www.nclinmed.com
Novelty in Clinical Medicine. 2023; 2(1): 24-31
https://doi.org/10.22034/NCM.2023.380439.1060

Research Article Open Access

Comparison of the effects of local cold therapy and hand and foot massage on blood pressure in post-operative patients

Ali Miri [1], **Mostafa Roshanzadeh** [2], **Reza Masoudi** [3], **Soleiman Kheiri** [2], **Ali Tajabadi** [4], **Shirmohammad Davoodvand** [3]*

[1] Student Research Committee, Shahrekord University of Medical Sciences, Shahrekord, Iran
[2] Shahrekord University of Medical Sciences, Shahrekord, Iran
[3] Community-Oriented Nursing Midwifery Research Center, Nursing and midwifery school Shahrekord University of Medical Sciences, Shahrekord, Iran
[4] Sabzevar University of Medical Sciences, Sabzevar, Iran

* **Corresponding author:** Shirmohammad Davoodvand, Community-Oriented Nursing Midwifery Research Center, Nursing and midwifery school Shahrekord University of Medical Sciences, Shahrekord, Iran **Email:** shdavodvand@gmail.com

Received: 8 January 2023 **Revised:** 14 January 2023 **Accepted:** 18 January 2023 **e-Published:** 1 February 2023

Abstract

Background: Effective management of postoperative blood pressure is vital to minimizing the risk of complications in patients. The use of pharmacotherapy alone may not be sufficient, and complementary methods such as local cold therapy and massage techniques have shown promising results in maintaining blood pressure stability.

Objectives: The primary aim of this study was to investigate and compare the impact of local cold therapy and hand and foot massage on blood pressure levels in surgical patients. By examining the efficacy of these non-pharmacological approaches, we aim to identify safe and effective methods for postoperative blood pressure management.

Methods: This semi-experimental study employed a three-group, before-after design and was comprised of 90 patients who underwent surgery in 2019 at the Shahrekord University of Medical Sciences in Iran. Patients were selected through a convenience-sampling method and randomly assigned to either the intervention group, which received local cold therapy and massage, or the control group. The local cold therapy and massage were administered three times per day for 20 minutes over a 48-hour period. Following the intervention, the researcher measured changes in blood pressure.

Results: The mean difference in systolic blood pressure before and after the intervention was found to be significant in both the massage ($p = 0.001$) and local cold therapy ($p = 0.002$) groups. Similarly, the mean difference in diastolic blood pressure before and after the intervention was significant for the massage ($P<0.001$) and local cold therapy ($P = 0.036$) groups. An ANOVA test was conducted, revealing no significant differences in mean systolic and diastolic blood pressure between the different groups before ($P = 0.28$) and after ($P = 0.059$) the intervention.

Conclusion: The findings suggest that incorporating local cold therapy and hand and foot massage into routine care may be beneficial. It could be valuable to teach nurses and patients' companions how to use these methods effectively in order to enhance their effectiveness.

Keywords: Local cold therapy, Cryotherapy, Massage, Blood pressure, Surgery.

Introduction

Every year, over 200 million adults worldwide undergo surgery, a number that is increasing annually.[1] In Iran, it has been reported that an average of 1.5 million major surgeries take place per year, according to statistics from the Ministry of Health.[2] Studies have revealed that 36.57% of patients who have undergone surgery experience at least one complication during the postoperative period.[3] The World Health Organization (WHO) has estimated that approximately 10% of patients who undergo surgery suffer from complications related to changes in blood pressure and heart rate.[4]

Copyright© 2023. This open-access article is published under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License which permits Share (copy and redistribute the material in any medium or format) and Adapt (remix, transform, and build upon the material) under the Attribution-NonCommercial terms. Downloaded from: https://www.nclinmed.com/

