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The effect of Hugo point acupressure massage on respiratory volume and pain intensity due to deep breathing in patients with chest tube after chest surgeries

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ABSTRACT

Introduction: Hugo point is the most important pain control point in the body, so the study was performed to determine the effect of Hugo point massage on respiratory volume and the pain intensity after chest tube placement.

Materials and methods: The study was performed as a randomized crossover clinical trial on 61 patients with a chest tube. Patients were placed in every 2 h through the ternary permutation block once under a false point pressure, once under a Hugo point pressure, and once without intervention. Data were collected using a questionnaire of demographic, clinical information, the Numerical Pain Rating Scale, and spirometry. Analysis of variance with repeated measures was used to analyze the data.

Findings: There was no significant difference in the pain intensity before and during the intervention between the three groups. However, after the intervention, the mean pain intensity in the control group was higher than the Hugo and placebo groups ($P < 0.001$), and the mean pain intensity in the placebo group was higher than in the Hugo group ($P < 0.001$). There was no significant difference between the three groups in terms of the rate of ascent and retention time of spirometry ball the three times before, during, and after the intervention.

Conclusion: Hugo point massage reduces the pain intensity; however, has no significant effect on their respiratory volume. Hugo point massage is recommended to reduce the severity of pain in patients with chest tube.

1. Introduction

Chest injuries are fatal due to complications such as hemothorax and pneumothorax. Eighty-five percent of patients with chest trauma can be treated with a tubular tracheotomy [1]. Many patients who undergo chest surgery will need a postoperative chest tube. The chest tube can prevent severe pulmonary complications. This device usually comes out within 24–48 h after surgery [2,3]. The presence of a chest tube is vital for patients [2] however, patients are often unable to breathe deeply due to pain at the site of chest surgery [4], therefore patients with chest tube are at risk for atelectasis. Atelectasis is one of the most common complications of lung surgery after chest surgery, which reduces the functional capacity of the lungs [5]. Coughing and deep breathing can aggravate pain in these patients [4]. The exacerbation of pain also causes more fear and anxiety in the patient [6].

Pain relief is one of the oldest human needs and has the highest priority in nursing care [7]. The International Assembly of Nurses mentions pain relief as one of the responsibilities of nursing [8]. Proper

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pain management can improve the disease and the quality of life after surgery. On the other hand, uncontrolled pain can cause chronic pain after surgery [9]. One of the most common methods of postoperative pain control is analgesic, but due to its side effects, complementary medicine is recommended [10].

Acupressure is one of the oldest methods of complementary medicine. This method is without the use of drugs. It is cheap, safe, and hassle-free [11]. Acupuncture is one of the branches of complementary medicine in which hand or finger pressure is used instead of a needle [12] and it works based on acupuncture points [13]. According to traditional Chinese medicine, the body's vital energy, called "chi", flows through channels called meridians. When this energy is blocked, it causes problems such as pain. Massage of certain parts of the body can be used to balance this energy in the body. Hugo Point is one of the points that lead to energy balance and pain relief. Hugo is one of the pressure points of the colon energy channel called the large intestine 4 (LI4) and is located between the first and second metacarpal bones (between the thumb and forefinger) [14].

Spirometry is required to improve pulmonary function in gas exchange and oxygenation however, most patients are not able to breathe deeply because of pain at the site of chest surgery. Various studies have been performed on the effectiveness of Hugo point acupressure to reduce pain [15–17]. Due to the lack of a study of the effect of Hugo pressure on the chest tube pain, we conducted a study to determine the effect of Hugo massage on the respiratory volume and the pain intensity in patients with the chest tube.

2. Method

This study was performed as a randomized cross-sectional clinical trial on 61 patients with chest tube after chest surgery in 2021 in the surgical ward.

$$n = \frac{(t_{n-1,\alpha/2} + t_{n-1,\beta})^2}{d^2}$$

Eligible patients were randomly assigned every 3 h, into three groups, false point, Hugo point, and control group respectively.

