Original Article

Which is More Effective: Cold Application or Relaxation Exercise on Pain During Chest Tube Removal

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Abstract

Background: Cold gel pad application and deep relaxation exercise are interventions that can be applied to reduce pain during chest tube removal.
Aim: The study was conducted to find out the effect of local cold application and relaxation exercise on pain level during chest tube removal in patients undergoing open heart surgery.
Methods: It was conducted an experimental study in 90 patients who underwent heart surgery. Local cold gel pad was applied to the patients in cold application group, rytmic breathing exercise was given to the patients in relaxation group, routine procedures were applied in control group during chest tube removal. The patient's pain levels were measured with VAS before, immediately after and 15 minutes after the procedure.
Results: It was determined that the mean VAS scores in the cold application group and relaxation exercise group was significantly lower than the control group. Local coldf gel pad application were not found more effective than relaxation group in reducing procedural pain level.
Conclusions: Cold gel pack application and relaxation exercise were found to be effective in reducing pain level in our study. Further studies that examine the effectiveness of cold gel pad and deep breathing exercices on the interventional pain should be performed.

Key words: chest tube removal, cold aplication, pain, distraction

Introductıon

Heart surgery aims to increase effort capacity by reducing chest pain and to perform daily life activities comfortably (Gunduz & Keskin, 2020). Moderate or severe pain is felt in the postoperative period due to nerve damage in the soft tissues of the chest area during thoracotomy (Aydin & Cilingir, 2016; Mesbah, Yeung, & Gao, 2016). When the pain cannot be controlled, deep breathing and coughing becomes difficult, secretion is delayed and the quality of life decreases accordingly (Aydin & Cilingir, 2016; Mesbah, Yeung, & Gao, 2016; Mazloum et al., 2012). The chest tube, which is applied during the surgical procedure, is inserted to protect the heart and lung functions, to prevent the formation of pleural effusion, hemothorax and pneumothorax (Aydin & Cilingir, 2016; Mesbah, Yeung, & Gao, 2016). After surgery, the chest tube is removed when the amount of drainage decreases (<100-150 cc) and becomes serous (Mazloum et al., 2012). It is known that patients experience moderate or severe pain during chest tube removal and the procedure is perceived as a bad experience (Mesbah , Yeung, & Gao, 2016, Mazloum et al., 2012, Payami et al., 2014).

When the literature is reviewed, pharmacological and non-pharmacological methods are used to relieve pain during chest tube removal (CTR). Cold application, relaxation exercise, and listening to music are among the non-pharmacological methods (Bruce, Howard, & Franck, 2006; Demir & Khorshid, 2010). Cold application is an effective, simple and inexpensive method, and the risk of complications is low (Otoibi, Mokabel, & Ghuneimy, 2013; Belhan et al., 2015). Cold application is performed by applying a cold object to any part of the body. Cooling at about 15°C, first cools the skin and then the muscles. This application reduces the muscle temperature for 10-30 minutes (Otoibi, Mokabel, & Ghuneimy, 2013; Naglaa & Shimaa , 2017; Wanxıa et al., 2019; Ertug & Ulker, 2012). Cold application shows its effect on pain by eliminating edema and muscle spasm, and also

blocks peripheral nerve conduction by slowing it down (Naglaa & Shimaa , 2017; Wanxıa et al., 2019; Ertug & Ulker, 2012; Mitra, Nahid, & Nouraddin, 2014). By stimulating the touch receptors in the gate-control mechanism, it increases the release of endogenous opioids and reduces pain(Otoibi, Mokabel, & Ghuneimy, 2013; Naglaa, & Shimaa, 2017).

Relaxation exercise, another non-pharmacological practice, helps to reduce anxiety and muscle tension (Heidari et al., 2014; Belhan et al., 2015). Relaxation lowers blood pressure by reducing oxygen demand, muscle tone, heart and respiratory rate and helps relieve pain by increasing skin resistance (Ebadi, Dehghani, & Firoozabadi, 2014; Mehdi & Ahmad, 2014). Relaxation is accomplished by applying relaxation exercises or by using progressive relaxation exercises (Friesner, Curry, Moddeman, 2006). Breathing exercise provides physical and psychological relaxation. The muscles contracted by the breathing process relax again with exhalation and the skin resistance increases. The patient relaxes and removes the thought of pain from himself, thus increasing the release of endorphins and reducing pain (Mehdi & Ahmad, 2014, Friesner, Curry Moddeman, 2006). It is also known that alternative methods used in pain relief increase the effectiveness of pharmacological treatments (Naglaa & Shimaa, 2017, Aktas & Karabulut, 2019). Alternative therapies are inexpensive, safe and is easily-tolerated by patients, Studies on pain relief during chest tube removal in patients undergoing thoracic surgery indicated that non-pharmacological methods of cold application and relaxation exercises were used as well as pharmacological methods, and these interventions reduced the level of pain (Heidari et al., 2014; Otoibi, Mokabel, & Ghuneimy, 2013; Ebadi & Firoozabadi, 2014; Ertug & Ulker, 2012; Friesner, Curry, & Moddeman, 2006).