Managing postoperative complications and reducing their incidence is essential in nursing care.[5] Healthcare providers now focus on finding and implementing new therapeutic interventions that are safer, more cost-effective, and have better effects on vital signs while causing fewer complications.[6] These interventions can be particularly useful in major surgeries where patients are at higher risk of complications, in conjunction with established methods, and can significantly contribute to improving patients' health and recovery while also reducing healthcare costs.[7,8]

Massage and local cold therapy are two non-pharmacological methods that have demonstrated positive effects on physiological variables, although they are short-term measures.[9,10] Massage induces the release of endorphins, which can help alleviate pain and inflammation and promote relaxation. In the same vein, the application of local cold therapy can help reduce pain and tissue inflammation, thereby relieving many of the unpleasant physical symptoms in the affected area. These methods are generally considered safe and do not cause any side effects, as long as the patient does not have any specific lesions or underlying diseases.[11,12]

The considerable benefits and limited adverse effects of non-pharmacological methods underscore the need for their incorporation into patient care and treatment. Traditional treatments and medications can produce numerous physical and mental side effects while only partially addressing patient needs. Moreover, drug use can result in adverse outcomes such as low blood pressure, impaired vital signs, drowsiness, nausea and vomiting, and even shock, ultimately imposing a high cost on the healthcare system. As such, their widespread adoption may not be reasonable despite their ease of use, cost-effectiveness, and accessibility.[13,14] Conversely, there is increasing emphasis on encouraging patient and family involvement in postoperative management and care. Approaches such as local cold therapy and massage can facilitate this participation and promote better care after major surgeries.[15]

Despite numerous studies evaluating the effects of non-pharmacotherapy approaches such as massage and local cold therapy on various physiological parameters, it remains difficult to determine whether variability in effectiveness is due to differences in the study groups' severity of physiological symptoms or differences in the methods used.[16,17] It is important to note that even when these methods are performed in a standardized manner, differences in implementation by different individuals can potentially impact results.[18,19]

Although many studies have examined the impact of massage and local cold therapy on patients, there remains a scarcity of research investigating the effect of these approaches on blood pressure in patients undergoing surgery.[20] Bahramnezhad et al. have reported that foot reflexology massage can significantly affect physiological parameters in patients undergoing coronary angiography.[21] Furthermore, Yeke Fallah et al. investigated the effect of hand touch on vital signs in patients with traumatic brain injuries admitted to the intensive care unit and found that massage can influence blood pressure but not heat.[16]

A study by Song et al. investigated the impact of self-reflection massage on the improvement of vital signs in healthy individuals and found that reflex massage applied to the sole of the foot did not improve blood pressure levels.[17] Additionally, Khoshtarash et al. demonstrated that reflexology massage had no significant effect on physiological parameters in patients following a cesarean section.[22] Furthermore, Ebrahimi et al. assessed the effect of local cold therapy on deep breathing pain and cough in patients after open-heart surgery and found that applying cold gel to the sternum was effective in reducing these symptoms.[20] Moghimi Hanji et al.[23] conducted a study on the impact of local cold therapy on labor pain in primiparous women and observed a significant decrease in pain intensity and duration of labor. Additionally, participants reported improved satisfaction with labor during both the first and second stages. Similarly, Zgavc et al.[24] found that the early use of local cold therapy could effectively reduce inflammatory responses and edema in damaged tissues.

A review of the literature suggests that several studies have examined the impact of massage and local cold therapy on hemodynamic parameters in different patient populations. However, a significant research gap exists in

this area. Firstly, the effects of massage and local cold therapy on vital signs have been documented using various study designs, and their significant and non-significant effects have been reported in multiple patient groups. Secondly, there are limited studies examining the effects of topical massage and local cold therapy, specifically in patients undergoing chest and abdomen surgery.

Objectives

The aim of the present study was to investigate the impact of topical massage and local cold therapy on the blood pressure of patients undergoing chest and abdomen surgery.

Methods

Study design

This semi-experimental study used a three-group, before-and-after design and was conducted in 2019 at Shahrekord University of Medical Sciences in Iran. The study population consisted of all patients who underwent chest and abdomen surgery at Ayatollah Kashani Hospital in Shahrekord. Postoperative patients were selected using a convenience sampling method until the desired sample size was achieved and in accordance with the inclusion criteria.

