used to allot the samples in the experimental and control groups. Lottery method was conducted by pulling the card to prevent bias in selecting intervention group.

Criteria for sample selection

Inclusion criteria

The following criteria were included in the study:

a. Patients who were subjected for elective abdominal surgery
b. Patients who were (male and female) in the age group of 20 to 60 yrs
c. Patients who were willing to participate
d. Patients who were able to communicate in Assamese, Hindi, or English
e. Patients who were receiving inj. diclofenac 75 mg BD.

Exclusion criteria

The following criteria were excluded from the study:

a. Patients who developed post-operative complications such as peritonitis, post-operative hemorrhage, mild atelectasis, and fever
b. Patients who were posted for emergency abdominal surgery.

Variables

In the present study

Independent variable
PMR technique administered to the patients undergoing abdominal surgery.
Dependent variable
Level of pain.

Tool

Development of the tool

It was evident from the literature review that because of the nature of the type of data required to be analyzed to assess the level of pain of the patients undergoing abdominal surgery, standardized tools are essential. After an extensive literature search and examining the tools available, the standardized tool numerical pain rating scale was selected or procured for the present study.
Tool consists of three parts:
Section I: Consisted of self-structured interview schedule developed by the investigator to collect the demographic variables such as age, sex, education, occupation, and religion marital status and other selected variables such as type of anesthesia, type of surgery, and family support.
Section II: Consisted of numerical pain rating scale which is a self-administered standardized tool which has 10 cm baseline as per the recommendations. The subjects were asked to rate the pain on the numerical pain rating scale. The pain score has been classified into the following – "no pain" (0), "mild pain" (1–3), "moderate pain" (4–6), and "severe pain" (7–10).
Section III: Consisted of pre- and post-test assessment of physiological parameters such as pulse, respiration, and blood pressure.

Reliability of the tool

Reliability of the structured interview schedule was found to be 0.801 which indicated that the tool was reliable.

Ethical consideration

- Permission was obtained from the Institutional Ethical Committee of Gauhati Medical College and Hospital, Assam
- Verbal and written consent was obtained from all the participants of the study after explaining the purpose and other details of the study.

Data collection procedure

After administrative approval from the concerned authority was obtained, the study was conducted on Gauhati Medical

College Hospital, Guwahati, Assam, from July 1, 2019, to August 30, 2019.

The purpose of the study was explained to patients and written consent was obtained from the study participants. After selecting the sample patients of the study by convenient method, lottery was done to randomly select the experimental and control group. One day before the surgery, PMR technique was taught and verbal instruction was given for the experimental samples. Pre-test level of pain was assessed and PMR was given as intervention for 3 consecutive post-operative days starting from the 1st post-operative day and post-test was conducted every day in both. PMR was given for 15 min and post-test was conducted after 1 h.

Table 1: Schematic diagram for research design

Sample	Day 1			Day 2			Day 3		
Experimental group	O_1	X_1	O_2	O_3	X_2	O_4	O_5	X_3	O_6
Control group	O_1		O_2	O_3		O_4	O_5		O_6

Table 1 resprents the Schematic diagram for research design used in the present study. The data in the table 1 shows that O_1: Pre-assessment of level of pain in the 1st post-operative day, O_2: Post-assessment of level of pain in the 1st post-operative day, O_3: Pre-assessment of level of pain in the 2nd post-operative day, O_4: Post-assessment of level of pain in the 2nd post-operative day, O_5: Pre-assessment of level of pain in the 3rd post-operative day, O_6: Post-assessment of level of pain in the 3rd post-operative day, X_1: PMR technique provided in the 1st day, X_2: PMR technique provided in the 2nd day, X_3: PMR technique provided in the 3rd day

Analysis and interpretation

Analysis of data for the present study was based on the objectives and using descriptive and inferential statistics. The Statistical Package for the Social Sciences (SPSS) was utilized to analyze the data. After the task of data collection, the master data sheet was prepared from the raw data before entering the data to SPSS.

Presentation of data

The findings of the study are discussed in the following section.

Section I: Distribution of samples according to selected variables in the experimental and control groups.

Section II: Assessment of level of pain in patients undergoing abdominal surgery.

Section III: Determination of the effectiveness of PMR technique on pain management in patients undergoing abdominal surgery.