Research Hypotesis

H0. There is no difference in the level of pain between the patients having received cold gel aplication, and relaxation exercise and control group during during CTR after heart surgery.

H1. There is difference in the level of pain between the patients having received cold gel aplication, and relaxation exercise and control group during during CTR after heart surgery.

Methods

Aim: The aim of this study is to determine the effect of cold gel pad application and relaxation exercise on pain level during Chest Tube Removal (CTR) in individuals undergoing open heart surgery.

Design and sample: This study involved a clinical experimental trial that included 90 patients who underwent post-cardiac surgery in a private hospital, department of cardiac surgery, between the dates of October 2015 and May 2016. The aim was to detect the efficiency of cold gel pad and relaxation exercises on the pain level during chest tube removal the patients who underwent heart surgery. Convenience sampling method was used with patients who met the sampling criteria among the given population and who agreed to participate in the research were distributed between the cold gel pad application group (30), deep breathing group (30) and control group (30). A time-based method was used to prevent bias in assigning volunteers to intervention and control groups. The application was first performed in the control group. The patients were then assigned to the distraction group on odd-dated days and to the cold application group on even-dated days of the month. Patients included in the scope of the study underwent a planned open heart surgery with general anesthesia, volunteered for the study, were 18 years old and older, had orienting to place and time, had no communication problems in Turkish, had a chest tube, could expressed the pain. Patients who received mechanical ventilation support, had hearing loss, had mental illness and had hypersensitivity to cold were excluded.

Procedure and data collection: The researcher selected patients who were to undergo a planned open cardiac surgery and met the sampling criteria by daily visits to the hospital. Patients in the sample were informed about the monitoring of their pain level while chest tube removal and the other data during the postoperative period. All patients in the sample received routine postoperative care. Cold gel pads was applied to the patients in the cold application group for ten minutes before chest tube was removed, and five minutes after the removal, for a total 15 minutes. Relaxation exercise can be applied as breathing exercise or progressive muscle relaxation (Heidari et al., 2014; Ebadi & Firoozabadi, 2014, Friesner, Curry, & Moddeman, 2006). In our study, patients were given deep breathing exercises as a relaxation method. The breathing exercise enables the individual to relax physically and mentally and to draw his attention away from pain, and it improves the person's sense of control. During the intervention, the individual should focus on the breathing action. In a semi-fowler position, one hand is placed on the abdomen, other hand on the chest. Breathing is taken from the nose and the air is provided to fill the entire lung, while

blowing, leaving the lips half open. Exhalation time should be twice as long as the breathing time. During the exhalation, the person should be passive and relaxed, not tense or strain the body (Ebadi & Firoozabadi, 2014). Breathing exercise was applied as five breathing and one minute rest. Respiratory exercise was applied for 10 minutes before the procedure and five minutes after the procedure for a total of 15 minutes. Pain levels of individuals in all three groups were measured before the tube was withdrawn (VAS I), immediately after withdrawal (VAS II) and 15 minutes after withdrawal (VAS III). Patients in the control group received routine care after the operation. "Data Collection Form" was used by the researcher according to literature information for the data collection process.

***Data** analysis:* Evaluation of the findings were done using SPSS (Statistical Package for Social Sciences for Windows) 22.0. Chi-square test was used for the distribution of demographic characteristics by groups, and One way Anova test was used to compare quantitative continuous data between more than two independent groups. Scheffe test was used as a complementary post-hoc analysis to determine the differences after the Anova test. The difference between the repetitive VAS measurements within the group was analyzed by the paired group t-test. Man-Whitney U test and Kruskall-Wallis test were used to determine the differences of repeated VAS measurements according to age, gender and habits. Results were evaluated at a 95% confidence interval and the significance was evaluated under $p < .05$.

