Effect of Benson Relaxation Technique on Pain, Vital Signs, Sleep Quality and Anxiety Among Patients After Spinal Surgery

Mona Nadr Ebraheim[(1)], Zainab Mohammed Ibrahim[(2)]

(1) Assistant professor in medical surgical nursing department, faculty of nursing, Ain Shams University, Egypt

(2) Lecturer in psychiatric nursing, faculty of nursing, Modern University, Egypt.

Corresponding author: Mona Nadr Ebraheim E –mail: dr.mona.nadr@nursing.asu.edu.eg

Abstract

Background: Pain, hemodynamic instability, anxiety, and sleep disturbances are the most postoperative complaints after spinal surgery. Benson's relaxation technique (BRT) is one of the non-pharmacological strategies supposed to reduce postoperative complaints after spine surgery. **Aim of the study**: this study aimed to evaluate the effectiveness of BRT on pain intensity, vital signs, sleep quality and anxiety among patients after spinal surgery. **Design**: A quasi-experimental research design was used to achieve the aim of the study. **Setting**: This study was conducted at Neurosurgical departments at Ain Shams University Hospital. **Subjects**: a purposive sample of 60 adult patients. They were assigned into two equal groups (study and control groups) (thirty subjects in each group). **Tools**: **Tool I:** Patient's interviewing questionnaire included: demographic data for patients, Patient medical clinical data, and Pain numerical rating scale. **Tool II**: vital signs assessment record, **Tool III:** Beck Anxiety Inventory and **Tool IV**: Groningen Sleep Quality Scale. **Results:** There was statistically significant effect of BRT on reducing pain intensity, vital signs mean values, anxiety level and improving sleep quality among patients after spinal surgery at $p < 0.05$. **Conclusion:** the Benson relaxation technique after spinal surgery has a positive statistically significant effect on improvement of intensity of pain, reduction of vital signs mean values, severity of anxiety and quality of sleep among the study group who applied BRT as compared to control group which support study hypothesis. **Recommendations:** this study recommended that nurses should incorporate BRT in post-operative nursing care for patients with spinal surgery.

Keywords: Anxiety; Benson Relaxation Technique; Pain, Sleep Quality; spinal Surgery; Vital Signs

Introduction

The number of spinal surgeries increased in recent years worldwide. Spinal surgery is one of the most common surgeries in the United States as well as in developed countries. As the number of spinal surgery cases increases, the costs associated with treating spinal diseases also increase. Laminectomies, discectomies, spinal fusions, instrumentations, scoliosis corrections, and spinal tumor excision are among the most frequent spine procedures. These operations aim to remove spinal disc tissue that is pushing on the nerve so alleviating nerve compression and relieve leg pain. Spinal surgical procedures frequently require substantial dissection of subcutaneous tissues, bones, and ligaments, which causes a significant amount of postoperative discomfort **(Hart et al., 2013; Grotle et al., 2019).**

Spinal procedures are generally associated with intense pain in the postoperative period, especially for the initial few days. Adequate pain management in this period has been seen to correlate well with improved functional outcome. To reduce this type of pain, patients usually use analgesics, which are associated with adverse events; hence, there is a great need to control post operative pain using supplementary and nonpharmacologic methods **(Bajwa & Haldar,2015; Elsamadicy et al., 2017).**

Spinal surgery patients expect the surgery to improve their quality of life. However, these patients may experience physical dysfunctions, pain, emotional stress; severe anxiety after surgery could be expected and negatively affect one's physical function and pain after surgery. Anxiety can exacerbate postoperative associated disorders and may have an undesirable effect on the physiological status. Anxiety can trigger stress response and stimulate releasing epinephrine and norepinephrine. Activation of the

neuroendocrine response to stress may be associated with several physiologic changes such as an increase in blood pressure, heart rate, and cardiac output **(Lim, & Kim, 2019).**

Post-operative patients are under constant nursing intervention, which is essential in this area and must take a proactive role in assisting the patient to find measures that may ease and relieve their pain sensation. Relieving postoperative pain and its consecutive physiological changes, anxiety and sleep disturbances are considered specialized nursing care. The nurses are also responsible for assessing the need and type of pain relief as the administration of analgesics is an important part of nursing practice. Relaxation is a nursing intervention, which has been introduced as a complementary treatment method and sometimes an alternative medicinal therapy in many studies. Despite the introduction of a wide range of relaxation methods to medical circles, Benson technique seems to be a suitable option, considering its simplicity and easy application **(Rejeh et al., 2013; Heshmatifar et al., 2015).**

Benson's relaxation technique is one of the most common methods of relaxation, which was first introduced in 1975 by Herbert Benson, a Harvard physician. This technique could bring about the relaxation response by reducing stimulation of the autonomic nervous system. It is indicated that Benson's relaxation technique can reduce the severity of pain and improve hemodynamic status. It can efficiently decrease emotional distress and its associated anxiety and sleep disturbances. In addition to its simplicity, this technique is an inexpensive, efficacious, and practical method to reduce pain, anxiety, and reduce medication intake after invasive procedures **(Poorolajal et al., 2017).**

Significance

The most common post operative complaints after spinal surgery are pain, stress, anxiety, hemodynamic instability and sleeping alterations. Acute postoperative pain management still shows pain scores higher than three in up to thirty percent on a visual analog scale of ten for operated patients. A recent study has reported that moderate to severe postoperative pain has been experienced by over eighty percent of patients undergoing surgeries. Nearly all over the world, pain physiological response is negative, and undiminished causes a fatal unstable hemodynamic state, immune system function alteration, increased blood glucose level, and increased catecholamine, cortisol, and anti-diuretic hormones excretion **(ELmetwaly et al., 2020).**

Benson relaxation techniques is one of the more favorite relaxation methods due to its simple way of learning and leads to full relaxation of all the muscles. It is known as one of the foremost muscular relaxation techniques that works through the regulation of the hypothalamus and reduction of the sympathetic and parasympathetic stimuli and is effective on the respiratory function, pulse rate, and heart workload. In addition, this relaxation method encompasses mindfulness techniques that can affect many physical and psychological symptoms associated with postoperative period of spinal surgery such as pain, stress, anxiety, and insomnia. Therefore, nurses must pay additional attention to the Banson relaxation method as a simple, effortless, inexpensive, and efficient technique while caring for those patients **(Habibollahpour et al., 2019).**

There are many clinical trials was conducted to examine the effect of Benson's relaxation technique on the pain, anxiety hemodynamic response and even sleep quality in patients undergoing various kinds of surgical procedures including coronary artery bypass graft (CABG), coronary angiography (CAG), percutaneous intervention (PCI), or general surgeries **(Poorolajal et al.,2017).** Meanwhile, one or two studies had been conducted to examine the effect of Benson relaxation techniques on intensity of postoperative pain only after spinal surgery. Hence, the purpose of this study was designed to evaluate the effect of Benson relaxation technique on postoperative complaints after spinal surgery including pain, vital signs, sleep quality and anxiety to validate its efficiency for such group of patients.

Aim of the study

This study aims to assess the effect of Benson relaxation technique on pain intensity, vital

signs, sleep quality and anxiety among patients after spinal surgery through the followings:

1- Assess pain intensity, vital signs, anxiety level and quality of sleep among patients after spinal surgery before implementation of BRT.
2- Implement Benson relaxation technique.
3- Evaluate the effect of Benson relaxation technique on pain intensity, vital signs, sleep quality and anxiety among patients after spinal surgery after its implementation.