Section IV: Assessment of association between the level of pain and selected variables in the experimental group on day 1.

Section V: Assessment of correlation between physiological parameters such as pulse, respiration, and blood pressure and level of pain in the experimental group on day 1.

Section I: Distribution of samples according to sociodemographic variables in the control and experimental groups

Table 2 shows the frequency distribution of samples according to their sociodemographic variables. It was observed that, in the experimental group, majority of patients, that is, 40% were in the age group of 31–40 years. On the other hand, in the control group, majority of patients, that is, 35% were in the age group of 20–30 years and only 5% of patients were in the age group of 51-60 years. In sex category, it can be interpreted that equal numbers (50%) of male and female patients were found in both the experimental and control groups. In education, it shows that in the experimental group, majority of patients, that is, 35% had high schooling, 25% were illiterate, 25% had primary education, 10% had higher secondary education, and only 55 were graduate and above. In the control group, majority of patients, that is, 35% had primary education, 25% were illiterate, 25% had higher secondary education, and 15% had high schooling. Occupation shows that among the experimental group, majority (60%) of patients were unemployed, student, or housewife, 30% of patients were self-employed, and 10% were businessman. Also among the control group, majority (55%) of patients were unemployed, student, or housewife, 20% were self-employed, 15% had business, and 10% were non-govt. employee. In religion that among the experimental group, 65% of patients were Hindu and 35% were Islam people. Among the control group, 60% were Hindu and 40% were Islam people. Marital status shows that among the experimental group, majority, that is, 70% were married, 25% were unmarried, and 5% were widow/widower. Among the control group also, majority of patients, that is, 75% were married, 20% were unmarried, and 5% were widow/widower. The type of anesthesia it is observed that in both the experimental and control groups, all the patients had undergone surgery under general anesthesia. Type of surgery shows that in the experimental group, majority of patients, that is, 65% undergone cholecystectomy, 20% undergone appendicectomy, and 15% undergone hernioplasty. In the control group, 55% undergone cholecystectomy, 30% undergone appendicectomy, and 15% undergone hernioplasty and the family support shows that all the patient's families in both the experimental and control groups were supportive.

Section II: Assessment of level of pain in patients undergoing abdominal surgery

From Table 3, it is observed that in day 1 in the experimental group, majority of patients, that is, 90% had moderate pain and 10% of patients had severe pain. Also in the control group, majority of patients, that is, 85% had moderate pain, 10% of patients had mild pain, and 5% of patients had severe pain.

In day 2 also, majority of patients in both the experimental group and control group had moderate pain, that is, 75% and

Table 2: Distribution of samples according to sociodemographic variables. *n*=40 (Experimental group=20, Control group=20)

Sample characteristics	Experimental		Control	
	Frequency	%	Frequency	%
Age (in years)				
20–30	7	35.00	7	35.00
31–40	8	40.00	7	35.00
41–50	4	20.00	5	25.00
51–60	1	5.00	1	5.00
Sex				
Male	10	50.00	10	50.00
Female	10	50.00	10	50.00
Education				
Illiterate	5	25.00	5	25.00
Primary	5	25.00	7	35.00
High school	7	35.00	3	15.00
Higher secondary	2	10.00	5	25.00
Graduate and above	1	5.00	0	0
Occupation				
Govt. employee	-	-	-	-
Non-govt. employee	-	-	2	10.00
Business	2	10.00	3	15.00
Self-employed	6	30.00	4	20.00
Unemployed/student/housewife	12	60.00	11	55.00
Religion				
Hindu	13	65	12	60
Islam	7	35	8	40
Others	0	0	0	0
Marital status				
Married	14	70	15	75
Unmarried	5	25	4	20
Divorced	0	0	0	0
Widow/widower	1	5	1	5
Type of anesthesia				
General	20	100	20	100
Spinal	0	0	0	0
Type of surgery				
Appendectomy	4	20	6	30
Cholecystectomy	13	65	11	55
Hernioplasty	3	15	3	15
Gastrectomy	0	0	0	0
Family support				
Supportive	20	100	20	100
Non-supportive	0	0	0	0

65%, respectively. About 25% in the experimental group and 35% in the control group had mild pain.

