The effects of neuro-linguistic programming and guided imagery on the pain and comfort after open-heart surgery

Article *in* Journal of Cardiac Surgery · March 2021

DOI: 10.1111/jocs.15505

CITATIONS
0

READS
81

2 authors:

Aysel Doğan
Toros Üniversitesi
2 PUBLICATIONS **0** CITATIONS
SEE PROFILE

Serdar Sarıtaş
Inonu University
20 PUBLICATIONS **64** CITATIONS
SEE PROFILE

Received: 14 November 2020 | Revised: 1 February 2021 | Accepted: 20 February 2021

DOI: 10.1111/jocs.15505

ORIGINAL ARTICLE

JOURNAL OF CARDIAC SURGERY WILEY

The effects of neuro-linguistic programming and guided imagery on the pain and comfort after open-heart surgery

Aysel Doğan PhD[1] | Serdar Saritaş PhD[2]

[1]Department of Nursing, Faculty of Health Sciences, Toros University, Mersin, Turkey

[2]Department of Surgical Nursing, Faculty of Nursing, Inonu University, Malatya, Turkey

Correspondence
Serdar Saritaş, PhD, Department of Surgical Nursing, Faculty of Nursing, Inonu University, Campus 44280, Malatya, Turkey.
Email: serdar.saritas@inonu.edu.tr

Abstract

Objective: The present study aims to evaluate the effects of neuro-linguistic programming (NLP) and guided imagery on postoperative pain and comfort after open-heart surgery.

Methods: In the current, prospective, randomized, single-blind clinical study, the participants received NLP with a new behavior formation technique or the guided imagery relaxation technique using an audio compact disc for a duration of 30 min.

Results: The patients in the NLP group had significantly lower posttest pain levels, compared to the patients in the guided imagery and control groups. Moreover, the patients in the guided imagery group had significantly higher posttest comfort levels, compared to the patients in the NLP and control groups.

Conclusion: The application of both NLP and guided imagery interventions resulted in reduced postoperative pain and increased postoperative comfort levels after open-heart surgery.

KEYWORDS

comfort, guided imagery, NLP, open-heart surgery, postoperative pain

1 | INTRODUCTION

Coronary artery disease is the leading cause of mortality across the world. Surgical procedures performed for the management of coronary artery diseases are important for the patients in terms of the quality and prolongation of life.[1,2] Consequently, cardiac surgery causes emotional, cognitive, and physiological reactions in patients.[1] Patients who undergo surgical procedures are concerned about the loss of employment, permanent disability, loss of control over their body, pain, loss of sexual ability, inability to emerge from anesthesia, and death.[2] Pain, which has existed since the beginning of human history, is an unavoidable part of life, similar to the activities like eating and drinking.[3] Previous studies have reported that postoperative pain is almost inevitable and most severe during the initial 48–72 h after cardiac surgery.[1] Every single incision placed on the human body causes pain. Hence, the postoperative process alone can be an adequate cause of pain. Postoperative incisional pain begins with surgical trauma, gradually declines, and ends with tissue healing.[1,4,5]

Among the members of a healthcare team, nurses spend the maximum time with patients. Consequently, they should offer guidance to the patients to aid in coping with pain using empathy skills and monitoring the treatment and outcomes.[4,5] Effective postoperative pain management may be implemented by adapting an individual-centered holistic care and a multidisciplinary team approach. Adoption of the holistic approach to pain management minimizes the postoperative discomfort.[6]

Ensuring or improving the patient's comfort is considered to be a function or outcome of the nursing process. Identifying the necessities for personal comfort, planning nursing interventions for the unmet needs, and evaluating pre- and post-intervention comfort levels are known as the scientific stages in the nursing process that uses the concept of comfort.[7,8] Nurses deliver professional care by effecting interventions to improve the comfort levels, encouraging the patients, and supporting their respective coping methods.[7,9] Kolcaba et al.[8] addressed the concept of comfort using three forms (relief, ease, and transcendence) and four dimensions (physical,

psychospiritual, environmental, and sociocultural).[7–10] Previous studies have reported that comfortable patients, as opposed to distressed ones, can express themselves and cope with disease-induced stress in a better manner, thereby accelerating the recovery process and facilitating rehabilitation, or experiencing a peaceful death in case of the patients under palliative care.[5] Individuals who are more comfortable will exhibit behaviors aimed at improving the health.[10]

Complementary medicine focuses on ensuring holistic mental, physical, and spiritual health and well-being.[11] Recent times have witnessed rapid advancements in the field of disease management. Owing to these developments, the interest in complementary and integrative medicine has increased, on account of a variety of reasons, such as having more control over treatment and taking responsibility in the treatment process.[3] Body–mind therapies, a type of complementary and integrative medicine that was the focus of the current study, are effective in aiding the patients to cope with pain by altering the sensory factors.[11] Previous studies on the aforementioned subject have revealed the effects of these methods on the process of coping with pain. In this regard, studies on the effects of relaxation, music, and their combination in reducing postoperative pain have reported that the application of a combination of these methods resulted in reduced pain.[8,11] NLP enables an individual to change the neural programming pertaining to any situation or emotional perception (addictions, phobias, pain) through various techniques.[12,13] In this aspect, NLP is similar to body–mind therapies.