Research hypothesis:

This study was conducted to confirm the following research hypothesis:

1. There would be a significant reduction in intensity of pain after implementation of BRT among study group patients as compared to control group.
2. There would be a significant improvement of vital signs values after implementation of BRT among study group patients as compared to control group.
3. There would be a significant improvement in the level of anxiety after implementation of BRT among study group patients as compared to control group.
4. There would be a significant improvement in quality of sleep after implementation of BRT among study group patients as compared to control group.

Operational Definitions

Benson Relaxation Technique

It is a type of relaxation method with a combination of individuals' belief systems or faith factors focusing on the senses that affect a wide range of physical and psychological symptoms such as anxiety, pain, sleep quality and vital signs.

Spinal surgery

The spinal surgery in this study refers to traditional open spinal surgery such as laminectomy with or without fixation and discectomy.

Vital signs refer to as pulse, respiration ad blood pressure (systolic and diastolic blood pressure) which are proved to Benson technique to had effect on (temperature is excluded because no previous proof of the effect of Benson technique on it).

After spinal surgery

The three postoperative days after spinal surgery are the average postoperative hospital stay for the abovementioned study participants.

Subjects and Methods

The subject and methods of the current study were designed under the following main four designs:

I. Technical Design

II. Operational Design

III. Administrative Design

IV. Statistical Design

I. Technical Design

It included research design, study settings, subject, and tools of data collection.

Research Design

A quasi-experimental research design (study and control groups, pre-post assessment). Quasi experimental research is a prospective or retrospective study in which patients are selected into one of some different treatment groups to compare the real effectiveness of non-randomized treatments **(Maciejewski, 2020).**

Study Settings

The study was conducted in the Neurosurgical departments at El-Demerdash hospital which is affiliated to Ain Shams University Hospitals. The neurosurgical departments consist of two floors, each floor contains five rooms, and each room has four beds. This setting accommodates many diagnosis including patients undergoing traditional open spine surgeries who met the selective criteria under study and receive routine pre and postoperative care.

Subjects:

A purposive sample of 60 adult patients was recruited from the previously mentioned setting. They were assigned into two equal groups (study and control groups) (thirty subjects in the study group who received

Benson relaxation technique and routine care and thirty subjects in the control group who received postoperative routine care only such as drug administration, pain medication, laboratory tests, x-rays, and physical examination, consultation, and wound dressing. Inclusion criteria of the study were: being adult patients with 18 years old or above and willing to participate in the study, conscious, able to communicate, accept to perform Benson technique. Exclusion criteria include Patients with verbal / audio-visual communication difficulties or mental disabilities or serious co-morbid diseases and serious postoperative complications.

Sample size

Based on the total number of adult patients who have undergone traditional open spinal surgery at the previously mentioned setting during the year 2020. Based on sample size equation introduced by **Machin et al. (2018),** patients will be 60 patients in the study. So, the sample size was calculated by adjusting the power of the test to 80% and the confidence interval to 95% with margin of error accepted adjusted to 5% with type I error (α) = 0.05%, type II error (B) = 0.20% using the following equation:

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

Nxp(1-p) =(70*(0.5*(1-0.5)))/
N-1 =(70-1)*
d^2/z^2 =0.0025 / 3.8416+
p(1-p) =0.5*(1-0.5)
n =60

N= Community size
z= Class standard corresponding to the level of significance equal to 0.95 and 1.96
d= The error rate is equal to 0.05
p= Ratio provides a neutral property = 0.50

Tools for data collection:

Data was collected using the following tools:

Tool I: Patient's **interviewing questionnaire:**

It was developed by the researcher in an Arabic language based on reviewing related literatures and contains three parts as follows:

Part one: Demographic data for patients under study:

It was concerned with assessment of demographic characteristics of patients under study including their age, gender, level of education, marital status, occupation, and residence.

Part two: Patient medical clinical data:

It was concerned with assessment of patients under study regarding medical clinical data among patients under study including type of spinal surgery, associated chronic illness, previous spinal surgery, family history of spinal surgery, chief complaints at admission, body mass index, number of spinal operated level, pain intensity at preoperative area, and length of hospitalization.

Part three: Pain numerical rating scale:

It is a standardized scale adapted from **Grotle et al. (2004)** to assess intensity of pain among studied patients. It was translated and retranslated into Arabic language. It was used to assess pain intensity before and after implantation of Benson relaxation technique. It represents a horizontal line with an eleven-point numeric range. It was labeled from zero to ten, zero mark is given for patients with no pain and ten marks is given for the worst pain possible.

Scoring system:

The score zero (0) indicates no pain and the top score (10) indicates the worst possible pain. The total score is divided into 4 main categories: zero, which indicates no pain; 1-3 grades, which indicates mild pain; 4-6 grades, which indicate moderate pain; and 7-10 grades, which indicate severe pain. Total scores for studied patients were summed up and mean scores were calculated.

Tool II: Vital Signs Assessment Record

It included assessment of vital signs among study and control group patients. It included assessment of heart rate, respiratory rate, systolic and diastolic blood pressures. It was checked immediately before implementation of Benson relaxation technique and 20 minutes after its implementation.

Scoring system

The total score of each vital sign is obtained by totaling the scores for each item and mean scores for each item were calculated.

Tool III: Beck Anxiety Inventory:

It is a standardized tool adapted from **Beck and Steer (1990)**. It is a 21-items multiple-choice self-report inventory that measures the severity of an anxiety. Translation and back translation from English to Arabic was done for this tool to assure accuracy for content validity.

Scoring system:

Each symptom item has four possible answer choices: Not at All = 0; mildly = 1; moderately = 2, and severely = 3. The values for each item are summed yielding an overall or total score for all 21 symptoms that can range between 0 and 63 points. A total score of 0 - 7 is interpreted as a "Minimal" level of anxiety; 8 - 25 as "Moderate" and 26 - 63 as "Severe".

Tool IV: Groningen Sleep Quality Scale (GSQS):

It is a standardized scale; it was adapted from **Mulder et al. (1981),** to assess client's previous night's sleep quality. It composed of fifteen statements about the previous night's sleep, answered with true or false. The sum of this scale expressed as a generalized score of the previous night's sleep quality. A higher score in the GSQS meant a more disturbance of sleep.

Scoring system:

The first question isn't counted among the total scores. One mark was given if the answer was "True" for questions (2, 3, 4, 5, 6, 7, 9, 11, 13, 14, 15) and One mark was given if the answer was "False" for questions (8, 10,12). Groningen Sleep Quality Scale total scores were summed that ranged from zero to fourteen. Maximum higher score of fourteen points indicated poor sleep the night before. The total scores of sleep quality were summed up and categorized as good sleep, if the score ranged from 0-4, fair quality of sleep if the score ranged from 5-9 and Poor quality of sleep if her score ranged from 10-14.

Benson muscle relaxation technique:

Benson's relaxation technique is one of the methods of focusing on the senses that affect a wide range of physical and psychological symptoms such as anxiety, pain, depression, mood, and self-confidence and reduces stress. The relaxation response, which brings about bodily changes that decrease heart rate, lower metabolism, decrease the rate of breathing and bring the body back into what is probably a healthier balance.

II. Operational Design

The operational design of this study was including preparatory phase, content validity and reliability, pilot study, fieldwork, and ethical considerations,

The preparatory Phase

It includes review of the current and past recent and related literatures and theoretical knowledge of various aspects of the study using books, articles, periodical magazines, and scientific web sites to develop tools for data collection. Permission of data collection and implementation of the study was obtained from the hospital administrative personnel by the submission of a formal letter from the Faculty of Nursing, Ain Shams University.