Ethical Considerations: This study was reviewed and approved by the ethics commission of Istanbul Medipol University Medical Ethic Commission (no: 2015/562). Before the launch of the research, patients were informed about the subject and the objectives of the research. Personal information would remain confidential and would only be used for the research data. Verbal and written permission were obtained from the patients who volunteered to participate in the research.

Results

When the ages of the individuals participating in the study are examined; It was determined that 56.7% of the patients in the cold application group, 50% of the relaxation group, and 46.7% of the control group were between the ages of 60-69. It was determined that all three groups were similar in terms of age ($x^2 = 6.787$; $p = 0.341$). When the distribution of the individuals participating in the research by gender is examined, 80% of the cold application group; 60% of the relaxation group; 63.3% of the control group was determined to be male. There was no significant difference between the groups ($x^2 = 3.154$; $p = 0.207$).It was determined that 65.5% of the patients had CABG, 34.5% had valve surgery, and 75.5% had double resistance (Table 1)

Table 2 shows the comparison of the VAS scores of the control and intervention groups. When the average pain scores of all three groups included in the study were compared immediately after chest tube removal, the difference was found to be statistically significant ($f = 143.963$; $p < .05$). According to the complementary post-hoc analysis, the pain score of the cold application group (3.92 ± 0.69) was found to be significantly lower than both the relaxation group (5.23 ± 0.98 and the control group (7.97 ± 1.11)). The relaxation group pain score (5.23 ± 0.98) was found to be lower than the control group (7.97 ± 1.11) ($p < .05$).

When the average pain scores of all three groups 15 minutes after chest tube removal were compared, the difference was found statistically significant ($f = 122.63$; $p < .05$). Complementary post-hoc analysis was conducted to identify sources of group (2.87 ± 1.15), the difference was not significant. The pain score in the cold application group (1.85 ± 0.66) was found to be significantly lower than the control group (5.48 ± 0.90). The pain score in the relaxation group (2.87 ± 1.15) was found to be significantly lower than the control group (5.48 ± 0.90) ($p < .05$) (Table 3).

The difference between the amount of decrease in pain level of all three groups was found to be statistically significant (Table 2, $f = 26.81$, $p < .05$). Complementary post-hoc analysis was performed to determine the source of difference. The amount of decrease in the cold application group (2.97 ± 1.82) was higher than the control group (0.083 ± 1.260). The amount of falling in the relaxation group (3.25 ± 2.33) was also higher than the control group (0.08 ± 1.26). The difference between the falling amount in the cold application group and the drop in the relaxation group was not statistically significant (Figure 1).

It was found that age, gender and habits did not have a significant effect on the pain score of the individuals in the cold application group. It was found that gender affected the pain level immediately after the intervention in the relaxation group; It was determined that the pain level immediately after chest tube removal was higher in women than in men (MWU = 57.50; $p < .030$).

Table 1-2: Comparison of the Descriptive Characteristics of the Patients and Comparison of VAS I, VAS II, VAS III Average Scores of Cold Application, Relaxation and Control Groups

Pain Level	Cold Application group	Relaxation group	Control group	F	*p*	Difference
	M±SD	**M±SD**	**M±SD**			
VAS I	4.82±1.79	6.112±1.66	5.57±1.37	4.89	0.010	2 > 1
VAS II	3.92±0.68	5.23±0.98	7.97±1.11	143.96	0.000	2 > 1 3 > 1 3 > 2
VAS III	1.85±0.66	2.87±1.15	5.48±0.90	122.63	0.000	2 > 1 3 > 1 3 > 2

1: Cold application 2: Relaxation 3: Control SD: Standard deviation.

Table 3. Averages of Amounts of Change of VAS I - VAS III of the Control and Intervention Groups

	Cold Application group	Relaxation group	Control group	*p*
	n(%)	n(%)	n(%)	
Gender				
Woman	6(20)	12(40)	11(36.7)	x^2=3.154
Man	24(80)	18(60)	19(63.3)	*p*=0.207
Age				
40-49	1(3.3)	1(3.3)	4(13.3)	x^2=6.787
50-59	8(26.7)	7(23.3)	10(33.3)	*p*=0.341
60-69	17(56.7)	15(50)	14(46.7)	
70 +	4(13.3)	7(23.3)	2(6.7)	
Operation				
CABG	26(86.7)	15(51.7)	18(60)	x^2=9.523
Valve	3(10)	10(34.5)	10(33.3)	*p*=0.049
CABG+valve	1(3.3)	4(13.8)	2(6.7)	
Number of tubes				
Right / left single	3(10)	4(13.3)	0(0.0)	
Middle single	20(66.7)	22(73.3)	26(86.7)	x^2=5.738
Middle + right / left single	7(23.3)	4(13.3)	4(13.3)	*p*=0.220

	Groups	n	**M ± SD**	**F**	**p**	Difference
Amount of change (VAS 1-VAS III)	Cold Application	30	2.97±1.82	26.811	0.000	1 > 3 2 > 3
	Relaxation	30	3.25±2.33			
	Control	30	0.08±1.26			

SD: Standard deviation.