The methods used in NLP, which is a cognitive technique, support the protection of personal integrity by coordinating the organization of thought, language, and behavior.[13] It is a concept that describes the techniques that can be used to achieve the desired behavioral change in a fast and effective manner and the application process that explains the methods of using these techniques. NLP techniques include framing and reframing, anchoring, creating new behavior, breaking apart, finding similarities, the linguistic structure of belief, revising values, belief control, faith chaining, and breaking negative anchors.[12,13]

Imagery is the process of coding, storing, and expressing information in the human brain.[14,15] Guided imagery (GI) is the mental experience of the physical healing process and is defined as a cognitive process that stimulates and uses information. This is achieved through five basic senses: touch, motion, hearing, smell, and taste.[14,16] Imagery allows patients to imagine themselves in a place where they feel relaxed, happy, peaceful, and safe; thus, distance themselves from the thoughts of day-to-day life.[14] The impact of dreaming on health was highlighted by Dr. Martin Rossman. Among the previous studies that assessed the effects of GI, five out of eight studies reported that GI was effective in reducing pain.[17]

Body–mind therapies are increasingly being used in the field of nursing and are effective in fighting against pain by altering sensory factors.[3] In this manner, NLP and GI bring about changes in the individual.[3,12,13] During an NLP intervention, the patient's medical history is elicited, and the words, body language, and glances used to describe the problematic events are analyzed, and the harmony among these factors is assessed, to comprehend the individual's feelings regarding the event and the actual effect of the events on the individual. Subsequently, the negative emotions are replaced with positive ones by utilizing the individual's submodalities and using a variety of techniques.[12,13]

Several previous studies have used GI for postoperative analgesia,[18,19] whereas NLP was employed in only one previous study.[20] Patients who undergo open-heart surgery experience intense pain that causes discomfort.[1] The present study aimed to evaluate the effects of NLP and GI on postoperative pain and comfort after open-heart surgery, thereby contributing to the discipline of nursing science, which aims to strengthen individual independence and improve community health.

1.1 | Research questions

Does the application of NLP after open-heart surgery affect the patients' pain?

Does the application of NLP after open-heart surgery affect the patients' comfort level?

Does GI practice after open-heart surgery affect the patients' pain?

Does GI practice after open-heart surgery affect the patients' comfort level?

2 | METHODS

2.1 | Research design

This was a prospective, randomized, single-blind clinical study. The present study was performed in a prospective, randomized, and controlled manner using the single-blind clinical trial model. The current research involved three groups of subjects, namely, the NLP, GI, and control groups.

2.2 | Participants

The current study involved the patients who were admitted to the cardiovascular surgery clinic of the Kahramanmaraş Necip Fazıl City Hospital and underwent open-heart surgery. During the time period from February 2017 to May 2018, a total of 220 patients underwent open-heart surgery.

The present research computed the sample size using the "G-power 3.1.9.2. software" ($\alpha = .05$, $1-\beta = .80$), and the minimum, required sample size was determined to be 132 subjects.[21] The patients were randomly assigned to three groups using the simple random sampling method, one of the probabilistic sampling methods, by means of the listing method and a table of random numbers. The present study included three groups, namely, the NLP, GI, control groups. Each group included 44 patients who satisfied the inclusion criteria.