Ethical Considerations:

Research approval was obtained from the Ethical and Research Committee, Faculty of Nursing. Modern University for Technology and Information (MTI) with formal approval code number (FAN/ 13/2021) on 1/5/2021. The researcher clarified the objectives and aim of the study to patients included before starting. Oral consent was obtained from the patients before inclusion in the study; a clear and simple explanation was given according to their level of understanding. They secured that all the gathered data was confidential and used for research purposes only. The patients were informed that they were allowed to choose to participate or not in the study and have the right to withdraw from the study at any time without any consequences.

Pilot Study

It was carried out on (10%) of the total sample of the studied patients to test the applicability of the constructed tools, the clarity of the questions and efficiency of the tools. According to the results of the pilot, minimal modifications were made, so the patients who were included in the pilot study were included in the study sample.

Validity and reliability:

The developed tools were tested and evaluated for their face and content validity.

Validity:

The tools are tested and revised for content and face validity by a jury of seven experts in

medical surgical nursing and psychiatric nursing specialty, five of them were professors and two of them were assistant professors, minimal modifications were done. The experts elicited responses regarding either by agree disagree and agree with modification. Validity for patient's interview questionnaire and other study tools ranged between 95% to 100%. Minimal modifications were made according to their recommendations.

Reliability:

Cronbach's Alpha test was used to measure the internal consistency of the tools used in this study. Alpha tests for patient's interviewing questionnaire, vital signs assessment record, Beck Anxiety Inventory and Groningen Sleep Quality Scale (GSQS) were 0.876, 0.92, 0.869 and 8.23 respectively which indicate good reliability.

Fieldwork

The present study was performed after receiving an ethical approval letter from the Ethics Committee in the Faculty of Nursing, Modern University of Technology. The participants received the required instructions and were familiarized with the objectives of the study. The actual field work and the process of data collection have consumed five months to be completed started from the beginning of June 2021 to the end of December 2021. The researchers collected data from the previously mentioned study setting three days per week on morning and afternoon shifts. The data collection was done through three phases, pre-implementation phase (before application of Benson Muscle Relaxation Technique), implementation phase and post–implementation phase (evaluation phase).

Pre implementation phase

The patients were selected according to inclusion criteria. After explaining the purpose of the research, data was collected by conducting face-to-face interviews with individuals who agreed to participate in the research. In order to prevent interference and control group interactions, first the control group data was collected and then the study group data were collected. Each patient from both groups was interviewed individually for the first time preoperatively to collect baseline data about personal and medical clinical data. The interview was carried out in the patient's room in hospital one day before surgery. It took about 20 – 30 minutes. The researchers introduced themselves to patients and explained the purpose of the study and got the oral consent to be involved in the study. The researchers gave information to the subjects in the study group only about the Benson relaxation technique, its purposes, advantages, and its technique and expected effect. using some illustrating pictures, brochures, video films.

The patients from both study and control groups were interviewed on the morning of the first postoperative day after the patients regained full consciousness and attention. The interview was carried out in the patient's room in hospital It took about 35 - 45 minutes using study tools (I, III and IV) to assess level of pain, anxiety at the time of interview and assess sleep quality at the night before in addition to measuring vital signs (temperature, pulse, systolic and diastolic BP) using tool II as a baseline data before implementation of Benson relaxation technique.

Implementation phase

During this phase, the participants from study group received training and implementation of BRT with routine postoperative care (drug administration, pain medication, laboratory tests, physical examination, consultation, and routine postoperative nursing care). while the control group received the routine postoperative care only. The first training session was done individually on the morning of the first postoperative day after pre-implementation data was assessed using study tools. It was carried out half an hour after routine postoperative pain medication to ensure patients 'comfort and cooperation. It took about 35 to 45 minutes according to patient level of understanding and cooperation.

After explaining the technique to the patient, The BR technique was done as follows: First, the patient sits in a comfortable relaxed position with dim light, slowly closes the eyes, slowly relaxes muscles beginning from the feet to the face, remains relaxed, breathes through the nose, and is aware of breathing. The patient exhales gently through the mouth while, based on the respective belief system, repeating a word or expression silently. The patient breathes normally and at ease and tries to keep his/her muscles relaxed. Then, the patient opens their eyes but does not stand up for a few minutes. The patient does not worry about

whether a deep level of relaxation has been achieved but rather lets relaxation occur at its own pace. and finally sitting quietly for several minutes, at first with closed eyes and later with eyes open. When distracting thoughts intervene, the patient tries to ignore them and be indifferent to them **(Benson, 2000).**

Demonstration and re-demonstration of Benson relaxation technique was done to each patient of the study group. A smart phone was used to play soothing music through mobile headphones (to minimize the effect of environmental provocations). Benson's Relaxation Technique instructions for each studied patient were performed for 20 minutes. The researchers carried out a re-demonstration according to the patient's needs. Also, the researchers corrected the wrong practice of the technique from the patient. After the completion of the explanation, the patient was asked to re-demonstrate Benson relaxation technique until he/she can perform it efficiently. The researchers instructed every patient in the study group to practice this technique for 20 minutes every 8 hours per day, in the morning, afternoon, and night for the three consecutive postoperative days (postoperative hospital stay).

Post-implementation and evaluation phase

The patients from both study and control groups were followed for three postoperative consecutive days. Patients from control group who receive the routine post-operative care only were assessed daily on the morning as a pre-test data and 45 minutes later for post -test data without implementation of BR technique for three days using study tools (except demographic and medical clinical data). Patients of the study group were assessed daily in the morning as pre-implementation data and then perform the BR technique for 20 minutes then immediately were assessed as post-implementation data using study tools (tool I, II, III, IV). Pain intensity, anxiety level, quality of sleep and vital signs measurement were assessed before and after implementation of Benson relaxation technique for the three postoperative days. A comparison between study and control groups results for the three postoperative days was done to determine the effects of BR relaxation technique on pain intensity, vital signs, anxiety, and quality of sleep among study group patients.

III. Administrative Design

An official permission was obtained by submission of a formal letter issued to the director of Ain Shams University Hospital. Approval was obtained from the hospital director and nursing directors. An informal and oral consent was obtained from every participant of patients under study.

IV. Statistical Analysis Design

Statistical presentation and analysis of the present study was conducted, using the mean, standard deviation, unpaired student t-test was used to compare between two groups in quantitative data, chi-square test was used to compare between groups in qualitative data and linear correlation coefficient was used for detection of correlation between two quantitative variables in one group by (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.). A statistically significant difference = P-value $\leq$ 0.05. High significant difference= P value <0.001. A non-statistically significant difference= P value >0.05.

Results:

Table (1) shows that 46.7% and 40% of the study and control groups respectively were in the age group between 30 - < 40 years. As regards gender, 60% and 70% of the study and control group respectively were males, 50 and 60% of study and control groups were married. In relation to patients' education, it was found that 40 % and 33.3 % in both the study and control groups respectively had university education. Concerning occupation, it was found that 40.0% and 50 % of the study and control groups respectively had muscular work. Regarding residence it was found that 53.3 % and 56.7 % of the study and control groups respectively were from urban areas. Moreover, no statistically significant differences were found between both groups regarding the abovementioned characteristics.

As shown from table (2), it was illustrated that 36.7% and 40% from the study and control groups respectively had undergone traditional lumbar laminectomy + fusion. Also, 83.3% of the

study group versus 90% of control group had history of back disorders. Regarding mean postoperative hospital stays among both groups under study, the findings indicated that the mean stay among study group was 3.9±3.25 and 3.4 ±2.78 days among control group. Concerning the number of spinal levels involved, it was revealed that 83.3% and 90% of study and control groups respectively had multiple spinal levels involved in spinal surgery. It was shown also that 6.58±0.99 versus 6.75±0.96 were pain intensity mean scores among study and control groups respectively at pre-operative period. The findings revealed that 60% of the study group and 46.7% of control group, their body mass index was more than 25. No statistical significance differences were found between both groups in relation to their clinical data which indicated proper matching between study and control groups as regards these variables.