In day 3, majority of patients, that is, 95% had mild pain and 5% had moderate pain in the experimental group. Also in the control group, majority of patients, that is, 85% had mild pain and 15% had moderate pain.

In Table 3, it is observed that post-test assessment, it was found that on day 1, majority of patients, that is, 80% had moderate pain and 20% had mild pain in the experimental group. Also in the control group, majority of patients, that is, 90% had moderate pain and 10% had mild pain.

On day 2, majority of patients, that is, 75% had mild pain and 25% had moderate pain in the experimental group, whereas 50% of patients had mild and 50% had moderate pain in the control group.

Table 3: Assessment of pre-test level of pain *n*=40 (Experimental group=20, Control group=20)

Day	Experimental group (%)			Control group (%)		
	Mild	Moderate	Severe	Mild	Moderate	Severe
1	-	18 (90)	2 (10	2 (10)	17 (85)	1 (5)
2	5 (25)	15 (75)	-	7 (35)	13 (65)	-
3	19 (95)	1 (5)	-	17 (85)	3 (15)	-

On day 3, all the patients (100%) had mild pain in the experimental group. Majority of patients, that is, 85% had mild pain and 15% had moderate pain in the control group.

The data in Table 4 shows that post test assessment it was found that on day 1, majority of patients i.e., 80% had moderate pain and 20% had mild pain in experimental group. Also in control group majority of patients i.e., 90%had moderate pain and 10% had mild pain.

On day 2, majority of patients i.e., 75% had mild pain and 25% had moderate pain in experimental group whereas 50% patients had mild and 50% had moderate pain in control group.

On day 3, all the patients (100%) had mild pain in experimental group. Majority of patients that is 85% had mild pain and 15% had moderate pain in control group.

Section III: Assessment of effectiveness of PMR technique on pain management in patients undergoing abdominal surgery

The data in Table 5 show that in day 1, the value for df 19 is significant at 0.05 level of significance in the experimental group, whereas in the control group, t value is not significant. It infers that reduction of pain level in the 1st post-operative day was significant in the experimental group, but in the control group, there was no significant reduction of pain level in the 1st post-operative day. Thus, it can be interpreted that PMR was effective as it was applied to the experimental group. Hence, the null hypothesis (H_{01}) is rejected and it infers that there is a significant difference between the level of mean pain scores among the experimental and control groups.

Day 2 shows that the t value for df 19 is significant at 0.01 level in the experimental group, whereas in the control group, t value is not significant. It infers that in the 2nd post-operative day, reduction of pain level was significant in the experimental group, but in the control group, there was no significant reduction of pain level. Thus, it can be interpreted that PMR was effective as it was applied to the experimental group. Hence, the null hypothesis (H_{01}) is rejected and it infers that there is a significant difference between the level of mean pain scores among the experimental and control groups.

Day 3 shows that in both the experimental and control groups, t value for df 19 is significant at 0.01. It implies that there was significant reduction of pain level on the 3rd post-operative day in both the experimental and control groups irrespective of applied PMR technique to the experimental group. It can be explained as because of the use of analgesics and individual's physiological adaptation, pain has reduced in both the groups. Furthermore, the study findings have shown that intensity of pain is more on the 1st and 2nd post-operative days and it has reduced to mild level on the 3rd post-operative day, so effectiveness of PMR technique could not be found out on the 3rd post-operative day. Hence, null hypothesis (H_{01}) that there is no significant difference between the level of mean pain scores among the experimental and control groups is retained for the 3rd post-operative day.

Table 4: Assessment of post-test level of pain ***n***=40 (Experimental group=20, control group=20)

Day	Experimental (%)			Control (%)		
	Mild	Moderate	Severe	Mild	Moderate	Severe
1	4 (20)	16 (80)	-	2 (10)	18 (90)	-
2	15 (75)	5 (25)	-	10 (50)	10 (50)	-
3	20 (100)	-	-	17 (85)	3 (15)	-

Table 5: Effectiveness of progressive muscle relaxation technique on level of pain in the experimental and control groups in days 1, 2, and 3