Inclusion criteria included the presence of at least one chest tube after chest surgery, age 18–65 years, consciousness, absenceof respiratory diseases such as COPD, lung cancer, fracture, wound, previous incision, and scratch at acupressure point, no history of acupressure, mental disorders, use of psychiatric drugs, and any local neuromuscular blocking. Exclusion criteria included the patient's unwillingness to cooperate, receiving painkillers, and worsening of respiratory status during the study. After identifying the eligible patients, the study plan and objectives were explained to them and all participants signed written consent. They were informed that if they wished to take painkillers during the study, they could take their painkillers as directed by

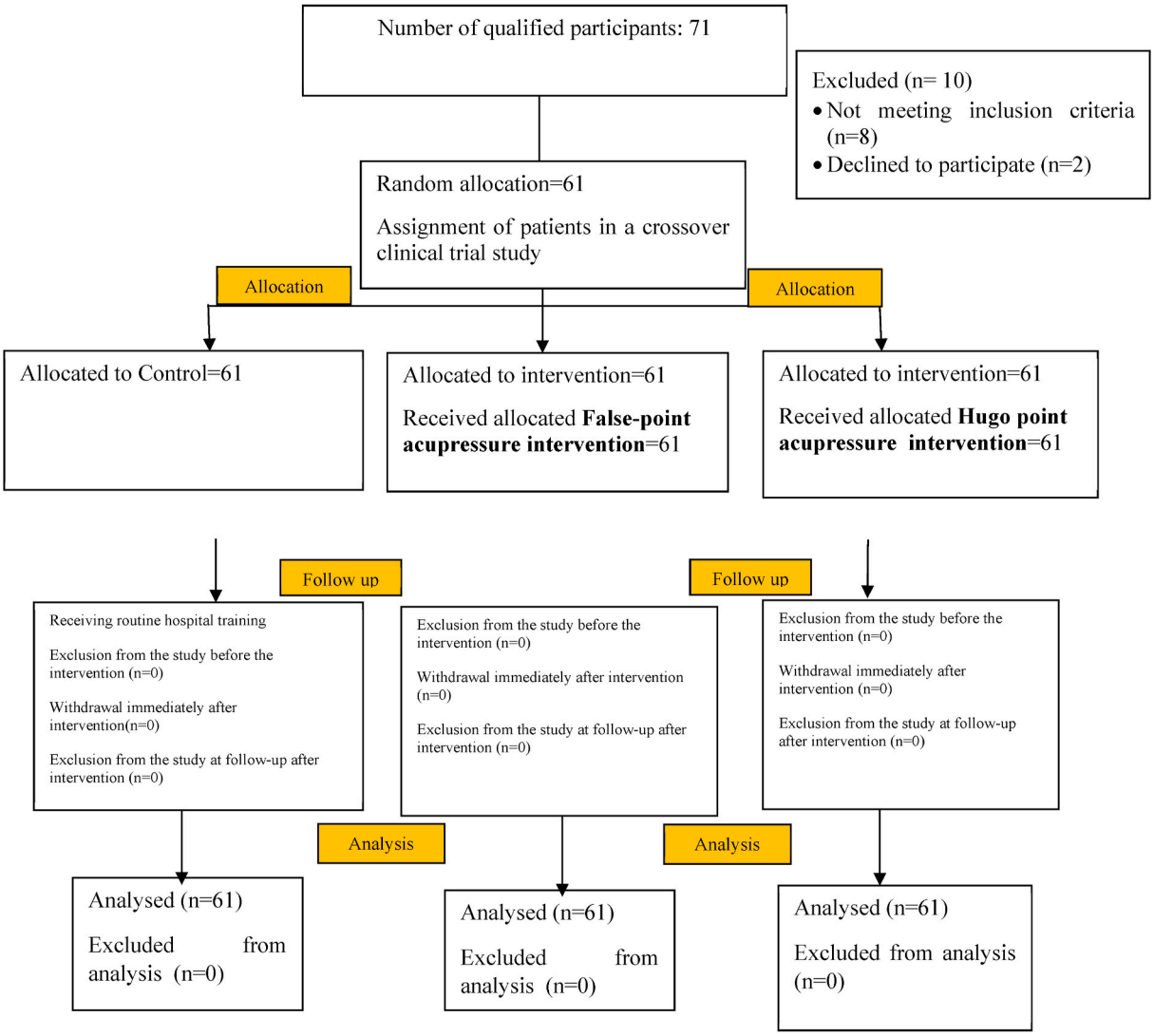

Fig. 1. CONSORT **2010 flow diagram.**

their doctor, and this study did not create any barriers to the patient receiving painkillers. Patients were selected and randomly entered into each of the study groups. Group A (acupressure on Hugo point), group B (acupressure on false point), and group C (control) (Fig. 1). Randomization was performed using a triple permutation block.