The present study determined the required sample size using the following formula for interventional studies

$$[n = \frac{2(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 \sigma^2}{d^2}]$$

Using previously completed studies[19,16] a sample size of 27 individuals per group was estimated to obtain a statistical power of 95% with a significance level of alpha = 0.05 (where $Z_{1-\alpha/2}$=0.84, $Z_{1-\beta}$=1.96, d=4, σ=5). However, to ensure sufficient statistical power, a sample size of 30 participants was deemed appropriate for each group.

According to the formula, a sample size of 90 individuals was calculated for the study. The inclusion criteria for participants were as follows: individuals between the ages of 18 and 64 who had undergone thoracic and abdominal surgery, with no history of underlying diseases such as hypertension, allergies, immediate postoperative cardiovascular arrhythmias, disorders such as coagulation, and severe mental disorders such as depression. Additionally, individuals with infections diagnosed before surgery or Raynaud's disease were excluded. Those with skin complications or allergies, early postoperative complications (i.e., acute postoperative infection and fever, cardiac arrhythmia requiring medical intervention, abnormal bleeding, acute pulmonary disorders such as pulmonary embolism and pneumonia after surgery), the need for reoperation in the first 48 hours after surgery, and simultaneous multiple surgeries were also excluded. The sampling process continued daily until the final sample size of 90 individuals (30 in each group) was reached.

Sampling

The patients in this study were randomly allocated to a hexagonal blocking method based on surgery type and physician selection criteria. During the selected study period at Ayatollah Kashani Hospital in Shahrekord, 210 patients were admitted. After evaluating 15 blocks, 90 patients met the inclusion criteria. Six blocks with a total capacity of 36 patients were assigned to the first physician, four blocks with a total capacity of 24 to the second physician, three blocks with a total capacity of 18 to the third physician, and two blocks with a total capacity of 12 to the fourth physician. The capacity of each block was determined by dividing the total sample size by the number of blocks, resulting in a capacity of six patients per block. As the study consisted of three groups, each block of six patients was randomly allocated to three groups of two. To allocate patients in this study, a hexagonal blocking method was implemented based on surgical type and physician selection criteria. Over a period of 34 days, 210 patients were admitted to Ayatollah Kashani Hospital in Shahrekord. After evaluating 15 blocks, 90 patients were found to meet the inclusion criteria. To properly allocate patients, six blocks with a maximum capacity of 36 patients were designated for the first physician, four blocks with a maximum capacity of 24 patients were designated for the second physician, three blocks with a maximum capacity of 18 patients for the third physician, and two blocks with a maximum capacity of 12 patients for the fourth physician. The capacity of each block was determined by dividing the total sample size by the number of blocks, resulting in a capacity of six patients per block. To randomize the patients, each block was divided into three groups of two patients to create study groups.