Day	Mean	SD	t	df	*P*-value
Day 1					
Experimental					
Pre-test	5.50	0.95	3.68	19	0.02*
Post-test	5.00	1.21			
Control					
Pre-test	5.00	1.08	1.00	19	0.33 NS
Post-test	4.95	1.05			
Day 2					
Experimental					
Pre-test	4.10	0.97	10.38	19	0.002**
Post-test	3.25	0.97			
Control					
Pre-test	4.15	1.09	2.52	19	0.33 NS
Post-test	5.90	1.29			
Day 3					
Experimental					
Pre-test	2.45	0.94	5.63	19	0.001**
Post-test	1.45	0.69			
Control					
Pre-test	2.63	0.99	1.00	19	0.001**
Post-test	2.60	0.88			

**Significant at *P*<0.01), *Significant at *P*<0.05, NS: Non significance

Section IV: To determine the association between the level of pain and selected variables in the experimental group

The data in Table 6 show that calculated Chi-square value for all the variable is less than the tabulated value at the level of significance ($P < 0.05$). Thus, it could be proved that there is no significant association between the level of pain with the selected demographic variables such as age, sex, education, occupation, and religion marital status and other selected variables such as type of anesthesia, type of surgery, and family support.

Hence, the hypothesis (H_{02}) that there is no significant association between the level of mean pain scores with the selected variables in the experimental group on day 1 is retained.

SectionV. Assessment of correlation of physiological parameters such as pulse, respiration, and blood pressure with level of pain in patients in the experimental group on day 1

Data in Table 7 show that there was no significant correlation of level of pain with pulse and respiration. Mean arterial

Table 6: Association between the level of pain with age, sex, education, occupation, and religion marital status and other selected variables such as type of anesthesia, type of surgery, and family support. *n*=20

Age (years)	Day 1 pre-test score of pain			Chi-square	df	*P*-value
	Moderate	Severe	Total			
20–30	7	0	7	1.944	3	0.584 NS
31–40	7	1	8			
41–50	3	1	4			
51–60	1	0	1			
Sex						
Male	9	1	10	0.000	1	1.000 NS
Female	9	1	10			
Education						
Illiterate	4	1	5	1.587	4	0.811 NS
Primary	5	0	5			
High schooling	6	1	7			
Higher secondary	2	0	2			
Graduate and above	1	0	1			
Occupation						
Business	2	0	2	0.556	2	0.757 NS
Self-employed	5	1	6			
Unemployed/student/housewife	11	1	12			
Religion						
Hindu	11	2	13	1.197	1	0.274 NS
Islam	7	0	7			
Marital status						
Married	12	2	14	0.952	2	0.621 NS
Unmarried	5	0	5			
Widow/widower	1	0	1			
Type of surgery						
Appendicectomy	4	0	4	2.336	2	0.311 NS
Cholecystectomy	12	1	13			
Hernioplasty	2	1	3			

*Significant at $P<0.05$, NS: Non-significance

pressure (MAP) was positively correlated with level of pain ($P < 0.05$). It implies that if intensity of pain was increasing, the MAP was also increasing.

Hence, null hypothesis (H_{03}) that there is no significant correlation between the level of pain scores and physiological parameters among the experimental group on day 1 retained for pulse and respiration. However, null hypothesis was rejected for MAP. It means that there is a significant correlation between the level of pain and MAP.

Table 7: Correlation of physiological parameters with pre-test level of pain in patients in the experimental group on day 1 *n*=20

Physiological parameters	Mean	SD	Correlation related to pain r value
Pulse	82.80	9.96	0.257 NS
Respiration	24.50	5.15	0.652 NS
Blood pressure (mean arterial pressure)	88.00	9.82	0.453*

*Significant at $P<0.05$, NS: Non-significance

Discussion

The findings of the study have been discussed with the reference to the objectives.

To assess the level of pain in patients undergoing abdominal surgery

The study findings were supported by a similar study conducted by Chanif *et al*. (2019),[4] conducted a study to describe pain intensity and pain distress at the first 24–48 h experienced by the patients after abdominal surgery. The study was conducted among 40 adult patients older than 18 years who underwent major abdominal surgery under general anesthesia and were admitted at Doctor Kariadi Hospital Semarang, Central Java Province, Indonesia. The findings revealed that on average, post-operative patients had experienced moderate to severe pain, both in their report of pain intensity and pain distress as evidenced by the range of scores from 4 to 9 out of 10 and median score of 5 and 6 (IQR = 2), respectively. It indicated that post-operative pain was common symptom found in patients after abdominal surgery.

