

The Effect of Respiratory Exercises on Pain and Anxiety in patients with Chest Trauma

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ABSTRACT

Background: Trauma is the fourth leading cause of death in the world and the second leading cause of death in Iran. Most patients with this diagnosis also suffer from chest trauma. Therapeutic goals in patients with chest trauma often include airways maintenance, oxygen therapy, and pain and anxiety management.

Aim: To determine the effect of respiratory exercises on pain and anxiety in patients with chest trauma referred to Imam Khomeini Hospital of Ilam, Iran in 2019.

Methods: This was an educational-interventional study on patients with chest trauma. Data was collected using a questionnaire addressing patients' demographic characteristics, the VAS scale for pain measurement, and the Spielberger Anxiety Inventory (STAI-Y). Education consisted of 3 phases including face to face training, as well as practical trainings with and without the presence of a nurse. Data was analyzed by SPSS 20 software.

Results: Males and females constituted 46 (67.6%) and 22 (32.4%) patients, respectively. Mean pain scores were 3.49 before and 2.33 after educations which showed statistically significant reduction. Anxiety scores were 54.5 and 47.59 before and after training, respectively showing a statistically significant difference.

Conclusion: The results of this study showed that training respiratory exercises significantly reduced pain and anxiety in chest trauma patients.

Keywords: Trauma, Pain, Anxiety, Education

INTRODUCTION

Trauma is the fourth leading cause of death in the world (killing 5 million people annually) and the second leading cause of death in Iran. Many traumatic patients suffer from chest trauma. Therapeutic goals for chest trauma include airway maintenance, oxygen therapy, and pain and anxiety management¹. Pain and anxiety are the most common psychological reactions to stress and are commonly experienced by all people throughout their lives². According to the Pain International Association, pain is an unpleasant feeling and emotional experience associated with tissue damage varying by the severity, perception, quality, location, duration, and the condition being acute or chronic³. Pain is the most important factor compelling patients to seek health care⁴, and pain relief is cited as one of the important nursing responsibilities by the International Society of Nurses⁵.

Therefore, given the high prevalence of anxiety and its negative impact on the quality of life and treatment process of patients, respiratory exercises can be low-cost and easily accessible alternatives for non-pharmacological drugs to control anxiety^{6,7}. At the same time, respiratory exercises increase and improve ventilation, prevent secretion and atelectasis, increase the strength and coordination of the respiratory muscles (especially those responsible for the inhalation), and regulate respiratory patterns and effective coughing⁸. Respiratory exercises include specific trainings to improve breathing patterns and maximize the output of existing respiratory function⁹. These exercises which are included in most pulmonary rehabilitation programs aim to enhance the effectiveness of treatment, control symptoms, and improve the patient's

practical pulmonary capacity¹⁰. Acute or chronic partial obstruction of airways often leads to ineffective breathing habits, and respiratory exercise is the most important method to minimize this disturbance¹¹.

Nurses can play an important role in educating patients providing them with specific services such as respiratory training, physical assistance in performing the exercises and Respiratory exercises and ergotherapy in energy storage methods during daily activities¹². The high costs of rehabilitation, dispersal of provider centers, inaccessibility, mobility limitations of patients, and difficulties in communications restrict patients to follow-up the rehabilitation programs and respiratory exercises (13). In most studies, respiratory exercises have been performed with varying qualities and quantities. Also, in most of these studies, the effects of combinational respiratory exercises (using motivational spirometry, effective coughing, and deep breathing) have been assessed on improving patients' respiratory function and decreasing pulmonary complications. The aim of this study was to determine the effect of respiratory exercises on pain and anxiety in patients with chest trauma referred to Imam Khomeini Hospital of Ilam, Iran.

METHODS

Study design: The study population consisted of patients with chest trauma referred to Imam Khomeini Hospital of Ilam. Sample size was calculated as 68 subjects who were chosen by simple random sampling from accessible patients.

Inclusion criteria: These included patient's willingness to participate, not being diagnosed with lung contusion,

hemothorax, and pneumothorax (less than 20%) needing chest tube, being admitted to the general or surgical wards of the hospital, age of 20 to 65 years, less than three fractures in ribs (excluding the floating rib), presenting with chest pain, and finally being conscious.