To ensure accurate readings, blood pressure was measured before interventions using a SA Iran portable monitoring device. The cuff was secured to the patient's left arm, and the hand was positioned at the level of the heart. The researcher confirmed that the device was correctly calibrated prior to each use, and blood pressure was also measured using a mercury sphygmomanometer to validate the device's accuracy. All patients had their blood pressure recorded using the monitoring device after the researcher received full patient consent. In the intervention group, a superficial massage of the hand and foot was performed in addition to routine care. The massage was applied to each toe, sole, back of the hand, foot, and wrist at intervals of four five-minute sessions for each patient limb, for a total of 20 minutes. The patients underwent the intervention three times a day for 48 hours, with the researcher present at the bedside solely to oversee the process. The massage protocol consisted of two steps. Firstly, the therapist held the base of each finger with their thumb and other fingers. Then, they pulled and rotated each finger outwards towards the tip. Secondly, the therapist stretched the client's toes, extending them and flexing them back and forth to improve flexibility. The massage technique involved gently rubbing the sole of the patient's foot from the heel towards the ball of the foot with the thumb. Additionally, while the foot was in an upward position, pressure was gradually applied to the wrist and toe tendons using either the thumb or other fingers.[25] The study involved performing massages on both the right and left foot, as well as massages on both the right and left hand. To improve the reliability of the massage procedure, a male massage therapist was assigned to massage male patients, while a female colleague performed massages on female patients. The therapist-patient agreement coefficient was previously measured at 91%. For the group receiving local cold therapy, in addition to routine care, a standard frozen pack, or cold pack, made in Germany was applied topically at the site of the dressing. After removing the cold pack from the refrigerator, the therapist measured its temperature (4 degrees Celsius) and placed it on the dressing site according to the appropriate size (small, medium, or large). The cold pack was applied for a duration of 20 minutes, during which the researcher was present at the bedside solely to oversee the cold therapy procedure. The intervention was administered three times a day, with each cycle being separated by 8 hours, and it lasted for a total of 48 hours. The researcher then used the same sphygmomanometer to detect blood pressure fluctuations. The control group, on the other hand, received standard care in accordance with the treatment protocol, with no intervention from the researcher. After 48 hours, the researcher completed a questionnaire to get patient input, and their blood pressure was evaluated and recorded.

Ethical considerations

In order to conduct the research, after obtaining the necessary permits from the competent centers of the university and presenting them to Ayatollah Kashani hospital of Shahrekord, first the study method and its objectives explained to patients and their companions. The patient's demographic data form was completed. Institutional Review Board approval (code: IR.SKUMS.REC.1398.110) was obtained. The informed written consent was obtained from the volunteers to participate in the study and freedom to enter and leave the study, as well as the name of the questionnaires and emphasis on secrecy and confidentiality of data were taken into consideration. The study was conducted in accordance with the Declaration of Helsinki.

Statistical analysis

The continuous variables were expressed as the mean ±SD, and the categorical variables were presented as a percentage and frequency. The Chi-square, t-test, paired t-test, ANOVA test were used for analysis the data. All statistical analyses were performed with SPSS (version 16.0, SPSS Inc, Chicago, IL, USA). A “P-value” less than 0.05 was considered significant.

Results

Table 1 shows that there were no significant differences in demographic data between the two groups ($P > 0.05$). T-tests revealed that the mean systolic blood pressure before the intervention was not significantly different between the intervention and control groups ($p=0.28$). Similarly, the mean diastolic blood pressure before the intervention

was also not significantly different between the two groups (p=0.447). After the intervention, the mean systolic blood pressure was not significantly different between the intervention and control groups (p=0.059). Likewise, the mean diastolic blood pressure after the intervention was not found to be significantly different for different intervention and control groups (p=0.174).

For the massage group, a paired t-test revealed a significant difference in mean systolic blood pressure before and after the intervention (p=0.001), as well as a significant difference in mean diastolic blood pressure before and after the intervention (P<0.001). Similarly, for the local cold therapy group, a paired t-test showed that the mean systolic blood pressure before and after the intervention was significant (p=0.002) and that the mean diastolic blood pressure before and after the intervention was also significant (P=0.036). The detailed results are presented in Table 2.

Discussion

This study aimed to compare the impact of hand and foot massage versus topical local cold therapy on the blood pressure of patients undergoing thoracic and abdominal surgery. Although no significant differences in blood pressure were observed between the different interventions and control groups before and after the intervention, both systolic and diastolic blood pressure exhibited significant changes after the massage and local cold therapy interventions, compared to their pre-intervention levels. Abdi et al. demonstrated in their study that foot massage significantly altered blood pressure and pulse rate in patients admitted to the intensive care unit.[26] In a separate study, Yeke Fallah et al. found that hand massage significantly impacted breathing and blood pressure in patients with concussions who were admitted to the intensive care unit.[16] Bahramzadeh et al. also investigated the effect of foot reflexology massage on patients after coronary angiography and found that it could reduce fatigue and have a significant impact on systolic and diastolic blood pressure and pain.[21] Azami et al. discovered that short-term foot massage can increase arterial blood oxygen saturation, possibly by decreasing oxygen consumption through changes in metabolism.[27]