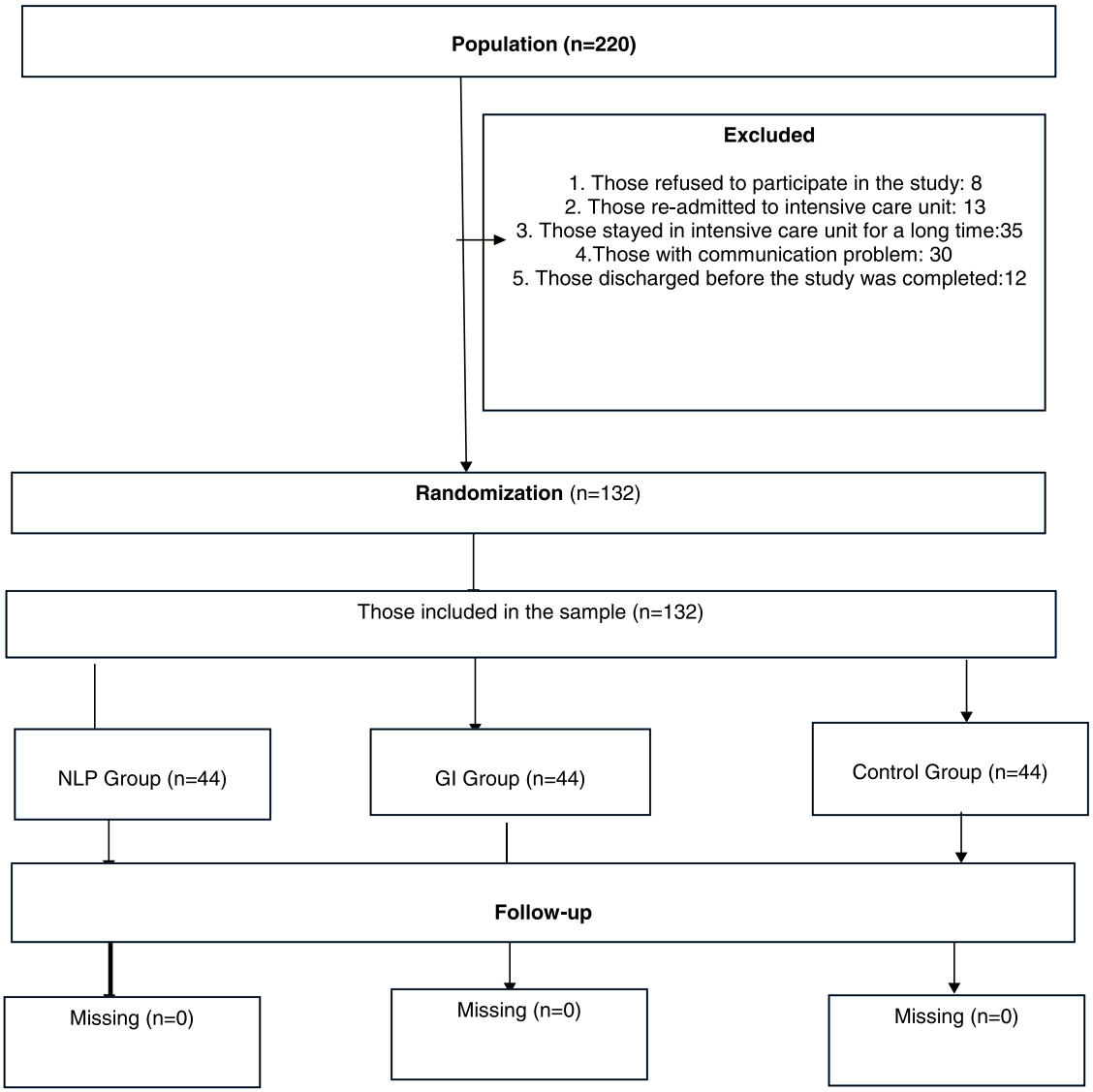

FIGURE 1 CONSORT diagram. GI, guided imagery; NLP, neuro-linguistic programming

The present study included the patients who were capable of verbal communication in Turkish, did not have any communication problems, psychiatric disorders, vision or hearing impairment, or prior history of NLP or GI interventions, and did not suffer from any painful health conditions or underlying health conditions that cause discomfort, except for surgery. The current study excluded the patients who wanted to withdraw from the research at any stage, stayed in the intensive care unit for a duration of more than 2 days, or displayed a deterioration in the general health condition, due to any reason, after the commencement of the study (Figure 1).

2.3 | Data collection tools

In the current study, data were collected using the Patient Demographics Form, Visual Analog Scale, and the General Comfort Questionnaire.

2.3.1 | Patient demographics form

The form comprised questions regarding the patients' age, sex, marital status, level of education, income level, disease, and analgesic usage. This form was developed by the authors after the review of relevant literature.[1,2,6,17,20]

2.3.2 | Visual Analog Scale (VAS)

The scale is comprised of a straight horizontal line with equal intervals and a fixed length of 10 cm, orientated from the left (no pain) to the right (unbearable pain), and employs facial expressions to evaluate the intensity of pain.[22] The validity and reliability of the scale was evaluated and reported by Cline in 1992, whereas the validity and reliability of the Turkish version was evaluated and reported by Aslan.[23]

2.3.3 | General Comfort Questionnaire (GCQ)

The questionnaire was developed by Kolcaba et al.[8] and the validity and reliability of the Turkish version were evaluated and reported by Kuğuoğlu and Karabacak.[24] It was developed on the basis of a taxonomic structure, which consisted of three levels and four dimensions constituting the theoretical elements of comfort. The questionnaire is used to ascertain the patients' needs and to evaluate whether the expected increase in comfort levels can be achieved through nursing interventions. This is a 48-item, four-point, Likert-type scale comprising both positive and negative items. Accordingly, a high score (four) indicates a high comfort level. The scores corresponding to the negative items are summed with those corresponding to the positive items by means of reverse coding. The highest and lowest total scores on the scale are 192 and 48, respectively. The total score obtained is divided by the number of items on the scale. Subsequently, the mean score is calculated and the resultant scores fall within the range of one to four, where the score of one implies a low level of comfort, and the score of four indicates a high level of comfort. In previous literature, Cronbach's α coefficient pertaining to the original scale was reported to be .88,[24] whereas in the current study, the coefficient was observed to be .69.