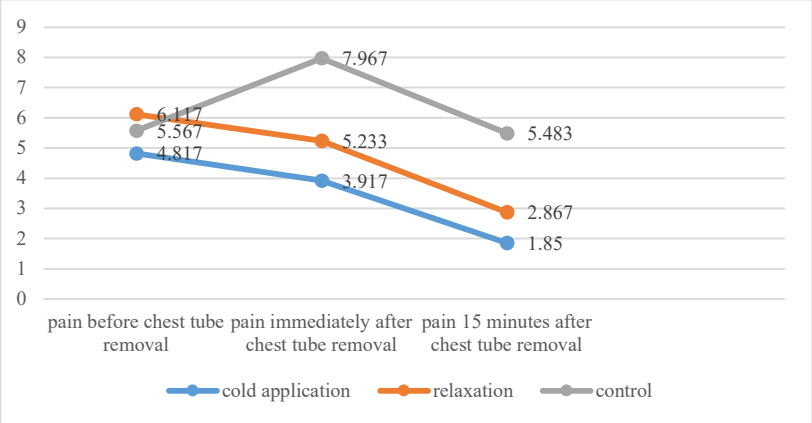

Figure 1.VAS I, VAS II, VAS III Average Scores of Cold Application, Relaxation and Control Groups

Discussion

Our findings showed that cold application and relaxation can reduce pain during chest tube removal. In the study of Heidari Gorji et al., ıt was found that cold application and breathing exercise applied while removing the chest tube reduced pain (Heidari et al., 2014). Our study findings are similar to the findings in this study. In the study of Otaibi et al. on 40 patients with chest tube who had undergone thoracic surgery, it was stated that cold application before removing the tube reduced the level of pain and anxiety (Otoibi, Mokabel, & Ghuneimy, 2013).

In a study conducted on 66 patients who had undergone coronary artery bypass surgery, pain levels after cold application and indiomethazine administration were examined before chest tube removal. It was found that the pain level in the experimental group, in which cold was applied together with indomethazine, was significantly lower than that in the group that was applied only with indomethazine (Mitra & Nahid, 2014). In the study conducted by Demir and Khorsid on 90 patients who underwent cardiac surgery, the effect of cold or warm application on the level of pain and anxiety after the removal of the chest tube was examined, anxiety levels did not change, and the pain level was lower in the cold application group compared to the other groups (Demir & Khorshid, 2010). The findings of Demir and Korshid also showed that cold application decreased the level of pain, as our findings.

Friesner et al. in order to evaluate the effect of relaxation exercise on pain reduction, pain was evaluated before, immediately after and 15 minutes after chest tube removal in a study conducted on 40 adult patients. The pain level of the patients who were applied relaxation exercise together with opioid treatment was found to be lower than the pain level of the individuals only in the opioid applied control group (Friesner, Curry, & Moddeman, 2006). In the study of Heidari Gorji et al.,no significant decrease in pain level was reported after 15 minutes of CTR (Heidari et al., 2014). Our research finding is similar to that of Freisner. It provides relaxation, anxiety and relative relief of the tension in skeletal muscles. With relaxation, the need for oxygen, muscle tone, heart and respiratory rate are reduced, blood pressure is reduced and skin resistance is increased, so pain relief is tried.

Heidari Gorji et al. In their study with 80 patients who underwent open heart surgery, routine analgesic was given to the experimental and control groups before chest tube removal, and relaxation exercise was applied to the experimental group. The pain level of the patients who were applied relaxation exercise was found to be lower than the group that received only analgesia (Heidari et al., 2014). In the study conducted by Mazloum et al. with 51 patients who had undergone open heart surgery, the effect of ice application on pain around the tube 20 minutes before the chest tube was removed was examined. When the pain level was measured before, immediately after, and 15 minutes after CTR, the level of pain immediately after tube removal was found to be significantly lower in the subjects who underwent ice application compared to the placebo and control groups (Mazloum et al., 2012). In a study conducted by Mohammadi et al with 90 patients who underwent bypass surgery, it was determined that applying an

cold gel pad for 20 minutes before the chest tube was removed reduced the severity of pain immediately after the chest tube was removed (Mohammadi et al., 2018).