Exclusion criteria: Exclusion criteria were deterioration of patient's condition during the study, history of chronic respiratory diseases (asthma, COPD, lung fibrosis, etc.), history of taking benzodiazepines, and multiple traumas including fractures or injuries in other body parts.

Data collection tools: Data collection tool was a three-part questionnaire. The first part addressed demographic characteristics including age, sex, residency, education, occupation, marital status, history of pulmonary diseases, addiction, and history of smoking.

The second part included standard VAS scale to measure pain. This scale includes a 10-cm gradient line in which zero means no pain, and 10 represents the most severe pain. The patients marked their scores from one to ten. The validity and reliability of this tool have been proven in various studies¹⁴.

The third part was the standard Spielberger Anxiety Inventory (revised STAI-Y form with 40 questions). The first 20 questions assessed evident anxiety with four options (never, sometimes, generally, often), the second 20 questions (i.e. 21 to 40) determined latent anxiety with four options (almost never, sometimes, most often, and almost always). The scoring was inverted for expressions representing no anxiety. The scores of either evident or latent anxiety ranged between 20 and 80. The scores of 20-31, 31-42, 43-53, 54-64, 65-75, and >76 indicated mild, mild-moderate, moderate-severe, relatively severe, severe, and very severe anxieties, respectively. The validity and reliability of the questionnaire have been confirmed in several studies^{15,16}.

The content validity of the questionnaires was evaluated with the participation of 10 experts, and its reliability delivered a Cronbach's alpha coefficient of 86.6%. **Intervention:** After obtaining the approval of Ethics Committee of Ilam University of Medical Sciences (code: Ir.medilam.rec.1397.157) and getting permission from the respective hospital wards, the researcher interviewed patients. The subjects were chosen by simple random sampling among those meeting inclusion criteria. Written informed consent was obtained from the participants.

A pre/post-test design was used for this educational interventional study. Respiratory exercises included motivational spirometry, effective coughing and deep breathing. The questionnaires were first administered to the patients before training. Then the intended respiratory exercises were educated by face to face training and thereafter with pamphlets. The exercises were performed in three steps under the researcher's guidance.

First: respiratory exercises were educated by face to face training for 10 minutes under the guidance of the researcher. Second: breathing program (proper abdominal respiration, breathing speed, body posture, and abdominal

muscle contraction and relaxation) were educated through pamphlets. Afterwards, the patients were instructed to take a deep breath under the researcher's supervision.

Third: the patients practically performed respiratory exercises under the supervision of the researcher for 30 minutes. At the end of the intervention and performing the exercises by the patients, the questionnaires were completed again.

Data analysis: Mean and standard deviation were used to describe quantitative variables, and frequency and percentage were used to describe qualitative variables. T-test, one-way ANOVA, regression, and correlation (Pearson) were used to analyze the relationships between the variables. All statistical procedures were performed in SPSS 20. The significance level was $P < 0.05$.

RESULTS

The participants' demographic information has been presented in Table 1.

Table 2 shows the anxiety and pain scores before and after trainings. Pain scores were 3.49 and 2.33 before and after respiratory exercises, respectively ($P < 0.05$). The latent anxiety scores were 54.49 and 52.76 before and after the intervention, respectively. The score of evident anxiety reduced from 47.59 at pre-intervention to 45.44 at post-intervention ($P < 0.05$).

Table 3 shows the results of Pearson correlation between pain/anxiety scores and participants' demographic characteristics. There was a strong correlation between latent anxiety and overt anxiety while there was no significant relationship between pain score and age. There were moderate correlations between pain and evident and latent anxieties. There was also a strong correlation between latent and overt anxiety and gender. Furthermore, pain score was strongly correlated with occupation.