2.4 | Data collection

In the present study, the patients' personal information was obtained using the Patient Demographics Form, VAS was used to evaluate the pain levels, and GCQ was used to assess the comfort levels. The data were collected during the time period from September 2017 to May 2018. The duration of each session of data collection was approximately 25–30 min per patient. The face-to-face interview technique, performed by the researcher, was used for data collection. Subsequent to the transfer of the patients from the intensive care unit to the clinic, their clinical compliance was obtained and the most appropriate time (the time apart from the visit, treatment, and sleep hours) to perform the interventions, that is, between 14:00 p.m. and 17:00 p.m. on the second postoperative day, was selected by the researcher. Only the patient was allowed to stay in the room during the interventions. The present study employed the new behavior generation technique of NLP (Figure 1).

2.5 | Data evaluation

The Shapiro–Wilk test was used to test the normality of data. One-way analysis of variance (ANOVA) was used to compare the numerical data pertaining to more than two independent groups with regard to the normally distributed variables. The Kruskal–Wallis test and Dunn's multiple comparison test were used to analyze the variables with non-normal distribution. Among the post hoc multiple comparison tests, the LSD (least significant difference) test was used to compare the groups. Regarding the analysis of the data pertaining to the variables with non-normal distribution, the data obtained at two different times were compared using the Wilcoxon test, whereas Freidman and Dunn's multiple comparison tests were used to compare the data obtained through multiple sessions (more than two). Cronbach's α coefficients were calculated, to assess the validity and reliability of the scales. Data were evaluated using descriptive statistics including mean ± standard deviation with reference to the numerical variables, and frequencies and percentages with reference to the categorical variables. The SPSS Windows version 24.0 software was used to conduct the analyses, and $p < .05$ was considered to be statistically significant.

2.6 | Ethical considerations

Written permissions were obtained from the secretary-general of the Kahramanmaraş Public Hospitals Association (number: 24/07/17 55590723-000-1280) and the İnönü University Scientific Research and Publication Ethics Committee (number: 2017714-4), to conduct the study and collect data. Moreover, permission to use the General Comfort Questionnaire was obtained from Mrs. Karabacak via email. Verbal and written informed consents were obtained from all the participants before the intervention. The results of the present study were shared with the cardiovascular surgeons and clinical nurses.

3 | RESULTS

3.1 | Sociodemographic and individual characteristics of the patients

Table 1 shows the distribution of the patients on the basis of their descriptive characteristics. The mean age of the patients in the in the NLP, GI, and control groups were 62.27 ± 9.85, 61.52 ± 9.99, and 62.29 ± 10.22 years, respectively. Among the patients in the NLP group, 93.2% underwent coronary artery bypass graft (CABG) surgery, 55.4% were males, 93.2% were married, 43.2% were illiterate, 61.4% had a monthly income lower than their expenditures, 54.5% had undergone prior surgical procedures, and 72.7% used analgesics as a method of coping with pain. Among the patients in the GI group, 100% underwent CABG surgery, 52.3% were males, 81.8% were married, 47.7% were illiterate, 68.2% had a monthly income lower than their expenditures, 59.41% had undergone prior surgical procedures, and 63.6% used analgesics as a method of coping with pain. Among the patients in the control group, 93.2% underwent CABG surgery, 52.3% were males, 95.5% were married, 54.5% were illiterate, 52.3% had a monthly income lower than their expenditures, 54.4% had undergone prior surgical procedures, and 72.7% used analgesics as a method of coping with pain (Table 1).

3.2 | VAS scores pertaining to the patients

The present study evaluated the postoperative pain levels using the VAS, and the results are shown in Table 2. There was no

TABLE 1 Descriptive characteristics of patients

Control variable	NLP Group ($n = 44$)		GI Group ($n = 44$)		Control Group ($n = 44$)		Test and significance
Age	62.27 ± 9.85		61.52 ± 9.99		62.29 ± 10.22		$F = 0.080$ $p = .923$
	S	%	*S*	%	*S*	%	
Type of surgery							
CABG[a]	41	93.2	44	100	42	95.5	$\chi^2 = 3.42$
MVR[b]	2	4.5.	0	0.0	1	2.3	$p = .809$
AVR[c]	1	2.3	0	0.0	1	2.3	
Gender							
Female	20	45.5	21	47.7	23	52.3	$\chi^2 = 0.42$
Male	24	54.5	23	52.3	21	47.7	$p = .809$
Marital status							
Married	41	93.2	36	81.8	35	79.5	$\chi^2 = 3.11$
Single	3	6.8	8	18.2	9	20.5	$p = .540$
Education level							
Illiterate	19	43.2	21	47.7	24	54.5	$\chi^2 = 3.79$
Literate	14	31.8	13	29.5	9	20.5	$p = .704$
Primary education	9	20.5	7	15.9	6	13.6	
High school and above	2	4.5	3	6.8	5	11.4	
Income level							
Revenues equal to expenditures	16	36.4	11	25.0	21	47.7	$\chi^2 = 7.55$
Revenues lower than expenditures	27	61.4	30	68.2	23	52.3	$p = .110$
Revenues higher than expenditures	1	2.3	3	6.8	0	0	
Previous surgery							
Yes	24	54.5	18	40.9	20	45.5	$\chi^2 = 1.70$
No	20	45.5	26	59.1	24	54.5	$p = .427$
Pain Management Method							
Nothing	6	13.6	12	27.3	11	25.0	$\chi^2 = 6.15$
Massage	1	2.3	1	2.3	0	0.0	$p = .406$
Analgesic	32	72.7	28	63.6	32	72.7	
Other	5	11.4	3	6.8	1	2.3	