Table (3) illustrates the difference between the study and control groups regarding their level and mean scores of postoperative pain intensity before and after implementation of Benson technique. It was observed that no statistically significant difference was found between study and control groups at first day after surgery before implementation of Benson technique (X2 =1.763, p= 0.184) while there was statistically significant difference between both groups after implementation of BRT (X2 =14.622, p<0.001). As regards the second day after surgery, the findings revealed that there was no statistically significant difference between study and control groups before implementation of Benson technique (X2 =2.857, p= 0.091) while statistically significant difference was detected between both groups after implementation (X2 =18.286, p<0.001). Whereas no statistically significant difference between the study and control groups (X2 =0.676, p= 0.713) before implementation at third day after surgery, meanwhile, the difference between the two groups after implementation was statistically significant after implementation (X2 =13.237, p<0.001).

Table (4) In the analysis of the vital signs mean values namely the heart rate, respiratory rate, systolic and diastolic blood pressure among the study and control groups at the three days after surgery before and after implementation of Benson technique, there were found to be no significant differences between study and control groups before implementation of Benson technique at the three days after spinal surgery (P-value > 0.05). However, there were statistically significant reduction of mean values of heart rate, systolic and diastolic blood pressure among study group as compared to control group at first and second postoperative days after implementation of Benson technique (p-value <0.05). Also, there were highly statistically significant reduction of mean values of respiratory rate among study group as compared to control group at the three postoperative days after Benson implementation(p-value <0.001). In addition, the mean values of systolic and diastolic blood pressure were significantly reduced at the third postoperative day as compared to control group after BRT implementation (p-value <0.001).

Regarding level of anxiety before and after implementation of Benson technique at the three postoperative days among study and control groups, table (5) indicated that there were no statistically significant differences between study and control groups regarding anxiety severity level at first and second postoperative days either before or after implementation of Benson technique (P-value >0.05). Moreover, statistically significant difference was detected between study and control groups regarding anxiety level after implementation of Benson technique (p-value =0.031) at third postoperative day, meanwhile, no statistically significant differences was observed before implementation at the same day.

According to table (6), 53.4% and 50% of study and control group participants respectively had poor sleep quality at the first night after spinal surgery before implementation of BRT with no statistically significant difference among both groups (p=0.966). However, 66.7% of study group had fair sleep quality as compared to 46.7% of control group with statistically significant difference was detected at the second night after implementation of Benson technique. Furthermore, 53.4 % of the study group assumed good sleep quality as compared to 26.7% of control group after Benson technique implementation at the third postoperative night with statistically significant difference between both groups at p = 0.017.

Table (7) showed that there were highly statistically significant positive correlations between pain intensity and respiratory rate, heart rate, diastolic BP, anxiety, and sleep quality at the

third postoperative day after Benson technique implementation (p <0.001). Also, there were statistically significant positive correlations between anxiety and respiratory rate, systolic, diastolic BP, and sleep quality.

Table (1): Frequency and percentage distribution of demographic data among the study and control group patients (No=60).

Demographic data	Study group (n=30)		Control group (n=30)		Tests	
	No.	%	No.	%	t/X^2	P-value
Age (years):						
▪ 20 - <30	2	6.7	3	10	0.497	0.920
▪ 30 - <40	14	46.7	12	40		
▪ 40 - <50	11	36.7	11	36.7		
▪ 50 - 60	3	10	4	13.3		
■ **Mean± SD (years) Min. – Max.**	43.40 ± 8.8 (29-58)		44.73 ± 8.49 (28-59)		0.596	0.554
Gender:						
■ Male	18	60	21	70	0.659	0.417
■ Female	12	40	9	30		
Marital status						
■ Single /divorced/ widow	15	50	12	40	0.606	0.436
■ Married	15	50	18	60		
Educational level:						
■ Read and write	10	33.3	11	36.7	0.288	0.866
■ School education	8	26.7	9	30		
■ University education	12	40	10	33.3		
Occupation:						
■ No working / retired/ student/ housewife	11	36.7	9	30	0.610	0.737
■ Sedentary work	7	23.3	6	20		
■ Muscular work	12	40	15	50		
Residence:						
■ Rural	14	46.7	13	43.3	0.067	0.795
■ Urban	16	53.3	17	56.7		

Non-significant P > 0.05

Table (2): Frequency and percentage distribution of the study and control group patients as regards their medical clinical data (n=60).

Item	Study group (n=30)		Control group (n=30)		Tests	
	No.	%	No.	%	t/X^2	P-value
Types of spinal surgery						
▪ Traditional cervical laminectomy	6	20.0	9	30.0	1.373	0.712
▪ Traditional cervical laminectomy + fusion	3	10.0	2	6.7		
▪ Traditional lumbar laminectomy	10	33.3	7	23.3		
▪ Traditional lumbar laminectomy + fusion	11	36.7	12	40.0		
Associated common chronic illness						
▪ No	20	66.7	17	56.7	0.486	0.485
▪ Diabetes mellitus	5	16.7	3	10.0	1.000	0.317
▪ Hypertension	7	23.3	10	33.3	1.059	0.303
▪ Back disorders	25	83.3	27	90.0	0.154	0.695
Mean Postoperative Hospital stay (days) Range: (3-5 days)	3.9±3.25		3.4 ±2.78		0.640	0.525
Previous spinal surgery						
▪ Yes	5	16.7	2	6.7	1.456	0.228
▪ No	25	83.3	28	93.3		
Family history of spinal surgery						
▪ Yes	3	10.0	5	16.7	0.577	0.448
▪ No	27	90.0	25	83.3		
Chief complaints at admission						
▪ Low back pain	30	100.0	30	100.0	0.000	1.000
▪ Numbness in lower limbs	20	66.7	16	53.3	0.889	0.346
▪ Heaviness in lower limbs	17	56.7	21	70.0	0.842	0.359
▪ Weakness in lower limbs	15	50.0	17	56.7	0.250	0.617
▪ Leg pain	18	60.0	16	53.3	0.235	0.628
No. of spinal Levels involved						
▪ Single	5	16.7	3	10.0	0.577	0.448
▪ Multiple	25	83.3	27	90.0		
Pain intensity mean scores. (pre-operative) (Range)	6.58±0.99 (7-10)		6.75±0.96 (7-10)		0.675	0.502
Body mass index (25)						
▪ <25	12	40.0	16	53.3	1.071	0.301
▪ ≥25	18	60.0	14	46.7		

Non-significant P > 0.05 ≥ 25 (BMI): indicator for overweight

Table (3): Comparison between the study and control groups regarding their level and mean scores of postoperative pain intensity before and after implementation of Benson technique (n=60).

After surgery		Study Group (N=30)						Control Group (N=30)						Tests	
		Mild		Moderate		Severe		Mild		Moderate		Severe			
		N	%	N	%	N	%	N	%	N	%	N	%	t/X^2	P-value
First day	Pre	0	0	14	46.7	16	53.3	0	0	9	30.0	21	70.0	1.763	0.184
	Post	5	16.7	15	50	10	33.3	0	0	6	20.0	24	80.0	14.622	<0.001**
	Mean±SD (post)	**5.97±1.33**						**7.13±1.07**						**3.722**	**<0.001****
Second day	Pre	0	0	12	40.0	18	60.0	0	0	6	20.0	24	80.0	2.857	0.091
	Post	4	13.3	20	66.6	6	20	0	0	8	26.7	22	73.3	18.286	<0.001**
	Mean±SD (post)	**4.67±1.03**						**6.87±1.07**						**8.103**	**<0.001****
Third day	Pre	3	10	15	50	12	40	2	6.7	13	43.3	15	50.0	0.676	0.713
	Post	7	23.3	23	76.7	4	13.3	2	6.7	12	40	16	53.3	13.237	<0.001**
	Mean±SD (post)	**3.93±0.90**						**5.80±1.09**						**7.246**	**<0.001****

*P-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS*

Table (4): Comparison between the study and control groups regarding their vital signs mean scores before and after implementation of Benson technique (n=60).