The data collection tools are as follows:

1. Demographic information questionnaire including age, gender, marital status, education, and occupation of patients, which was developed based on the studies of Khatiban et al. [18,19]. This questionnaire was completed at the beginning of the study by patients.
2. The disease information questionnaire included history of chest surgery, chest tube, location of chest tube, presence of drain in other parts of the body, previous disease, cause of chest tube insertion, length of hospital stay and chest tube size. This questionnaire is based on previous studies [18,19].
3. The Numbering Rating Scale (NRS) was used to assess pain. The criterion for pain intensity is a number between zero and 10. Its validity and reliability have been confirmed [20]. Patients were instructed to rate their chest pain following deep breathing by motivational spirometry from zero (no pain) to 10 (most severe pain).
4. A checklist for recording patients' respiratory volume has been prepared based on the speed of ascent and the holding time of the spirometric ball. This checklist was before, during and after each study procedure. The checklist was completed by a study researcher and a trained nurse during motivational spirometry. Comparison of respiratory volume and recorded time of the two assessors did not show a significant difference. All patients were under routine care and training. At the beginning of the study, the patient received the necessary training for spirometry. Patients were asked to report any dizziness. The patient was taught how to use a spirometer.

Patients rated their pain on exhalation using the NRS scale. Before intervention, the researcher also recorded the amount of respiratory volume based on the rate of ball rise and the duration of ball stay as the first time measurement (T0). This step was performed without considering the assigned group. After 5 min of normal breathing,the following was performed:

1. Group A: Hugo point acupressure: After finding the Hugo spot, between the first and second metacarpals and in the skin membrane of the hand between the index finger and thumb, a gentle acupressure massage was performed for 30 s and gradually increased the pressure for 30 s until the client felt tingling, numbness, heaviness and stretching around the area, then the thumb was held in position for 1 min, after which the acupressure was gradually reduced for 30 s, and finally the point was released within 30 s, then 2 min of rest. This process took 5 min. In total, three alternating 5-min periods were performed for about 20 min [21]. The patient was immediately asked to perform motivational spirometry using the NRS scale to rate his or her pain during it. The researcher also recorded the amount of respiratory volume and pause time as a measure immediately after the intervention (T1). Finally, after 5 min, the patient was asked to perform motivational spirometry and rate his pain during it. The researcher also recorded the amount of respiratory volume and pause time as a measure of follow-up after the intervention (T2).
2. Group B: Acupressure on the false point: All cases were performed as in group A, except that the massage was given at a point outside the Hugo point. In this method, a false point massage was performed on the wrist at a point just above Hugo's point.
3. Group C: In the control group: All cases were performed as in group A, with the difference that no acupressure was performed for the patient.

Thus, respiratory volume and the pain intensity caused by respiration were recorded by the researcher for all patients by expiratory motivational spirometry before, during, and after the intervention.

Finally, the collected data were entered into SPSS-20 software to analyze the data, descriptive statistics of mean and standard deviation for quantitative and frequency data, and percentage for qualitative data. Analysis of variance with repeated measures (Repeated Measures ANOVA) was used to compare the three groups at different times.

The study was based on the dissertation of Master's degree in Nursing, approved by the ethics committee in research with the number 9906043483, IR.UMSHA.REC.1398.1055, and was registered in the Center Clinical Trial with the identifier IRCT20121114011469N4.

3. Findings

The results showed that the mean age of the patients was 38.2 ± 6.6 years, the mean size of a chest tube was 32.2 ± 3.9 inches. Patients were hospitalized for an average of 2.3 ± 1.9 days. Other variables are listed in Tables 1 and 2