Table 1. Frequency of demographic characteristics of patients undergoing surgery according to different groups of massage, local cold therapy and control (n=30)

Demographic data		Massage N (%)	Local cold therapy N (%)	Control N (%)	Significant level
Age	18-25	3(10)	4(13.3)	1(3.3)	P: 0.208 F: 1.427
	26-35	6(20)	4(13.3)	2(6.6)	
	36-45	6(20)	4(13.3)	3(9.9)	
	46-55	9(30)	9(30)	11(36.6)	
	>56	6(20)	9(30)	13(43.3)	
	Total	30(100)	30(100)	30(100)	
Gender	Male	17(56.7)	19(63.3)	16(53.3)	P:0.727 X^2:1.23
	female	13(43.3)	11(36.7)	14(44.7)	
	Total	30(100)	30(100)	30(100)	
Type of physician	1	12(40)	13(43.3)	13(43.3)	P:1 X^2:1.005
	2	9(30)	9(30)	8(26.6)	
	3	5(16.7)	4(13.3)	5(16.7)	
	4	4(13.3)	4(13.3)	4(13.3)	
	Total	30(100)	30(100)	30(100)	
Type of surgery	Abdominal	23(76.7)	23(76.7)	23(76.7)	P:0.98 X^2:0.54
	Thoracic	27(23.3)	27(23.3)	27(23.3)	
	Total	30(100)	30(100)	30(100)	
Type of anesthesia	General	28(93.3)	30(100)	28(93.3)	P:0.553 X^2:2.11
	Spinal	2(6.7)	0	2(6.7)	
	Total	30(100)	30(100)	30(100)	

Table 2. Comparison of mean blood pressure of patients undergoing surgery in massage, local cold therapy, and control groups before and after the intervention (n=30)

Variables		Massage (M±SD)	Local cold therapy (M±SD)	Control (M±SD)	ANOVA
Systolic blood pressure	**Before**	122.12±8.7	125.7±12	120.14±5	P:0.28 F:4.55
	After	118.8±11.1	121.1±11.2	115.5±14	P:0.059 F:1.134
	Paired t-test	P:0.001 t:1.162	P:0.002 t:3.008	P<0.001 t:3.176	-
Diastolic blood pressure	**Before**	76.8±5.8	79.6±3.4	78.8±8	P:0.447 F:5.54
	After	72.8±1.1	75.7±5.1	74.8±5	P:0.174 F:4.096
	Paired t-test	P<0.001 t:2.003	P:0.036 t:3.114	P:0.007 t:2.304	-

In a study by Song et al. in Korea investigating the effect of self-reflection massage on vital sign improvement in healthy individuals, foot reflexology massage was found to have no impact on blood pressure.[17] Conversely, Khoshtarash et al. found no significant effect of foot reflexology massage on physiological parameters of pain after cesarean section.[22] Similarly, Mohammadpour et al. did not find any substantial effects of massage on physiological parameters.[28] In contrast, a study by Sayari et al. on patients with acute myocardial infarction revealed a significant effect of foot massage on physiological parameters, specifically blood pressure, pulse, temperature, and heart rate.[29]

The varying results found in studies investigating the impact of massage on blood pressure can be attributed to several factors. One possible contributing factor is the nature of the massage technique itself, which can encompass various methods as well as differing levels of depth, intensity, and duration. Additionally, the specifics of a patient's medical condition and corresponding changes in their vital signs can play a role in determining the efficacy of massage therapy.