To determine the effectiveness of PMR technique on pain management in patients undergoing abdominal surgery

Good *et al*. (2019)[5] supported the study by determining the effect of jaw relaxation, music, and the combination of relaxation and music on post-operative pain after major abdominal surgery during ambulation and rest on post-operative days 1 and 2. Five hundred subjects aged 18–70 in five Midwestern hospitals were randomly assigned by minimization to a relaxation, music, relaxation plus music, or control group. Result shows that all the three treatment groups had significantly less pain than the controls (P = 0.028–0.000), which was confirmed by the univariate analysis of covariance (P = 0.018–0.000). *Post hoc* multivariate analysis revealed that the combination group had significantly less sensation and distress of pain than the control group on all post-tests (P = 0.035–0.000), and the relaxation and music groups had significantly less on all tests (P = 0.022–0.000) except after ambulation.

To determine the association between the level of pain and selected variables such as age, sex, education, occupation, religion, marital status, type of anesthesia, type of surgery, and family support

Couceiro *et al*. (2018)[6] supported this study by assessing the prevalence and influenced of gender, age, and type of surgery on post-operative pain. This is a transversal study in which interviews were done with 187 patients undergoing surgeries. In the study population, 66.8% (n=125) were females; mean age 45.83 ± 16.17 years, but 25.1% (n = 47) were 60 years old or more. In the first 24 h, 46% (n = 85) of the patients reported pain. Among male patients, 48.4% (n = 30) complained of pain, while 66.8% (n = 55) of the females did so. The prevalence of pain showed no differences regarding gender (P = 0.536) and age (P = 0.465). A significant association between the incidence of post-operative pain and type of surgery was observed (P = 0.003).

To correlate the physiological parameters such as pulse, respiration, and blood pressure with the level of pain in patients in the experimental group undergoing abdominal surgery on the 1st post-operative day

In contrast to this, Ledowski *et al*. (2012)[7] conducted a study on effects of acute post-operative pain on catecholamine plasma levels, hemodynamic parameters, and cardiac autonomic control. A total of 85 post-operative patients in the recovery room were repeatedly asked to rate their pain on a numeric rating scale (NRS). Concurrently, the parameters of heart rate (HR) variability were analyzed, and MAP, HR, and respiration rate were recorded. A total of 239 pain readings were obtained. None of the investigated parameters correlated with NRS scores.

Conclusion

This study examined the effectiveness of PMR technique on post-operative pain management in patients undergoing abdominal surgery. The present study concluded that PMR technique is effective in reducing post-operative pain. Another important finding is that there is no correlation of level of pain with pulse and respiration but it has positive correlation with MAP.

References

1. Lewis SL, Heitkemper MM, Dirksen SR, O'Brien PG, Bucher L. Medical-Surgical Nursing. Amsterdam: Elsevier; 2011. p. 109.
2. Mackintosh C. Assessment and management of patients with post-operative pain. Nurs Stand 2007;22:49-55; quiz 58.
3. Sacide YT, Ummu YF. Effect of relaxation exercises on controlling postoperative pain. Pain Manag Nurs 2012;13:11-7. Available from: https://www.medscape.com/viewarticle/759618_2. [Last accessed on 2020 Dec].
4. Chanif C, Wongchan P, Wimonrat C. Acute postoperative pain of Indonesian patients after abdominal surgery. Nurse Media J Nurs 2012;2:409-20. Available from: http://www.ejournal.undip.ac.id/index.php/medianers/article/view/3986. [Last accessed on 2020 Dec].
5. Good M, Stanton-Hicks M, Grass JA, Anderson GC, Choi C, Schoolmeesters LJ, *et al*. Relief of postoperative pain with jaw relaxation, music and their combination. Pain 1999;81:163-72.
6. Couceiro TC, Valença MM, Lima LC, de Menezes TC, Raposo MC. Prevalence and influence of gender, age, and type of surgery on postoperative pain. Rev Bras Anestesiol 2009;59:314-20.
7. Ledowski T, Reimer M, Chavez V, Kapoor V, Wenk M. Effects of acute postoperative pain on catecholamine plasma levels, hemodynamic parameters, and cardiac autonomic control. Pain 2012;153:759-64.