[a]Coronary artery bypass graft.
[b]Mitral valve replacement.
[c]Atrial valve replacement.

statistically significant difference among the groups with regard to the mean pre-test VAS scores ($p > .05$). However, the current study observed statistically significant differences among the groups with regard to the mean VAS scores obtained immediately after the intervention ($p < .05$). Further analysis by means of Dunn's multiple comparison test implied that the difference was attributable to the NLP group, in view of the fact that the NLP group had a significantly lower mean VAS score, compared to the GI and control groups.

The current study observed statistically significant differences among the groups with regard to the mean VAS scores obtained 72 h after the intervention ($p < .05$). Further analysis by means of Dunn's multiple comparison test implied that the difference was attributable to the NLP group, on account of the fact that the NLP group had a

TABLE 2 Comparison of patients' postoperative pre- and posttest pain mean and General Comfort Questionnaire scores

	NLP Group	GI Group	Control Group	Test and significance
Visual Analog Scale				
Before intervention	6.61 ± 2.28	6.64 ± 1.84	6.48 ± 2.19	$K_W = 0.39$[a]
				$p = .822$
Just after intervention	3.16 ± 2.48	4.36 ± 2.07	5.34 ± 2.19	$K_W = 17.49$[a]
				$p = .001$*
3 days after intervention	1.55 ± 1.78	2.45 ± 1.78	3.3 ± 1.89	$K_W = 19.44$[a]
				$p = .001$*
Test and significance	$\chi^2 = 76.07$[b]	$\chi^2 = 70.61$[b]	$\chi^2 = 59.92$[b]	
	$p = .001$*	**$p = .001$***	**$p = .001$***	
General Comfort Questionnaire				
Before intervention	3.28 ± 0.72	3.26 ± 0.84	3.28 ± 0.72	$K_W = 0.44$[a]
				$p = .80$*
3 days after intervention	3.42 ± 0.58	3.55 ± 0.45	3.41 ± 0.49	$K_W = 12.70$[a]
				$p = .002$*
Test and significance	$Z = -4.61$[c]	$Z = -5.78$	$Z = -5.27$[c]	
	$p = .001$*	**$p = .001$***	**$p = .001$***	

Abbreviations: GI, guided imagery; NLP, neuro-linguistic programming.
[a]Kruskal–Wallis test.
[b]Freidman test.
[c]Willcoxon test.
*Test significance $p < .005$.

significantly lower mean VAS score, compared to the GI and control groups.

3.3 | GCQ scores pertaining to the patients

The present study used the GCQ to evaluate the patients' comfort levels. The results are shown in Table 2. There was no statistically significant difference among the groups with regard to the mean pretest GCQ scores ($p > .05$). However, the current study observed statistically significant differences among the groups with regard to the mean GCQ scores obtained 72 h after the intervention ($p < .05$). Further analysis using Dunn's multiple comparison test implied that the difference was attributable to the GI group, as the GI group had a significantly higher mean GCQ score, compared to the NLP and control groups.

Advanced-level analysis of the VAS scores obtained immediately after the intervention revealed significant differences between the NLP and GI groups ($p = .013$), between the NLP and the control groups ($p = .001$), and between the GI and the control groups ($p = .044$). The current study observed significant differences between the NLP and GI groups ($p = .021$), between the NLP and control groups ($p = .001$), and between the GI and control groups ($p = .032$) with regard to the VAS scores obtained 72 h after the intervention. Moreover, the current study observed significant differences between the NLP and GI groups ($p = .002$) and between the GI and control groups ($p = .001$) with regard to the GCQ scores obtained 72 h after the intervention.

4 | DISCUSSION

The current study examined the effects of NLP and GI interventions on postoperative pain and comfort levels. Kukulski et al.[25] reported that the postoperative comfort and absence of pain were important factors associated with the attainment of an appropriate level of postoperative rehabilitation. Failure to provide adequate pain relief after cardiac surgery results in limited movements. Consequently, the patients might avoid breathing and coughing exercises. Thus, the risk of developing postoperative complications increases, and the perceived postoperative patient comfort decreases. Nurses are responsible for identifying and applying the most appropriate non-pharmacological method of intervention in the patients.[5,6]