In the study conducted by Nagla Mohamed El Mokadem et al. with patients who had undergone open heart surgery, patients were given breathing exercises and cold applications while removing the chest tube, ıt has been noted that there is a significant decrease in pain levels just after CTR (Naglaa & Shimaa, 2017)

In a randomized controlled study conducted by Hasanzadeh et al. with 80 patients who underwent open heart surgery, the level of pain in cold application, lavender oil inhalation, combined application and control groups was examined. The level of pain immediately after CTR was found to be lower in the intervention groups compared to the control group (Hasanzadeh et al., 2016). In the randomized study conducted by Aktas and Karabulut, 120 patients who had undergone cardiovascular surgery were divided into 4 groups as control group, cold therapy, music therapy and lidocaine spray. Pain level was measured 10 minutes before, immediately after and 20 minutes after CTR. It was determined that cold application did not affect the pain level after CTR (Aktas & Karabulut, 2019).

In a randomized controlled study by Yarahmadi et al. performed on 180 patients with cardiac bypass surgery, cold application, music therapy, combined application of both and control groups were selected. Cold packs were applied to the first group 20 minutes before the chest tube was removed. The second group was listened to music 15 minutes before the chest tube was removed, while the third group received both cold application and music therapy, and a routine clinical procedure was applied to the control group. The pain level of the individuals was measured 3 times in total, every 15 minutes in each group. The pain level was found to be the lowest in the cold application and combined therapy group (Yarahmadi et al., 2018).

Conclusion: Our study was carried out as an experimental design to determine the effect of cold application and relaxation exercise on pain level while chest tube removal was performed in individuals undergoing open heart surgery. When the data obtained from the study were examined, it was determined that cold gel and relaxation exercises reduced the level of pain in patients.

References

Aktas, YY., & Karabulut, N.(2019). The use of cold therapy, music therapy and lidocaine spray for reducing pain and anxiety following chest tube removal. Complement Ther Clin Pract, 34: 179-184.

Aydin, A., & Cilingir, D.(2016). Pain Management with Non-pharmacological Methods in Patients Undergoing Coronary Artery Bypass Graft Surgery, *Türkiye Klinikleri J Nurs Sci,* 8(2):146-152.

Belhan, Z., Karabulut, H., Ariturk, C., Okten, M., Toraman, F., Gomez, S., & Orhan, P.(2015). The effect of drainage tube types and application sites on pain and effusion in the postoperative period in patients undergoing coronary artery surgery, *Bakırkoy Medical Journal,* 11(4): 155-157.

Bruce, EA., Howard, RF., & Franck, LS. (2006). Chest drain removal pain and its management: A literature review. *J Clin Nurs,* 15(2): 145-154.

Budak, Erturk E., & Karadag, M.(2020). Non-Pharmacological Methods Applied in the Control of Pain and Anxiety Caused by Chest Tube Removal, *THDD*, 1 (1), 53-68.

Demir, Y., & Khorshid, L.(2010). The effect of cold applicationin combination with standard analgesic administration on pain and anxiety during chest tube removal: A single-blinded, randomized, double-controlled study. *Pain Manag Nurs*, 11:186–196.

Ebadi, A., Dehghani, F., & Firoozabadi, A. (2014). Effect of Relaxation on Postoperative Pain in Patients after Coronary Artery Bypass Grafting (CABG) Surgery, *Nationalpark-forschung in der schweiz,* 103(1): 185,186.

Ertug, N., & Ulker, S.(2012). The effect of cold application on pain due to chest tube removal. J *Clin Nurs*, 21,5-6

Friesner, SA., & Curry, DM., Moddeman, GR. (2006). Comparison of two pain-management strategies during chest tube removal: relaxation exercise with opioids and opioids alone. *Heart Lung* 35(4):269-276.

Gunduz, E., & Keskin, H.(2020). The effect of pain training on postoperative pain levels before thoracotomy surgery. *GKDA Derg*, 26(4):213-220.