Several studies have examined the impact of local cold therapy on various vital signs, with a particular focus on pain rather than blood pressure. Khorshid and Demir found that local cold therapy, in conjunction with analgesics, did not have a positive effect on patients undergoing surgery who had chest tubes removed.[30] Shakoori et al., however, reported the positive impact of local cold therapy on pain management in patients undergoing open-heart surgery.[19] In a study by Moghimi Hanji on primiparous women in labor, local cold therapy was found to significantly reduce pain intensity and duration while also improving satisfaction during the first and second stages of labor.[23] Finally, Khalkhali et al. discovered that administering cooling gel at the sternal incision site reduced anxiety in surgical patients induced by coughing and deep breathing.[31]

To the best of our knowledge, no other studies have explored the impact of local cold therapy on blood pressure in postsurgical patients, making it challenging to compare these results to previous findings. It is possible that the lack of any observed effects in our sample could be attributable to various factors, such as the relatively brief duration of local cold therapy applications. One significant limitation of the current study is the use of non-random sampling to select participants, which we attempted to mitigate by employing a random allocation method. Additionally, there was no viable way to implement a blinded study design.

Conclusions

In light of these findings, we recommend that massage and local cold therapy be considered complementary care methods alongside other treatments by healthcare providers. Including these methods in in-service training programs is also advisable since they are cost-effective, have minimal side effects, and are generally well-tolerated

by patients. Both therapies can be administered by family members or patients themselves, without the supervision of a professional caregiver, and have been shown to effectively improve physiological symptoms. Additionally, nurses may want to consider integrating these methods into their pre-discharge education for patients and their families. However, further research is necessary to evaluate the effect of massage and local cold therapy on different patient groups.

Acknowledgment

Hereby, from the Deputy of Research & Technology of Shahrekord University of Medical Sciences, the Ayatollah Kashani Educational and Medical Center in Shahrekord, as well as all those who cooperated in the study process, are thanked.

Competing interests

The authors declare that they have no competing interests.

Abbreviations

World Health Organization: WHO

Authors' contributions

Study design: Davoodvand, Masoudi and Miri; Execute and data collection: Miri; Data analysis: Kheiri, Writing the original draft: Roshanzadeh. Reviewing the final edition: Roshanzadeh, Davoodvand. All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

Funding

This study is a student dissertation of the Master of critical Care nursing approved at Shahrekord University of Medical Sciences that financially supported it.

Role of the funding source

None.

Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki. Institutional Review Board approval (code: IR.SKUMS.REC.1398.110) was obtained from Shahrekord University of Medical Sciences. The present study did not interfere with the process of diagnosis and treatment of patients and all participants signed an informed consent form.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

References

1. Brummett CM, Waljee J, Goesling J, Moser S, Lin P, Englesbe M, et al. New persistent opioid use after minor and major surgical procedures in US adults. JAMA Surg. 2017; 152(6): e170504. doi:10.1001/jamasurg.2017.0504 PMid:28403427 PMCid:PMC7050825
2. Devereaux P and Sessler DI. Cardiac complications in patients undergoing major noncardiac surgery. N Engl J Med. 2015; 373 (23): 2258-2269. doi:10.1056/NEJMra1502824 PMid:26630144
3. Li D, Bohringer, Liu H. What is normal intraoperative blood pressure and do deviations from it really affect postoperative outcome? J Biomed Res. 2017; 31(2): 79. doi:10.7555/JBR.31.20160167 PMid:28808189 PMCid:PMC5445210
4. Chauhan SB and Sharma H. A comparative study of postoperative complications in emergency versus elective laparotomy at a tertiary care center. Int Surg J. 2017; 4(8): 2730-2735. doi:10.18203/10.18203/2349-2902.isj20173408
5. Ganjifard M, Samii M, Kouzegaran S, Sabertanha A. The effect of positive end-expiratory pressure during anesthesia on arterial oxygen saturation after surgery in patient undergoing cesarean section. Eur J Transl Myol. 2018; 28(1): 93-97. doi:10.4081/ejtm.2018.7191 PMid:29686815 PMCid:PMC5895984
6. Afshar PF, Ghorbani S, Alavi M, Bahramnezhad F. Comparing the Planned Respiratory Cares and CPAP on Atelectasis and Arterial Blood Oxygen Levels of patients undergoing Coronary Artery Bypass Graft. Int J Med Res Health Sci. 2016; 5(9): 117-123.
7. Van waes JA, Van klei WA, Wijeysundera DN, Beattie WS. Association between Intraoperative Hypotension and Myocardial Injury after Vascular Surgery. Anesthesiology. 2016; 124(1):35-44. doi:10.1097/ALN.0000000000000922 PMid:26540148
8. Nagele P. Postoperative hypotension and troponin elevation: association or causation? Br J Anaesth. 2018; 120(1): 4-5. doi:10.1016/j.bja.2017.11.008 PMid:29397136
9. Ramesh C, Pai VB, Patil N, Nayak SB, George A, George SL, Devi SE. Effectiveness of massage therapy on post-operative outcomes among patients undergoing cardiac surgery: A systematic review. Int J Nurs Sci. 2015; 2(3): 304-312.doi:10.1016/j.ijnss.2015.07.006
10. Beleza ACS, Ferreira CHJ, Driusso P, Santos CBD. Effect of local cold therapy on relief of perineal pain after vaginal childbirth