The present study observed that the NLP and GI interventions reduced the postoperative pain perceived by the patients. Further analysis revealed that the NLP group experienced less pain,

compared to the GI and control groups ($p < .005$) (Table 2). Similarly, Bowers[26] reported that NLP was effective in the reduction of acute pain in chiropractic patients. Zaharia et al.[27] reported that NLP was effective in the treatment of ophidiophobia, claustrophobia, social phobia, posttraumatic stress disorder, anxiety, depression, insomnia, and pollen allergy. Furthermore, several studies pertaining to different fields support the results of the current study.[27,28]

In his paper on beliefs, values, and the vacuum of choice, Jemmer stated that pure experience has no meaning.[29] Modeling analyzes people who have managed to cope with emotional confusion. Reframing is implemented, to aid individuals to cope with emotional confusion successfully. NLP may be used to modify human representation systems and sub-modifications. Individuals who manage to modify their representation systems and sub-modifications can replace their old and useless restrictive behaviors with new and empowering ones.[12,13,29] The current study used a new behavioral technique developed by Bandler and Grinder (2014) and observed that the NLP group experienced less pain, compared to the other groups, owing to the NLP-induced changes regarding the perception of postoperative pain and comfort through the auditory, visual, and kinesthetic sensations (Table 2) ($p < .005$).

Coronary artery diseases are the leading cause of mortality worldwide. Surgical procedures performed for the management of coronary artery diseases are important for the patient in terms of the quality and prolongation of life.[1,2] Hence, cardiac surgery causes physiological, emotional, and cognitive reactions in patients.[2] Postoperative NLP interventions enable self-sufficient individuals to complete the postoperative process successfully by removing the useless thoughts from their minds. These interventions make the patients believe in achieving a goal by motivating them to exhibit relevant behaviors.[12,13,30] Sturt et al.[31] performed a systematic review on the impact of NLP on health outcomes and found little evidence regarding the positive effects of NLP interventions on health-related outcomes. The aforementioned authors reported that this conclusion was the result of the limited quantity and quality of the research on NLP, rather than the robust evidence of no effect.[30]

Although the present study observed that the GI intervention was effective in reducing postoperative pain, the effects were not tantamount to that of NLP ($p < .005$) (Table 2). Several previous studies support the aforementioned results.[19,26,30–35] The results confirmed our hypothesis, which is stated as follows: "GI intervention after open-heart surgery reduces postoperative pain." However, literature also includes studies that contradict the results of the present study.[36,37]

Previous studies have stated that nursing care is based on the patients' comfort, strengthening their bodies, and accelerating the recovery process.[4–40] Patients with poor comfort are weak; hence, they require strengthening, to heal.[40]

The present study did not observe any statistically significant difference between the groups with regard to the pre-test comfort levels ($p > .05$) (Table 2). However, the difference between the comfort levels measured 72 h after the intervention was observed to be statistically significant ($p < .05$) (Table 2). Further analysis with Dunn's multiple comparison test indicated that the difference was attributable to the GI group, as the GI group had a significantly higher mean GCQ score, compared to the NLP and control groups. In GI interventions, the patients are asked to relax, close their eyes, and imagine themselves in a place they like and are happy, to give up their problems, to feel rested, painless, and stronger, and thus, to have the power to do everything they want to achieve.[14–16] The current study observed that the GI intervention, which supported independent decision-making regarding their lives, increased the patients' general comfort level. Previous literature includes several studies on GI, which is one of the disciplines in complementary medicine, with positive results that support the results of the current study.[19,31–35,38,41] This result confirmed our hypothesis, which is stated as follows: "GI intervention after open-heart surgery increases postoperative comfort." Anxiety and pain, which are the physical and psychospiritual dimensions of the comfort theory,[9,10] are the most frequent constituents of scenarios wherein GI interventions are applied, yielding positive, statistically significant results supporting the use of GI in medicine.[41]

Oxman et al. (1995) reported that in older cardiac surgery patients, the lack of participation in social groups and the absence of strength and comfort from religion increased the probability of mortality within the 6-month after surgery by over threefold each, even after controlling for the history of previous surgery, presurgical functional impairment, and age.[42] In the current study, the rationale behind the phenomenon of improved comfort levels in the patients who received the GI intervention may be attributed to the fact that the intervention allowed them to have a sense of control over their own life, which could also be employed in their future. In fact, this is the mainstay of complementary medicine.[1,43,44]

4.1 | Limitations

As the present study involved patients who underwent cardiac surgery, the results can be generalized only in regard to this particular group of patients. The data were collected from the patients who underwent cardiac surgical procedures at a hospital affiliated with the Turkish Ministry of Health. Furthermore, in the current study, Cronbach's α value pertaining to the GCQ was observed to be .69. Accordingly, it is recommended that the validity and reliability of the GCQ with reference to the Turkish population should be evaluated by means of further studies using larger samples. Hence, the results of the current study have limited generalizability.