The results of repeated measures analysis of variance showed that there was no significant difference in terms of mean pain intensity at the time before the intervention ($P = 0.168$) and after the intervention ($P = 0.111$) between the three methods, however at follow-up after the intervention, there was a statistically significant difference between the mean pain intensity in the three methods of acupressure on Hugo point (4.9 8 ± 0.8), pressure on false point (6.5 ± 0.5) and control (7.6 ± 0.7) ($P < 0.001$). According to Bonferroni post hoc test, at the time of follow-up after the intervention, the mean pain intensity of patients in the Hugo point massage method and the false point massage method was significantly lower than the control group ($P < 0.001$). Also, the mean pain intensity in patients of the false point massage group was higher than patients in the Hugo point massage group ($P < 0.001$). Comparison of the trend of changes in each group during different times showed that only in the intervention group and the placebo group the mean pain intensity at different times was significantly different from each other and this trend was decreasing. According to the results of Bonferroni post hoc test, the mean pain intensity at follow-up after the intervention was significantly lower than before and immediately after the intervention ($P < 0.001$), but there was no significant difference between pain intensity at the time before and immediately after the intervention ($P = 1$). In the control group, the mean pain intensity at different times was not significantly different ($P = 0.624$). Comparison between the three methods in the three times of pain intensity measurement showed that there was a statistically significant difference between the three methods during the study ($P < 0.001$). In all three stages, the mean pain intensity in patients in the intervention and placebo groups was lower than the control group ($P < 0.001$) and in the intervention group was significantly lower than the placebo group ($P < 0.001$) (Table 3). In

Table 1
Characteristics of demographic information of patients with chest tube under study (n = 61 people).

Variable		n(%)
Age	21–35	(32.8)20
	36–45	29(45.7)
	46–55	(19.7)12
Gender	Male	(90.2)55
	Female	6(9.8)
Marital Status	Single, Divorced	(63.9)39
	Married	(36.1)22
Education	High school	18 (29.5)
	Diploma	32(52.5)
	Academic	11 (18.0)
Job	Workless	17(27.9)
	Freelance	28 (45.9)
	Employee	(21.3) 13
	Retired	3 (4.9)

Table 2
Characteristics of clinical information of patients with chest tube under study (n = 61 people).

History of chest surgery	**yes**	**13.1) 8)**
	No	53(86.9)
Have a history of chest tube	yes	3(4.9)
	No	58(95.1)
Chest tube location	Right	39(63.9)
	Left	14(22.9)
	Both sides	8(13.2)
History of the previous disease	yes	9(14.7)
	No	52(85.3)
The cause of chest tube	Hemothorax	(58.2)
	Pneumothorax	8(13.1)
	Pyothorax	15(24.6)
	Hydrothorax	24(39.3)
	Chylothorax	9(14.7)
Day of hospitalization	5–1	16.4(10)
	10–6	50.8(31)
	15–11	(29.5)18
	16–20	(3.3)2
Chest tube size (inches)	25-29 Inches	(26.2)16
	30-35 Inches	(45.9)28
	36-40 Inches	(27.9)17

other words, Hugo point massage leads to a reduction in pain intensity in patients With chest tube after chest surgery (Fig. 2).

The results of analysis of variance with repeated measures showed that in terms of mean, the increase of spirometry ball (in terms of cubic millimeters) in the three times before (P = 0.643), during (P = 0.704), and after the intervention (P = 0.956) was no statistically significant difference between the three groups. In other words, Hugo point acupressure massage did not have a significant effect on increasing patients' respiratory volume at the time immediately and follow-up after the intervention. The results of analysis of variance with repeated measures to examine the trend of changes in each method during different times showed that the average increase in spirometry ball (in cubic millimeters) in the Hugo point massage method (P = 0.311), false point massage (P = 0.630) and control (P = 0.474) did not have a statistically significant difference during the three times. Therefore, Hugo point acupressure massage has no effect on respiratory volume in the studied patients (Table 4).

The results of analysis of variance with repeated measures showed that in terms of Spirometric ball pause at the highest volume(in seconds) in the three times before (P = 0.250), immediately after the intervention (P = 0.279), and follow-up after the intervention (P = 0.768), there was no statistically significant difference between the three methods (Hugo point massage, False point massage, No massage (control)). In other words, Hugo point massage did not have a significant effect on increasing the pause in the highest respiratory volume of patients. The results of analysis of variance with repeated measures to examine the trend of changes in each group during different times showed that the mean staying high of spirometry ball in each of the interventions (P = 0.163), placebo (P = 0.875) and control (P = 0.066) groups during the three times were not statistically significant and there was no statistically significant difference between the three groups in terms of mean spirometry ball retention in all three times (P = 0.511) and therefore Hugo point acupressure massage has no effect on pause in the highest respiratory volume in patients with chest tube after chest surgery (Table 5).