Vital signs			Study group (n=30 (Mean ±SD)		Control group (n=30) (Mean ±SD)		T-test	
							t	P-value
First day after surgery	• Heart Rate (HR)	• **Pre**	94.93	5.11	94.80	4.80	0.102	0.919
		• **Post**	88.70	6.41	93.27	4.83	3.119	0.003*
	• Respiratory Rate (RR)	• **Pre**	18.67	2.23	18.90	1.58	0.467	0.642
		• **Post**	16.90	1.86	18.63	1.94	3.531	<0.001*
	• Systolic blood pressure (SBP)	• **Pre**	118.93	8.61	117.11	6.02	0.949	0.347
		• **Post**	114.83	7.78	118.60	6.12	2.099	0.040*
	• Diastolic blood pressure (DBP)	• **Pre**	77.50	7.56	76.83	8.95	0.313	0.755
		• **Post**	72.97	3.53	75.43	4.19	2.459	0.017*
Second day after surgery	• Heart Rate (HR)	• **Pre**	87.23	4.46	88.93	5.29	1.346	0.184
		• **Post**	84.03	5.10	87.33	4.33	2.702	0.009*
	• Respiratory Rate (RR)	• **Pre**	17.33	1.63	17.63	1.43	0.760	0.450
		• **Post**	15.60	1.92	17.57	1.79	4.096	<0.001**
	• Systolic blood pressure (SBP)	• **Pre**	117.50	8.23	119.67	7.65	1.058	0.295
		• **Post**	114.83	6.87	118.52	7.21	2.029	0.047*
	• Diastolic blood pressure (DBP)	• **Pre**	81.83	7.39	80.67	6.48	0.646	0.521
		• **Post**	77.83	6.84	82.83	5.15	3.199	0.002*
Third day after surgery	• Heart Rate (HR)	• **Pre**	85.77	7.61	87.07	7.58	0.663	0.510
		• **Post**	82.83	6.24	86.90	7.49	2.287	0.026*
	• Respiratory Rate (RR)	• **Pre**	16.40	2.62	17.13	3.03	1.003	0.320
		• **Post**	14.43	2.08	16.20	2.11	3.369	<0.001**
	• Systolic blood pressure (SBP)	• **Pre**	120.33	7.04	122.17	7.86	0.955	0.344
		• **Post**	117.20	7.03	123.03	6.11	3.428	<0.001**
	• Diastolic blood pressure (DBP)	• **Pre**	80.33	7.04	82.50	7.70	1.139	0.259
		• **Post**	77.40	6.66	83.37	5.58	3.763	<0.001**

P-value >0.05 NS **p-value <0.05 S* ***p-value <0.001 HS*

Table (5): Comparison between the study and control groups regarding their total level of anxiety before and after implementation of Benson technique (n=60).

Time		Study Group n=30			Control group n=30			Chi-square	
		Minimal	Moderate	Severe	Minimal	Moderate	Severe	X^2	P-value
		No. %	No. %	No. %	No. %	No. %	No. %		
First day after surgery	▪ Pre - implementation	8 26.7%	12 40%	10 33.3%	11 36.7 %	10 33.3 %	9 30 %	0.708	0.702
	▪ Post- implementation	9 30 %	14 46.7 %	7 23.3 %	8 26.7 %	13 43.3 %	9 30 %	0.346	0.841
Second day after surgery	▪ Pre - implementation	12 40%	12 40%	6 20 %	8 26.7 %	15 50 %	7 23.3 %	1.210	0.546
	▪ Post- implementation	14 46.7%	14 46.7%	2 6.7 %	10 33.3%	14 46.7 %	6 20 %	2.667	0.264
Third day after surgery	▪ Pre - implementation	15 50 %	14 46.7%	1 3.3%	12 40 %	13 43.3 %	5 16.7 %	3.037	0.219
	▪ Post- implementation	21 70 %	9 30 %	0 0%	12 40 %	15 50 %	3 10 %	6.955	0.031*

P-value >0.05 NS **p-value <0.05 S*

Table (6): Comparison between the study and control groups regarding their total quality of sleep before and after implementation of Benson technique (n=60).

Time	Study Group n=30			Control group n=30			X^2	p value
	Poor sleep	Fair sleep	Good sleep	Poor sleep	Fair sleep	Good sleep		
	No. %	No. %	No. %	No. %	No. %	No. %		
▪ Pre -implementation (First night after surgery)	16 53.4%	13 43.3%	1 3.3%	15 50%	14 46.7%	1 3.3%	0.069	0.966
▪ Post- implementation 2nd night after surgery	3 10 %	20 66.7%	7 23.3 %	13 43.3%	14 46.7%	3 10%	8.909	0.012*
▪ Post- implementation 3rd night after surgery	1 3.3%	13 43.3 %	16 53.4 %	8 26.7%	14 46.7%	8 26.7%	8.148	0.017*

P-value >0.05 NS **p-value <0.05 S*

Table (7): Correlation between different variables among study group post implementation of Benson technique on the third postoperative day (n=60).

Variables		Pain	Respiratory rate	Heart rate	Systolic BP	Diastolic BP	Anxiety
Respiratory rate	**r**	0.731					
	P-value	<0.001**					
Heart rate	**r**	0.135	0.427				
	P-value	<0.001**	<0.001**				
Systolic BP	**r**	0.198	0.323	0.230			
	P-value	0.832	<0.001**	0.243			
Diastolic BP	**r**	0.010	0.151	0.062	0.380		
	P-value	<0.001**	0.250	<0.001**	0.003*		
Anxiety	**r**	0.822	0.395	0.283	0.797	0.644	
	P-value	<0.001**	<0.001**	0.028*	<0.001**	<0.001**	
Sleep quality	**r**	0.298	0.394	0.026	0.269	0.278	0.384
	P-value	<0.001**	0.088	0.842	0.038*	<0.001**	0.002*

Discussion

Spinal surgeries are common surgical procedures used to treat wide variety of spinal pathologies, it includes many types including laminectomies, discectomies, spinal fusions, scoliosis corrections, and spinal tumor excision. thus, result in a considerable degree of postoperative pain, anxiety, and autonomic disturbances. Pain, anxiety, fear, sleep deprivation and physiological disturbances typically increase in postoperative days after surgery. Benson's relaxation is a light- emitting technique leading to complete relaxation of all body muscles and a method that is easy to use for pain reduction and sleep disorders treatment. Benson's relaxation which is a sort of subjective stress management decreases the anxiety level, mood disturbance, body discomfort, activity of autonomic nervous system and as a minimum it might have an effect on sleep quality **(Bajwa & Haldar 2015; Masry et al., 2017).**

This study was conducted to assess the effect of Benson relaxation technique on pain intensity, vital signs, sleep quality and anxiety among patients after spinal surgery. The present study had 4 hypotheses for study namely, "H1-There would be a significant reduction in intensity of pain after implementation of Benson's relaxation technique among study group patients as compared to control, " H2- There would be a significant improvement of vital signs after implementation of Benson's relaxation technique among study group patients as compared to control group". "H3- There would be a significant reduction in the level of anxiety after implementation of Benson's relaxation technique among study group patients as compared to control group" and "H4- There would be a significant improvement in quality of sleep after implementation of Benson's relaxation technique among study group patients as compared to control group".