5 | CONCLUSIONS

Both the NLP and GI interventions were effective in reducing postoperative pain and increasing comfort levels after open-heart surgery. However, NLP was more effective in reducing postoperative pain, whereas GI yielded better results in relation to the improvement in postoperative comfort levels. Hence, healthcare providers

can easily apply both NLP and GI in postoperative patient care. These interventions do not require any equipment and are easy to apply. They evoke feelings of relaxation in patients, thereby facilitating patient participation. They are mind–body interventions that positively affect the standard care outcomes and support positive holistic care. However, the long-term outcomes of these techniques should be evaluated through further studies involving different areas of health care. NLP or GI were applied to the patients in the experimental groups without interfering with the prescribed treatment protocols and routine nursing care by following the clinical routines. Complementary therapies should not be considered as an alternative to pharmacological treatment, but should be used as supplements in combination with the pharmacological methods of treatment.

ACKNOWLEDGMENTS

We would like to thank the patients who consented to participate in the study.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

ORCID

Serdar Saritaş https://orcid.org/0000-0003-4076-9001

REFERENCES

1. Zubrzycki M, Liebold A, Skrabal C, et al. Assessment and pathophysiology of pain in cardiac surgery. *J Pain Res*. 2018;11(11):1599-1611.
2. Ertürk EB, Ünlü H. Effects of pre-operative individualized education on anxiety and pain severity in patients following open-heart surgery. *Int J Health Sci (Qassim)*. 2018;12(4):26-34.
3. Francis L, Fitzpatrick JJ. Postoperative pain: nurses' knowledge and patients' experiences. *Pain Manag Nurs*. 2013;14(4):351-357.
4. Aslan FE. Akutağrı/Akut pain. *Hemşirelikte Eğitim ve Araştırma Dergisi*. 2005;2:24-31.
5. Aslan FE, Badır A. Ağrı kontrol gerçeği: hemşirelerin ağrının doğası, değerlendirilmesi ve geçirilmesine ilişkin bilgi ve inançları. *Ağrı/Pain*. 2005;17:44-51.
6. Zengin S, Kabul S, Al B, Sarcan E, Doğan M, Yildirim C. Effects of music therapy on pain and anxiety undergoing port catheter placement procedure. *Complement Ther Med*. 2013;21:689-696.
7. Kolcaba K. A theory of holistic comfort for nursing. *J Adv Nurs*. 1994;19:1178-1184.
8. Kolcaba KY, Kolcaba RJ. An analysis of the concept of comfort. *J Adv Nurs*. 1991;16(11):1301-1310.
9. Wilson L, Kolcaba K. Practical intervention of comfort theory in the perianesthesia setting. *J Perianesth Nurs*. 2004;19(3):164-173.
10. Kolcaba K. *Comfort Theory and Practice a Vision for Holistic Health Care and Research*. New York: Springer Publishing Company; 2003.
11. Hansen MM. A feasibility pilot study on the use of complementary therapies delivered via mobile technologies on Icelandic surgical patients' reports of anxiety, pain, and self-efficacy in healing. *BMC Complement Altern Med*. 2015;15:92.
12. Bandler R, Grinder J. Using Your Brain: For a Change. Translate: Akınhay O. *NLP Değişim İçin Beyninizi Kullanın*. 5. Baskı. İstanbul: AlfaYayınları. 2014.
13. Bandler R, Grinder J. NLP Frogs turning into Princes. Translate: Akınhay O. Nöro-*Linguistik Programlama NLP Prenslere Dönüşen Kurbağalar*. 5. Baskı. İstanbul, Alfa Yayınları. 2014.
14. Rossman LM. Guided İmagery for Self-Healing. Translate: Göbekcin T. *İmgelemenin İyileştirici Gücü*. 1. Baskı. İzmir, Ege Meta Yayınları. 2004.
15. Owen DW. Spontaneous and guided imagery ın counseling: putting fantasy to work. *Türk Psikolojik Danışma ve Rehberlik Dergisi*. 2010;4(33):71-80.
16. Heinscel JA. A descriptive study of the interactive guided imagery experience. *J Holıst Nurs*. 2002;20(4):325-346.
17. Apostolo ALJ, Kolcaba K. The effects of guided imagery on comfort, depression, anxiety, and stress of psychiatric in patients with depressive disorders. *Arch Psychiatr Nurs*. 2009;23(6):403-411.
18. Tusek DL, Church JM, Strong SA, Grass JA, Fazio VW. Guided imagery a significant advance in the care of patients undergoing elective colorectal surgery. *Dis Colon Rektum*. 1997;40:172-178.
19. Felix MMS, Ferreira MBG, Cruz LF, Barbosa MH. Relaxation therapy with guided imagery for postoperative pain management: an integrative review. *Pain Manag Nurs*. 2019;20:3-9.
20. Miranda AFA, Silva LF, Caetano JÁ, Sousa AC, Almeida PC. Evaluation of pain intensity and vital signs in the cardiac surgery postoperative period. *Rev Esc Enferm USP*. 2011;45:327-333.
21. Faul F, Erdfelder E, Lang AG. G* Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods*. 2007;39:175-191.
22. Aslan FE. Ağrı değerlendirme yöntemleri. *C.Ü. Hemşirelik Yüksekokulu Dergisi*. 2002;6:9-16.
23. Aslan FE. Ameliyat sonrası ağrı değerlendirmesinde GKÖ ve basit tanımlayıcı ölçeklerin duyarlık ve seçiciliği. *Yoğun Bakım Hemşireliği Dergisi*. 2004;8(1):1-6.
24. Kuğuoğlu S, Karabacak Ü. Genel konfor ölçeğininTürkçe'ye uyarlanması. *i.Ü. F. N. Hem Derg*. 2008;16(11):16-23.
25. Kukulski L, Krawczyk A, Pacholewicz J. Retrospective analysis of the impact of sternum closure technique on postoperative comfort and rehabilitation. *Kardiochir Torakochirurgia Pol*. 2018;1(4):233-237.
26. Bowers LA. An exploration of holistic and nontraditional healing methods including research in the use of neuro-linguistic programming in the adjunctive treatment of acute pain. Dissertation Abstracts International 56(11-B), The Sciences and Engineering: 6379; 1996.
27. Zaharia C, Reiner M, Schuütz P. Evidence-based neuro linguistic psychotherapy: a meta-analysıs. *Psychiatr Danub*. 2015;27(4):355-363.
28. Bigley J, Griffiths PD, Prydderch A. Neurolinguistic programming used to reduce the need for anaesthesia in claustrophobic patients undergoing MRI. *Br J Radiol*. 2010;83(986):113-117.
29. Sahebalzamani M. Efficacy of neurolinguistic programming training on mental health in nursing and midwifery students. *Iran J Nurs Midwifery Res*. 2014;19(5):503-507.
30. Jemmer P. Beliefs, values and the vacuum of choice. *Eur J Clin Hypn*. 2006;6(4):16-21.
31. Sturt J, Ali S, Robertson W, et al. Neurolinguistic programming: a systematic review of the effects on health outcomes. *Br J Gen Pract*. 2012;62:757-764.
32. Vural F, Aslan FE. Koroner arter baypas greft uygulanan hastalarda düşleme ve müziğin iyileşme sürecine etkisi. *Turkiye Klinikleri J Nurs Sci*. 2014;6(1):26-37.
33. Forward JB, Greuter NE, Crisall SJ, Lester HF. Effect of structured touch and guided imagery for pain and anxiety in elective joint replacement patients—a randomized controlled trial: M-TIJRP. *Permanente J*. 2015;19:4-18.
34. Baird CL, Murawski MM, Wu J. Efficacy of guided imagery with relaxation for osteoarthritis symptoms and medication intake. *Pain Manag Nurs*. 2010;1(1):56-65.
35. Antall GF, D Kresevic D. The use of guided imagery to manage pain in an elderly orthopaedic population. *Orthop Nurs*. 2004;23(5):335-340.
36. Nelson K, Adamek M, Kleiber C. Relaxation training and postoperative music therapy for adolescents undergoing spinal fusion surgery. *Pain Manag Nurs*. 2017;18(1):16-23.