4. Discussion

The results showed that the pain intensity in Hugo point massage and false point massage was less than the non-massage method, and in Hugo point massage was lower than the false point massage. In this study, we also saw a decrease in patients' pain in patients who used the false point massage method, which could be due to the presence and accompaniment of the intervener and the patient's sense of calm. Consistent with the results of the study in Sharifirizi et al.'s (2017) study, cancer patients undergoing bone marrow biopsy in the placebo group also reported a significant reduction in pain after massage in areas other than LI4 and HT7 points for the intervention group. In justifying this conclusion, they have stated that the possible reasons for this could be intervention hypnosis, patient safety due to the presence of the researcher, or the effect of Hawthorne [16].

Regarding the positive effect of Hugo point acupressure massage on reducing the pain intensity in patients in the chest tube at the expiratory stage, no similar study has been performed so far, however, in line with the positive effect of Hugo point acupressure massage on reducing pain in various diseases in line with the results of the study of Akgün et al. (2020), the acupressure group (P6 and LI4) had the lowest post-cesarean pain compared to the placebo group and the control group [18]. Also, in many studies, Hugo point massage has had a significant effect on reducing natural childbirth and post-cesarean pain [17,21–23]. Ganji

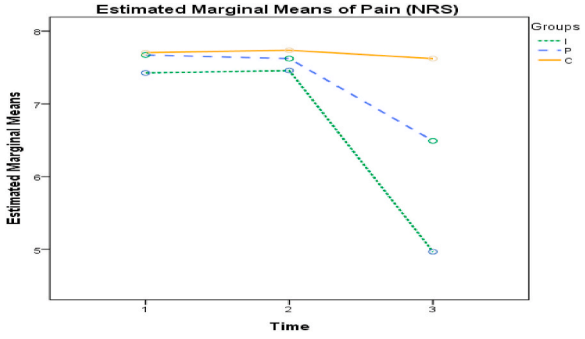

Fig. 2. Mean pain intensity of patients with chest tube in three times before, during and after the intervention.

Table 3
Comparison of pain intensity in patients with chest tube at three times before, during and after the intervention.

Methods	Before intervention (T0)	During intervention (T1)	After the intervention (T2)	✸RMANCOVA in each methods	✸RMANCOVA between three methods
	M± SD	M± SD	M± SD		
Hugo point massage	.1 ± 7.41	±7.4 0.8	0.8 ± 4.9	F = 134.18 2 = df P-value<0.001	F = 39.57 df = 3.73 P-value<0.001
False point massage	0 ± 7.7.9	0.9 ± 7.6	0.5 ± 6.5	F = 39.99 2 = df P-value<0.001	
No massage (control)	0 ± 7.7.8	0.9 ± 7.7	0.7 ± 7.6	F = 0.36 df = 1.44 P-Value = 0.624	
✸RMANCOVA	F = 1.93 df = 1.17 p = 0.168	F = 2.30 df = 1.75 p = 0.111	F = 219.40 df = 1.81 P < 0.001		

✸RMANCOVA = repeated-measures analysis of covariance.

Table 4
Comparison of Spirometr ball elevation (in cubic millimeters) in patients with chest tube in the study methods at three times before, during and after the intervention.

Methods	Before intervention (T0)	During intervention (T1)	After the intervention (T2)	✸RMANCOVA in each methods	✸RMANCOVA between three methods
	M± SD	M± SD	M± SD		
Hugo point massage	31.8 ± 1173.3	25.9 ± 1179.3	24.6 ± 1180.0	F = 1.15 df = 1.63 P-value = 0.311	F = 0.157 df = 3.84 P-value = 0.956
False point massage	27.7 ± 1177.7	22.8 ± 1182.4	26.2 ± 1179.8	F = 0.45 2 = df P-value = 0.630	
No massage (control)	27.8 ± 1176.1	22.8 ± 1181.14	29.2 ± 1178.8	F = 0.75 2 = df P-value = 0.474	
✸RMANCOVA	F = 0.443 2 = df P = 0.643	F = 0.314 df-1.76 P = 0.704	F = 0.04 2 = df P = 0.956		

✸RMANCOVA = repeated-measures analysis of covariance.

Table 5
Comparison of spirometry ball retention rate (in seconds) in patients with chest tube under study at three times before, during and after the intervention.