with episiotomy: a randomized and controlled clinical trial. Physiotherapy. 2017; 103(4): 453-458. doi:10.1016/j.physio.2016.03.003 PMid:27956033

11. Pishkarmofrad Z, Navidian A, Ahmadabadi CA, Aliahmadi E. Effects of localized cryotherapy on the severity of thoracic pain in patients undergoing coronary artery bypass grafting. Med-Surg Nurs J. 2016;5(1).
12. Vahedian-Azimi A, Ebadi A, Jafarabadi MA, Saadat S, Ahmadi F. Effect of massage therapy on vital signs and gcs scores of ICU patients: A randomized controlled clinical trial. Trauma Mon. 2014; 19: e17031. doi:10.5812/traumamon.17031 PMid:25337518 PMCid:PMC4199295
13. Lindquist R, Tracy MF and Snyder M. Complementary & alternative therapies in nursing. 2018: Springer Publishing Company. doi:10.1891/9780826144348
14. Trail-Mahan T, Mao CL and Bawel-Brinkley K. Complementary and alternative medicine: nurses' attitudes and knowledge. Pain Manag Nurs. 2013. 14(4): 277-286. doi:10.1016/j.pmn.2011.06.001 PMid:24315251
15. Cutshal S, Derscheid D, Miers AG, Ruegg S, Schroeder BJ, Tucker S, Wentworth. Knowledge, Attitudes and use of Complementary and alternative Therapies among Clinical Nurse Specialists in an Academic medical center. Clin Nurs Spec. 2011; 24(23):125-131. doi:10.1097/NUR.0b013e3181d86cd1 PMid:20404620
16. Yeke Fallah L, Azimian J, Aghae F, Alipour Heidari M, Hasandoost F. Effect of hand tactile stimulation on the vital signs of brain injury patients hospitalized in Qazvin intensive care units, Iran. J Qazvin Univ Med Sci. 2018; 22(4): 13-21. doi:10.29252/qums.22.4.13
17. Song HJ, Son H, Seo HJ, Lee H, Choi SM, Lee S. Effect of self-administered foot reflexology for symptom management in healthy persons: A systematic review and meta-analysis. Complement Ther Med. 2015; 23: 79-89. doi:10.1016/j.ctim.2014.11.005 PMid:25637156
18. Fakhr-Movahedi A, Nobahar M, Bolhasani M. The effect of touch on the vital signs of agitated patients undergoing mechanical ventilation: an interventional study. J Urmia Nurs Midwifery Fac. 2015; 12(10): 899-897.
19. Shakouri M, Nourozi K, and Mohammadi F. The effect of cold therapy for the management of pain associated with deep breathing and coughing in patients undergoing open heart surgery in RAJAI cardiovascular hospital. Iran J Rehabil Res. 2015; 1(2): 33-41.
20. Ebrahimi Rigi H, Feizi A, Abdollahimohammad A, Ebrahimi Rigi Tanha Z. Effect of cold therapy on the pain of deep-breathing and coughing in patients after coronary artery bypass grafting. Der Pharm Lett. 2016; 8(10): 201-205.
21. Bahramnezhad F, Sylani Kh ,ShokatiAsl A , Haghani H, Navab E. The Effect of Foot Reflexology on Fatigue, Pain and Physiological Parameters in Patients after Coronary Angiography. Nurs J Vulnerable. 2019; 6 (20): 1-15.