37. Menzies V, Taylor AG, Bourguignon C. Effects of guided imagery on outcomes of pain, functional status, and self-efficacy in persons diagnosed with fibromyalgia. *J Altern Complement Med*. 2006;12(1):23-30.
38. Posadzki P, Lewandowski W, Terry R, Ernst E, Stearns A. Guided imagery for non-musculoskeletal pain: a systematic review of randomized clinical trials. *J Pain Symptom Manag*. 2012;44(1):95-104.
39. Danhauer SC, Marler B, Rutherford CA, et al. Music or guided imagery for women undergoing colposcopy: a randomized controlled study of effects on anxiety, perceived pain, and patient satisfaction. *J Low Genit Tract Dis*. 2007;11(1):39-45.
40. Williams AM, Irurita VF. Emotional comfort: the patient's perspective of a therapeutic context. *Int J Nurs Stud*. 2006;43:405-415.
41. Büyükünal PŞ, Rızalar S. Ameliyat geçiren hastalarda konfor düzeyi ve etkileyen faktörler. *HSP*. 2018;5(3):404-413.
42. Blackburn LM, Abel S, Green L, Johnson K, Panda S. The use of comfort kits to optimize adult cancer pain management. *Pain Manag Nurs*. 2019;20:25-31.
43. Oxman TE, Freeman DH, Manheimer ED. Lack of social participation or religious strength and comfort as risk factors for death after cardiac surgery in the elderly. *Psychosom Med*. 1995;57(5):5-15.
44. Alam M, Roongpisuthipong W, Kim NA, et al. Utility of recorded guided imagery and relaxing music in reducing patient pain and anxiety, and surgeon anxiety, during cutaneous surgical procedures: a single-blinded randomized controlled trial. *J Am Acad Dermatol*. 2016;75:585-589.

How to cite this article: Doğan A, Saritaş S. The effects of neuro-linguistic programming and guided imagery on the pain and comfort after open-heart surgery. *J Card Surg*. 2021;1-9. https://doi.org/10.1111/jocs.15505