Methods	Before intervention (T0)	During intervention (T1)	After the intervention (T2)	✸RMANCOVA in each methods	✸RMANCOVA between three methods
	M± SD	M± SD	M± SD		
Hugo point massage	0.6 ± 2.1	0.6 ± 2.1	0.5 ± 1.9	1.84 F 2 = df P-value = 0.163	= 0.81 F Df = 3.55 P-value = 0.511
False point massage	0.9 ± 1.9	0.3 ± 2.0	0.4 ± 1.9	F = 0.05 df = 1.24 P-value = 0.875	
No massage (control)	0.5 ± 2.1	0.6 ± 2.1	0.5 ± 1.9	F = 2.91 df-1.74 P-value = 0.066	
✸RMANCOVA	1.40 = F 1.65 = df P = 0.250	F = 1.29 2 = df P = 0.279	= 0.179 F = 1.47 df 0.768 = p		

✸RMANCOVA = repeated-measures analysis of covariance.

et al. (2014) in a systematic review study reported that to reduce labor pain with more confidence can use acupressure massage of spleen 6 and Hugo points compared to other points (gallbladder 21, bladder 32, and bladder 63) because these points have been used in most studies with acceptable validity [24]. Borzou et al. (2018) reported that Hugo point acupressure massage effectively reduces the pain of needle insertion in arteriovenous fistulas in hemodialysis patients [25]. In this regard, Raddadi et al. (2017) concluded that pressure massage of LI4 and BL32 points reduce the pain of patients when intramuscular injection of penicillin compared to the control group [26]. Contrary to the results of this study, Sharif Nia et al. (2017) did not observe a significant difference in the level of pain of leukemia patients during sampling between the two groups of massage therapy and control after 12 sessions of intervention [27], also, study Ramezani et al. (2016) entitled acupressure at point LI4 has not been effective in reducing pain after cesarean section [22]. One of the reasons for the difference between the results of these studies and our study is the type of disease or the point of massage. On the other hand, the use of combination methods such as ice can increase the effectiveness of massage therapy.

The results of this study showed that Hugo point massage had no effect on respiratory volume. A similar study has not been performed on the effect of massage therapy on respiratory volume, but according to the results of this study, the study of Sharifizari et al. (2017) showed that massage of LI4 and HT7 points in cancer patients undergoing bone marrow biopsy had a significant reduction in pain but had no effect on patients' respiration and blood pressure [16]. However, contrary to the results of this study, Polastri et al. (2019) showed that manual massage in chronic obstructive pulmonary disease (COPD) improves active expiratory volume and relieves shortness of breath [28]. Also in the study of Nekooee et al. (2008), there was a significant difference in the mean of spirometric indices (forced vital capacity (FVC) and forced expiratory volume (FEV) in the massage group at the beginning and after one month of follow-up, and researchers report that daily massage can improve airway strength, reduce airway sensitivity, and improve asthma control, therefore, the use of this method can reduce the use of irrational drugs and can be considered as a complementary method to pharmacological methods [29].

One of the limitations of the study was the assessment of pain intensity based on self-report, which may be affected by pain threshold and different physical and psychological conditions. This was beyond the control of researchers. Another limitation of this study was the coincidence of sampling with the epidemic of Covid-19, which caused a prolongation of the sampling time, lack of cooperation of some patients due to unfavorable physical and mental conditions.

One of the strengths of this study is the cost-effectiveness of Hugo point massage and its non-invasiveness. It is suggested that other methods of complementary medicine be used to reduce pain and improve patients' respiratory status.

5. Conclusion

Because according to the findings of this study, Hugo's point massage was effective in reducing pain intensity, so it is recommended to use it during spirometry, which is a painful procedure.

Competing interest

The authors have no conflicts of interest to declare.

Authors' contribution

SMF, AK, and MKh made substantial contributions to the conception

and design of the study. Sampling was carried out under the supervision of MH. Data analysis was performed by UM. SMF and AK were involved in the writing-up of the manuscript. All read and approved the final manuscript.

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Statement of ethics

This study was conducted in accordance with the declaration of Helsinki. The study protocol was approved by the Ethics Committee of Hamadan University of Medical Sciences with ID 9906043483 and code IR.UMSHA.REC.1398.1055. Also, the study registered in the Iranian Registry of Clinical Trial with the number IRCT20121114011469N4 and date of 2020-07-23.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Acknowledgment

This study is part of an MSc thesis. The study protocol was approved by the Ethics Committee of Hamadan University of Medical Sciences with the number 9906043483 and the ethics code IR.UMSHA.REC.1398.1055. The registration code IRCT for this study was IRCT20121114011469N4.

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