22. Khoshtarash M, Ghanbari A, Yeganeh MR, Kazemnejad E, Reza Soltani P. Effect of foot reflexology on pain and physiological parameters after cesarean section. Koomesh. 2012; 14: 109-116.
23. Moghimi Hanjani S, Mehdizadeh Tourzani Z, Tajvidi M, Baheri B, Leilabadi Asl MP. Effect of localized cold treatment modality on pain intensity during labor in primiparous women. Iran J Obstet Gynecol Infertil. 2018; 21(5): 14-21. doi: 10.22038/ijogi.2018.11381
24. Zgavc T, Ceulemans AG, Hachimi-Idrissi S, Kooijman R, Sarre S, Michotte Y. The neuroprotective effect of post ischemic brief mild hypothermic treatment correlates with apoptosis, but not with gliosis in endothelin-1 treated rats. BMC Neurosci. 2012; 13: 105. doi:10.1186/1471-2202-13-105 PMid:22920191 PMCid:PMC3502503
25. Haji Hoseini F, Avazeh A, Elahi N, Shariati A, Sori H. The effect of massage on comatos patients' vital signs, hospitalized in intensive care units. J Arak Univ Med Sci. 2017; 9(3): 1-10.
26. Abdi S, Oshvandi K , Karampourian A , Moghimbaghi A , Homayonfar SH. The effect of foot massage on blood pressure and heart rate of CCU patients. J Urmia Nurs Midwifery Fac. 2016; 14(1): 47-55.
27. Azimian J, Abdi M, Moradi M, Alipour Heidari M, Yekeh Fallah L, Sheikhi MR. The effect of foot massage on the level of consciousness in comatose patients with brain injury hospitalized in intensive care unit (icu): a randomised control trial. J Knowl Health. 2015; 10(3): 25-30. doi: 10.22100/jkh.v10i3.692.
28. Mohammadpour A, Dehno Alian A, Mojtabavi SJ. The effect of foot reflexology massage on physiological parameters of patients with stroke. Nasim-Danesh. 2013; 20: 50-57.
29. Sayari S, Nobahar M, Ghorbani R. Effect of foot reflexology massage on physiological indices in patients with acute myocardial infarction. Koomesh. 2018; 20(3): 469-477.
30. Demir Y, Khorshid L. The effect of cold application in combination with standard analgesic administration on pain and anxiety during chest tube removal: a single-blinded, randomized, double-controlled study. Pain Manag Nurs. 2010; 11(3): 186-196. doi:10.1016/j.pmn.2009.09.002 PMid:20728068
31. Khalkhali HR, Ebrahimi Rigi Z, Feizi A, Salehi SH, Salmanzadeh HR, Bazdar P. The effect of applying cold get pack on the anxiety of sternal incision associated with deep breathing and coughing in coughing in cardiac surgery patients. J Urmia Nurs Midwifery Fac. 2013; 11(3): 225-230.

Cite this article as:

Miri A, Roshanzadeh M, Masoudi R, Kheiri S, Tajabadi A, Davoodvand S. Comparison of the effects of local cold therapy and hand and foot massage on blood pressure in post-operative patients. Novel Clin Med. 2023;2(1):24-31. doi:10.22034/NCM.2023.380439.1060