The findings of the current study revealed that equal or more than two fifths of control and study groups respectively were in the age group between 30 to less than 40 years with mean age about 43 to 44 years old. As regards gender, three fifths and nearly three quarters of the study and control groups respectively were males, equal or more than half of study and control groups were married. In relation to patients' education, it was found that more than three fifths of the study and control groups had school and university education. Concerning occupation, it was found that two fifths of the study group and half of the control group had muscular work. Regarding residence it was found that more than half of the study and control groups were from urban areas.

These findings agreed with results of **Lee et al. (2018)** in their study titled ″Effects of

Educational Intervention on State Anxiety and Pain in People Undergoing Spinal Surgery: A Randomized Controlled Trial ″ who revealed that more than half of study and control groups were in age 30-50 years old with mean age of 41.9±11.75 and 40.9±12.23 respectively, more than half of both study and control groups were males, majority of the study group and were married. similar findings have been reported by **Abd Elwahhab, et al. (2019)** in their study about patients with discectomy and reported that most of the studied patients were married, more than one third of the patients had secondary education and half of the studied patients had manual work. The contradiction between the previous study and current study revealed that three quarters of previously mentioned studied patients were from rural areas. This contradiction may be due to the difference in study setting for each study.

As regards the patients′ medical clinical data among the studied patients; it was found that more than one third of study group and two fifths of control group had undergone traditional lumbar laminectomy + fusion. Also, most of the study and control groups had a history of back disorders. Regarding mean Postoperative Hospital stays among both groups under study, the findings indicated that the mean postoperative hospital stay among study and control groups was ranged between 3.4 to 3.9 days. Concerning the number of spinal levels involved, it was revealed that most of the study and control groups had multiple spinal levels involved in spinal surgery. It was shown also that 6.58±0.99 versus 6.75±0.96 were pain intensity mean scores among study and control groups respectively at pre-operative period. The findings revealed that three fifths of the study group and nearly half of control group, their body mass index was more than 25 which indicates overweight on body mass index scale.

In this regard, **El Tabl et al. (2020)** in their study titled ″Evaluating the outcome of classic laminectomy surgery alone versus laminectomy with fixation surgery in patients with lumbar canal stenosis regarding improvement of pain and function″ found that majority of both groups under study had more than one spinal level involved in spinal surgery, their mean body mass index ranged from 28.1 to 29.4 among both groups under study and their mean hospital stay ranged from 3.4 to 3.6 days. Furthermore, **Hafez et al. (2021)** in their study about laminectomy, discectomy patients found that they were operated upon by multiple levels laminectomies and about two thirds of study sample, their body mass index was more than 25 (overweight or obese) which support our study findings.

Moreover, no statistically significant differences were noticed between both groups regarding the demographic characteristics and in relation to their clinical data which indicated proper matching between study and control groups regarding these variables which inferred that those factors did not affect study findings and avoid bias.

One of the current study aims was to assess the effect of Benson relaxation technique on pain intensity after spinal surgery, in this regard , the current study findings revealed statistically significant reductions of pain intensity after implementation of Benson relaxation technique as compared to control group at the first , second and third postoperative days after spinal surgery , meanwhile, no statistically significant differences were detected between study and control groups at the three postoperative days before implementation. This result emphasized the significant and positive effect of Benson relaxation technique on postoperative pain relief among patients after spinal surgery. This result may be attributed to the fact that Benson relaxation technique enhances pain relief by decreasing muscle tension, increase the alpha/theta waves in the brain and stimulate secretion of endorphins, as natural analgesic neurotransmitters, in neural synapses through cortical mechanisms as explained in a previous study conducted by **Seifi et al. (2018)** in as study about the of the effects of Benson muscle relaxation on the fatigue in patients with heart failure.

The results of the current study are also similar to the results of **Momen et al. (2018)** and in a study titled ″The effect of Benson relaxation method on pain severity after laminectomy in admitted patients to AJA hospitals and **Pishgooieet al. (2020)** in their study regarding effects of Benson relaxation techniques on acute postlaminectomy pain who found that there is significant decrease in average pain intensity scores among intervention group at first, second, and third stages of Benson

technique application after laminectomy surgery as compared to control group , they concluded that the Benson's relaxation technique had a positive and significant effect on pain severity in this group of patients after all three intervention stages and recommended it as a complementary method for reducing the pain of these patients. Benson's relaxation has been demonstrated to be useful in lowering post-operative pain in several studies **(Priya et al., 2017; ELmetwaly et al., 2020)**. The aforementioned studies indicate the efficacy of Benson technique as an effective method for postoperative pain relief.

In the analysis of effect Benson technique effect on the vital signs mean values namely the heart rate, respiratory rate, systolic and diastolic blood pressure, the present study indicated that there were statistically significant reduction of mean values of heart rate, systolic and diastolic blood pressure among study group participants as compared to control group at first and second postoperative days after implementation of Benson technique in addition to highly statistically significant reduction of mean values of respiratory rate among study group as compared to control group at the three postoperative days after Benson implementation. Moreover, the mean values of systolic and diastolic blood pressure were significantly reduced at the third postoperative days among study group as compared to control group after implementation of Benson relaxation technique.

However, there were no significant relationships between study and control groups before implementation of Benson technique regarding vital signs mean scores at the three days after spinal surgery which indicate the efficiency of Benson technique on reduction and improvement of vital signs after spinal surgery. This result can be explained through the fact that introduced by **Teimori et al, 2019** and reported that Benson relaxation made a balance between the anterior and posterior parts of the hypothalamus, decreases sympathetic system activity, reduces muscle spasms, and cardiac activity, and regulates breathing.

These findings were consistent with **Mohamed et al. (2021)** in their study entitled " Effect of Foot Reflexology Massage versus Benson Relaxation Technique on Physiological Parameters and Pain after Open Heart Surgery " who demonstrated that there were significant decrease in pulse, breathing rate, systolic Blood pressure, diastolic blood pressure and mean arterial blood pressure was observed in Benson group immediately and one hour after applying Benson technique from the first to the third day comparing to the control group. Similarly, **Teimori et al, 2019** who conducted a study to evaluate effect of BRT on physiological conditions in patients post open heart surgery, they showed that, Benson relaxation had a significant improving result on reducing the physiological parameters that make patients relaxed. Additionally, the same results reported by **Poorolajal et al. (2017),** who evaluated the influence of Benson relaxation procedure on the hemodynamic parameters, and reported the intervention group's blood pressure, pulse, average number of cardiac rhythms, and breathing rates all considerably declined when compared to the control group.

Regarding level of anxiety before and after implementation of Benson technique at the three postoperative days among study and control groups, the current study findings indicated that there were no statistically significant differences between study and control groups regarding anxiety severity level at first and second postoperative days either before or after implementation of Benson technique. However, statistically significant reduction of severity of anxiety among study group participants as compared to control group after implementation of BRT at third postoperative day, meanwhile, no statistically significant difference was observed before implementation of BRT at the same day. From researchers' point of view, this may be because BRT has no immediate effect on anxiety level, it was efficient in decreasing severity of anxiety at the third postoperative day which may be because the higher percentage of study and control groups had moderate and severe anxiety levels before BRT implementation at first and second postoperative days.

This finding was in contradiction with findings of **Malmir et al. (2016)** who report in their study regarding role of BRT on reducing state anxiety on patients undergoing open heart surgery and reported that Benson's relaxation technique could significantly reduce the mean scores of state anxiety among experimental group as compared to control group half an hour after intervention preoperatively. This discrepancy between both studies may be because the current study was

conducted at postoperative period after spinal surgery which is a stressful time for those patients associated with severe pain, consequently, Benson technique took more time to produce the desired effect and anxiety relief.