Table 1. Demographic features of study participants

Variables	Groups	Frequency	Percent
Age	20-30	13	19/1
	31-40	19	27/9
	41-50	18	26/6
	51-60	12	17/6
	61-65	6	8/8
Occupation	Employed	40	58/8
	Unemployed	14	19/9
	Housewife	14	21/3
Gender	Male	46	67/6
	Female	22	32/4

Table 2: The mean scores of pain, latent and overt anxiety before and after training

Variables	Mean ± SD	
	Pre-education	Post-education
Pain	3/492 ± 0/841	2/33 ± 0/700
Latent anxiety	54/49 ± 9/25	52/76 ± 7/336
Overt anxiety	47/59 ± 7/45	45/44 ± 7/88

Table 3. The results of Pearson correlation between pain, overt and latent anxieties and demographic variables

Variables Pearson correlation	Gender	Occupation	Overt anxiety	Latent anxiety	Pain
Pain	0.252	0.810	0.368	0.458	1
Latent anxiety	0.910	0.351	0.765	1	0.368
Overt anxiety	0.864	0.195	1	0.765	0.458

Table 4. How Interpretation of Pearson correlations between variables in table 3

Pearson correlation coefficient (the extent of correlation)	Interpretation
Very strong	1-0.8
Strong	0.8-0.6
Moderate	0.6-0.4
Weak	0.4-0.2
Negligible or no correlation	0.2-0

DISCUSSION

The aim of this study was to determine the effect of respiratory exercises on pain and anxiety in patients with chest trauma referred to Imam Khomeini Hospital of Ilam, Iran. Similar studies on this issue are infrequent, and most studies have been either reviews or conducted on the quality of health cares, Yoga and exercise therapies.

The present study showed that appropriate respiratory exercises can significantly reduce pain, latent and overt anxieties in patients with chest trauma. The results of various studies have also shown the positive effects of respiratory exercises in alleviating acute and chronic pain in patients undergoing various health care procedures.

In a study by Mohan et al (2016), the effects of respiratory exercises and strategic breathing education on pain were investigated in patients with neck pain. This approach improved respiratory muscle endurance and reduced the pain¹⁷. In line, the results of the present study demonstrated the beneficial effects of respiratory exercises on chest pain.

In the study of Alvandi et al (2019), respiratory exercises significantly reduced pain and disability in women with chronic neck pain (18), which is in agreement with the findings of the present study.

Also Zunhammer et al. (2013) in their study evaluated the effect of deep breathing technique on pain and concluded that deep and slow breathing reduced pain through stimulating parasympathetic system in patients with chronic pain¹⁹.

In another study by Park et al. (2013), the findings showed that respiratory relaxation technique reduced pain during burn bandage replacement²⁰.

Aghdami et al (2008) in their study assessed the effect of mind distraction on pain and anxiety in pre-school children and showed that there was a significant relationship between sensitivity and tolerance to pain. In this regard, anxiety was shown to lower pain threshold making anxious individuals to feel more pain²¹. Therefore, respiratory exercises can be used as a mind distraction tool to reduce pain and anxiety which is consistent with our findings.

In the study of Rickard et al. (2015) who used respiratory techniques to improve health care outcomes, the results showed that respiratory techniques can be beneficial in a variety of conditions such as anxiety, stress, pain, diabetes, sympathetic nervous system disorders, esophageal reflux, and hypertension²².

Also, a review by Stanley et al. (2011) showed that complete respiratory technique improved health, quality of

life, anxiety, fatigue, insomnia and pain in hemodialysis patients²³.

Khakha et al (2015) studied the effects of muscle relaxation and deep breathing exercises on reducing anxiety and improving sleep quality in elderly patients admitted to intensive care units from June 2013 to December 2013. The results showed that deep relaxation and breathing exercises were effective in decreasing anxiety and psychological distress, as well as improving sleep quality in elderly patients.

Our results showed that proper respiratory exercises can significantly reduce the pain as well as latent and overt anxieties in patients with chest trauma. Therefore, it is recommended to utilize respiratory exercises in these patients.

From limitations of this study were cultural, social, and psychological differences among the traumatic patients that may have affected the severity of patients' anxiety symptoms. Patients who were illiterate were not included in this study limiting the generalizability of the findings. On the other hand, considering different cultures and moods of people in different geographical climates, further studies are recommended to ascertain the impacts of different geographic climates on the effectiveness of these exercises. Because of the time limitation of nurses for educating patients, it is recommended to apply combinations of face-to-face (generally for explaining primary and basic principles) and pamphlet trainings by properly educated nurses for educating the patient and their companions.

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