Hasanzadeh, F., & Kashouk, NNM., & Amini S., & Asili, J., & Emami, SA., & Vashani, HB., et al.(2016). The effect of cold application and lavender oil inhalation in cardiac surgery patients undergoing chest tube removal. *EXCLI J*, 15:64-74.

Hasanzadeh, F., & Kashouk, NNM., & Amini S., & Asili, J., & Emami, SA., & Vashani, HB., et al.(2016). The effect of cold application and lavender oil inhalation in cardiac surgery patients undergoing chest tube removal. *EXCLI J*, 15:64-74.

Hasanzadeh, F., & Kashouk, NNM., & Amini S., & Asili, J., & Emami, SA., & Vashani, HB., et al.(2016). The effect of cold application and lavender oil inhalation in cardiac surgery patients undergoing chest tube removal. *EXCLI J*, 15:64-74.

Heidari, Gorji., Nesami, BM., Ayyasi, M., Ghafari, R., & Yazdani, J.(2014). Comparison of Ice Packs Application and Relaxation Therapy in Pain Reduction during Chest Tube Removal Following Cardiac Surgery. *North American Journal of Medical Sciences*, 6(1,) 19-24.

Hsieh, LY., Chen, YR., & LU, M.(2017). Efficacy of cold application on pain during chest tube removal: a randomized controlled trial A CONSORT-compliant article, Medicine, 96:46.

Mesbah, A., Yeung, J., & Gao, F.(2016). Pain after thoracotomy, *BJA Education*,16 (1):1-7.

Mazloum, SR., Abbasi Teshnizi, M., Kianinejad, A., & Gandomkar, F.(2012). Effect of applyig ice bag on pain intensity associated with chest tube removal after cardiac surgery. *Q Ofoghe Danesh*, 18:109-114

Mehdi Dehghani, Firoozabadi., & Ahmad, Ebadi.(2014). Effect of Relaxation on Postoperative Pain in Patients after Coronary Artery Bypass Grafting (CABG) Surgery, *Natıonalpark-Forschung in Der Schweiz,* 103 (1):185-191.

Mitra, Payami., Nahid, Darye., & Nouraddin, Mousavinasab.(2014). Effect of Cold Application in Combination with Indomethacin Sup. On Chest Tube Removal Pain in Patients Undergoing Open Heart Surgery. *Iran J Nurs Mıdwife Res,*19(1);77-81.

Mohammadi, N., Pooria, A., Yarahmadi, S., Tarrahi, MJ., Najafizadeh, H., & Abbasi , P.(2018). Effects of cold application on chest tube removal pain in heart surgery patients. *Tanaffos*, 17(1):29-36.

Naglaa Mohamed EL, Mokadem., & Shimaa EL-Sayed, Ibraheem.(2017). Cold Application and Breathing Exercises to Reduce Pain and Anxiety During Chest Tube Removal. *American Journal of Nursing* Science, 6(4): 285-292. doi: 10.11648/j.ajns.20170604.12

Otaibi, RA., Mokabel, FM., & Ghuneimy, YA.(2013).The effect of cold application on pain and anxiety during chest tube removal. *J Am Sci,* 9:13–23. (ISSN: 1545-1003). http://www.jofamericanscience.org

Payami, MB., Daryei, N., & Mousavinasab, Nourizade.(2014). Effect of Cold Application in Combination with Indomethacin Sup. On Chest Tube Removal Pain in Patients Undergoing Open Heart Surgery, *Iran J Nurs Mıdwife Res,* February; 19(1);77-81.

Wanxıa, ju., Lılı, Ren., Jun, Chen., & Yuman, Du.(2019). Efficacy of relaxation therapy as an effective nursing intervention for post-operative pain relief in patients undergoing abdominal surgery: A systematic review and meta-analysis. *Exp Ther Med, 1*8(4): 2909–2916

Tiippana, E., Nelskyla, K., Nilsson, E., Sihvo, E., Kataja, M., & Kalso, E.(2014). Managing Post-Thoracotomy Pain: Epidural or Systemic Analgesia and Extended Care–A Randomized Study with an "As Usual" Control Group. *Scandinavian Journal of Pain ,*5(4); 240–247.

Yarahmadi, S., Mohammadi, N., Ardalan, A., & Najafizadeh, H., Gholami, M.(2018). The combined effects of cold therapy and music therapy on pain following chest tube removal among patients with cardiac bypass surgery. *Complement Ther Clin Pract,* 31:71-75. https://doi.org/10.1016/j.ctcp.2018.01.006