In this regard, many studies supported the efficiency of Benson relaxation technique on reducing anxiety levels among patient undergoing coronary angiography (**Tahmasbi & Hasani, 2016)**, preoperative patients (**Poorolajal et al., 2017**), and among patient undergoing cataract surgery (**Barabady et al. (2020).**

On the other hand, **Kurniasari et al. (2016)** who reported in their study titled ″The Effect BRT with Anxiety in Hemodialysis Patients in Yogyakarta'' that Benson's relaxation technique have no effect on anxiety scores of hemodialysis patients. The differences in the results of this research with the research conducted by **Kurniasari et al.** might be due to difference in the number and characteristics of study populations, place of the study and time of intervention. Also, it may be justified as Benson technique had no effect on chronic anxiety associated with hemodialysis patients.

Studies have begun to address the fact that sleep disturbance is also highly prevalent in patients undergoing spinal surgeries either in pre or postoperative period, suggesting various mechanisms for their sleep disturbance management. The sleep disturbances were associated with surgical pain and anxiety **(Marrache et al., 2021)**.

According to current study findings, it was clear that about half of study and control group participants had poor sleep quality at the first night after surgery before implementation of Benson technique with no statistical significance difference among both groups. However, two thirds of study group had fair sleep quality as compared to less than one half of control group with statistically significant difference was detected at the second night after implementation of Benson technique. Furthermore, more than half of the study group had good sleep quality as compared to one fourth of control group after Benson technique implementation at the third postoperative night with statistically significant difference between both groups. This indicates statistically significant improvement of quality of sleep among study group participants as compared to control group due to the effect of Benson relaxation technique which support study hypothesis. This finding may be attributed to the fact that Benson relaxation technique as a one of relaxation technique may enhance sleep quality by relaxing the body, decreasing the blood pressure, stimulating circulation, and ensuring muscle relaxation. This technique facilitates transition to parasympathetic nervous system, and as a result, ensures physical and mental relaxation **(Roozbahani et al., 2016).**

The effects of Benson relaxation technique on quality of sleeping after spinal surgery have not yet been investigated. However, many studies have been carried out in different populations. The study carried out by **Bagheri al. (2021)** in a study titled ″Effect of Benson and progressive muscle relaxation techniques on sleep quality after coronary artery bypass graft: A randomized controlled trial‟ agreed with current study findings and revealed that overall sleep quality in the BR group improved significantly after intervention. A possible explanation in the study as improving overall sleep quality might be due to the effect of the applied relaxation techniques on decreasing anxiety, stress, pain, and fatigue among the patients undergoing CABG in addition to some chemical changes associated with relaxation exercises in the blood such as decreased levels of adrenal hormones that may improve sleep quality. In addition, consistent with our findings, the results of another study demonstrated by **Harorani et al. (2020)** reported that the sleep quality of cancer patients undergoing chemotherapy significantly improved with administration of the BR technique twice a day over 5 consecutive days.

Another study conducted by **Masry et al (2017)** who had investigated the effect of Benson's relaxation technique on night pain and sleep quality among adults' patients undergoing joints replacement surgery and found an improvement in sleep quality scores among study group than control group after implementing BRT at one day postoperative and 3rd postoperative day.

Furthermore, the findings showed that there were highly statistically significant positive correlations between pain intensity and respiratory rate, heart rate, diastolic BP, anxiety, and sleep quality at the third postoperative day after Benson technique implementation. Also, there were statistically significant positive correlations between anxiety and respiratory rate, systolic,

diastolic BP, and sleep quality. That indicate that all these previously mentioned variables are correlated which clarified that the lesser the pain intensity at third postoperative day, the lesser the values of vital signs, anxiety level and sleep disturbances which positively and consequently result in enhance the effect of BRT in improvement of all study variables.

Conclusion

Based on the result of the current study, it can be concluded that the Benson relaxation technique after spinal surgery has a positive statistically significant effect on improvement of intensity of pain, reduction of vital signs values, severity of anxiety and quality of sleep among the study group who applied Benson's relaxation technique as compared to control group. Therefore, BRT can be used as an effective nursing measure for improving pain, anxiety, vital signs, and quality of sleep after spinal surgery. These data validated and supported all the research hypotheses.

Recommendations

Based on the findings of the current study, the following recommendations can be suggested:

- Benson relaxation technique is a technique that is inexpensive, effective, and easy to apply during the hospitalization period. Therefore, the nurses should incorporate such practices in post-operative nursing care for patients after spinal surgery.
- Patient's education about BRT technique should be implemented with all postoperative patients to help in relieving pain and enhance post-operative quality of recovery.
- Replication of the study using a large probability sample from a broad geographical area to allow greater generalization of the results.
- A booklet explaining Benson's relaxation technique might be created and used in the neurosurgical department as an easy and effective technique in reliving postoperative discomforts.
- Training all staff nurses in the neurosurgical department to apply BRT for each patient in postoperative hospitalization period.

References

Abd Elwahhab ,A., Shehata A, and Abd Elghaffar S. (2019): Effect of Rehabilitative Nursing Program on Functional Status among Patients with Discectomy. IOSR Journal of Nursing and Health Science.;8(6):82-92.

Bagheri , H. Moradi-Mohammadi , F., Khosravi , A., Ameri , M., Khajeh , M., Chan S. , Abbasinia , M. and Mardani, A. (2021): Effect of Benson and progressive muscle relaxation techniques on sleep quality after coronary artery bypass graft: A randomized controlled trial, Complementary Therapies in Medicine, 63 (1): 102784. DOI: 10.1016/j.ctim.2021.102784

Bajwa, S. and Haldar, R. (2015): Pain management following spinal surgeries: An appraisal of the available options , J Craniovert Jun Spine,; 6(3):105-10. DOI: 10.4103/0974-8237.161589

Barabady, A., Baghdassarians, A., Memary, E., Yazdani, A., Barabady, A., and Sayadi, S. (2020): Effect of Benson's Relaxation Technique on Propofol Consumption and Preoperative Anxiety of Patients Undergoing Cataract Surgery. Anesthesiology and Pain Medicine, 10(3). e100703.

Beck, A. and Steer, R. (1990): Manual for the Beck Anxiety Inventory. San Antonio, TX: Psychological Corporation.

Benson, H. (2000): The relaxation response, New York, NY: Harper Collins: 1-12.

El Tabl, M ., El Sisi, Y. , Al Emam, S. , Hussen, M. and Saif, D. (2020): Evaluating the outcome of classic laminectomy surgery alone versus laminectomy with fixation surgery in patients with lumbar canal stenosis regarding improvement of pain and function, Egyptian Journal of Neurosurgery, 35(19), retrieved from https:// doi. org/ 10. 1186/ s41984-020-00087-6 at 4/9/ 2021.

ELmetwaly, A., Shaaban, E. and Mohamed, E. (2020): Benson Relaxation Technique: Reducing Pain Intensity, Anxiety level and Improving Sleep Quality among Patients Undergoing Thoracic Surgery., Egyptian Journal of Health Care, 11 (4):602-606.

Elsamadicy, A., Adogwa,, O., Behrens,S., Sergesketter, A., Chen,A., Mehta, A., Vasquez, R., Cheng,J., Bagley,C. and Karikari, I. (2017): Impact of surgical approach on complication rates after elective spinal fusion (≥3 levels) for adult spine deformity, J Spine Surg. 2017 Mar; 3(1): 31–37, doi: 10.21037/jss.2017.03.09.

Grotle, M., Småstuen, MC., Fjeld O, Grøvle L, Helgeland J, Storheim K, Solberg TK and Zwart, J-A. (2019): Lumbar spine surgery across 15 years: trends, complications, and reoperations in a longitudinal observational study from Norway. BMJ Open.;9(8): e028743. DOI: 10.1136/bmjopen-2018-028743.

Grotle, M., Vøllestad, N. K., Veierød, M. B. and Brox, J. (2004): Fear-avoidance beliefs and distress in relation to disability in acute and chronic low back pain, Pain, 112 (3), pp.; 343-352.

Habibollahpour, M. , Ranjkesh, F. , Motalebi, S.A. and Mohammadi. F. (2019): The impact of Benson's relaxation technique on the quality of sleep in the elderly, Top Geriatr Rehabil., 35 (1) , pp. 88-94.

Hafez, A., Ashry,A. , Elsayed,A. El Tayeb , A. and ElShenawy, M. (2021): Incidence of Iatrogenic Lumbar Spinal Instability after Laminectomy, Discectomy or Facetectomy, Journal of Medical Sciences.; 9(B):588-592..

Harorani M, Davodabady F, Farahani Z, and Rafiei F. (2020): The effect of Benson's relaxation response on sleep quality and anorexia in cancer patients undergoing chemotherapy: a randomized controlled trial. Complement Ther Med.;50, 102344.

Hart, R., Cabalo A. and Bess, S. (2013): Comparison of patient and surgeon perceptions of adverse events after adult spinal deformity surgery, Spine; 38(9): 732-6. Available from: https://insights.ovid.com /crossref?an=00007632-201304200-00005 [http://dx.doi.org/10.1097/BRS.0b013e31827ae242] [PMID: 244770 53] , retrieved at 1/4/2022.

Heshmatifar, N, Sadeghi H., Mahdavi A., Shegarf ,MR. and Rakhshani, MH. (2015): The Effect of Benson Relaxation Technique on Depression in Patients Undergoing Hemodialysis. J Babol Univ Med Sci. ;17 (8):34 -40 .

Kurniasari, A. N., Kustanti, A., Harmilah, H. (2016): The Effect Benson Relaxation Technique with Anxiety in Hemodialysis Patients in Yogyakarta. Indonesian Journal of Nursing Practices, 1(1), 40-47. DOI: https://doi.org/10.18196/ijnp.v1i1.2685.

Lee, C. H., Liu, J. T., Lin, S. C., Hsu, T. Y., Lin, C. Y., and Lin, L. Y. (2018): Effects of Educational Intervention on State Anxiety and Pain in People Undergoing Spinal Surgery: A Randomized Controlled Trial. Pain Management Nursing, 19(2), 163-171. Retrieved from https:// doi. org/ 10. 1016/ j.pmn.2017.08.004 at 7/10/2021.

Lim, H. and Kim, B. (2019): Effects of a Standardized Care Protocol for Patients with Degenerative Spine Disease, The Open Nursing Journal,13(4):28-38.DOI: 10.2174/1874434601913010028, 13, 28-38.

Machin, D., Campbell, M., Tan, S.B., and Tan, S.H. (2018): Sample Sizes for Clinical, Laboratory and Epidemiology Studies,4th Edition. Wiley-Blackwell. Chichester, United Kingdom.

Maciejewski, M. (2020): Quasi-Experimental design. Biostatistics & Epidemiology; 4 (1): 38-47.

Malmir,M. Teimouri, F. Pishgooie, S. and Dabaghi, P. (2016): The Role of Benson´s relaxation on reducing state anxiety on candidate of open heart surgery patientS , Journal Of Military Caring Sciences , 2(3): 182-190, English version. DOI http://dx.doi.org/10.18869/acadpub.mcs.2.3.182.

Marrache, M, Harris, AB, Puvanesarajah, V, Raad M, Cohen, DB, Riley, LH, Neuman, BJ, Kebaish, KM, Jain A, and Skolasky , RL. (2021): Persistent sleep disturbance after spine surgery is associated with failure to achieve meaningful improvements in pain and health-related quality of life. Spine J. , Aug;21(8):1325-1331, doi: 10. 1016/ j.

spinee. 2021. 03.021. Epub 2021 Mar 25. PMID: 33774209.

Masry, S., Aldoushy, E., and Ahmed, N. (2017). Effect of Benson's Relaxation Technique on Night Pain and Sleep Quality among Adults and Elderly Patients Undergoing Joints Replacement Surgery. Int J Nurs Didactics, 7(4), 1-8.

Mohamed,S., Thabet , O. Sayed , Z. and Ragaa, D. (2021) : Effect of Foot Reflexology Massage versus Benson Relaxation Technique on Physiological Parameters and Pain after Open Heart Surgery , Egyptian Journal of Health Care, 12 (3) , 1737-1749.

Momen, R., Roshandel, M. and Pishgooie, S . (2018): The effect of Benson relaxation method on pain severity after laminectomy in admitted patients to AJA hospitals, English version, Military Caring Sciences (MCS),4 (3) :168-177 doi, 10.29252/mcs.4.3.168.

Mulder-Hajonides Van Der Meulen, W., Wijnberg, J., Hollander, J., De Diana, I. and Van Den Hoofdakker, R. (1981): Measurement of subjective sleep quality. In: Proceedings of the International European Sleep Congress. Elsevier, Amsterdam.

Pishgooieet, S., Akbari, F. , Shahrestanaki, S. , Rezaei, M. , Nasiri, M. and Momen, R. (2020): Effects of Relaxation Techniques on Acute Postlaminectomy Pain: A Three-Arm Randomized Controlled Clinical Trial, Journal of PeriAnesthesia Nursing, https://doi.org/10.1016/j.jopan.2020.02.004.

Poorolajal, J., Ashtarani,F., and Alimohammadi , N. (2017): Effect of Benson relaxation technique on the preoperative anxiety and hemodynamic status: A single blind randomized clinical trial, Artery Research 17:C, 33–38. DOI: https://doi.org/10.1016/j.artres.2017.01.002.

Priya. J.D., Kalariya M., Shobhana B., and Doss J.J. (2017): Effectiveness of Benson's Relaxation Therapy on Reduction of Pain among Post Caesarean Mothers Admitted in Shree Mehta Sarvajanic Hospital at UNA, Gir Somnath District. International Journal of Nursing Education and Research; 5(1): 30-32.

Rejeh N., Karimooi M., Vaismoradi M. and Jasper M. (2013). Effect of Systematic Relaxation Techniques on Anxiety and Pain in Older Patients Undergoing Abdominal Surgery. International Journal of Nursing Practices; 19(5):462-70.

Roozbahani, T., Nourian, M., Saatchi, K., and Moslemi, A. (2016). Effects of Progressive Muscle Relaxation on Sleep Quality in Pre-university Students: A Randomized Clinical Trial. Scientific Journal of Hamadan Nursing & Midwifery Faculty, 24(1), 16-23.

Seifi, L., NajafiGhezeljeh, T. and Haghani H. (2018): Comparison of the effects of Benson muscle relaxation and nature sounds on the fatigue in patients with heart failure: A randomized controlled clinical trial. Holist Nurs Pract.;32(1):27-34.

Tahmasbi, H., & Hasani, S. (2016). Effect of Benson's relaxation technique on the anxiety of patients undergoing coronary angiography: A randomized control trial. Journal of Nursing and Midwifery Sciences, 3(1), 8. Retrieved from https:// doi. org/ 10. 18869/ acadpub. jnms.3.1.8.

Teimori, F. Pishgooie, S. Malmir, M. & Rajai, N. (2019): The Effect of Benson Relaxation on the Physiological Symptoms in Patients undergoing Open Heart Surgery, Complementary Medicine Journal. 9(3):3812-3823. Retrieved from https:// doi. org/ 10. 32598/ cmja. 9. 3. 3812 at 5/9/2021.