

The Effect of Whole Body Massage on the Process and Physiological Outcome of Trauma ICU Patients: A Double-Blind Randomized Clinical Trial

MASOUD HATEFI¹, MOLOUK JAAFARPOUR², ALI KHANI³, JAVAHER KHAJAVIKHAN⁴, TALEB KOKHAZADE⁵

ABSTRACT

Background and Aim: Hospitalization of traumatic patients in the Intensive Care Unit (ICU) and their critical condition can cause haemodynamic instabilities and deterioration in the level of consciousness. The study aimed to investigate the effect of whole body massage on the vital signs, Glasgow Coma Scale (GCS) scores and arterial blood gases (ABG) in trauma ICU patients.

Materials and Methods: In a randomized, double-blind trial, 108 trauma ICU patients received whole body massage {experimental group (n=54)}, or routine care {control group (n=54)}. The patients vital signs; systolic blood pressure (SBP), diastolic blood pressure (DBP), respiratory rate (RR), pulse rate (PR), Temperature (T), GCS score and ABG parameters were measured by a nurse at the same time in both groups before the intervention and 1 hour and 3 hours after the intervention

with a checklist. The patient in experimental group received full body massage in 45 minute by a family member.

Results: According to the findings, significant differences were observed between experimental and control groups in SBP 1 hour and 3 hours after intervention ($p < 0.001$), DBP, RR and PR 1 hour after intervention ($p < 0.001$) and GCS 1 hour and 3 hours after intervention ($p < 0.05$). Of ABG parameters, significant differences were observed between experimental and control groups in O_2 saturation ($p < 0.001$), PH ($p < 0.001$) and pO_2 ($p < 0.05$). No significant differences between experimental and control groups in Temperature, pCO_2 and HCO_3 ($p > 0.05$).

Conclusion: With respect to this study, massage therapy is a safe and effective treatment in intensive care units to reduce patient's physical and psychological problems. Therefore the use of massage therapy is recommended to clinical practice as a routine method.

Keywords: GSS, Massage Therapy, Vital Signs

INTRODUCTION

Traumatic patients, who are critically ill and need special care in 24 hour, are hospitalized in the ICU [1]. Hospitalization in the ICU, pain, anxiety, stress, long term disability, and fear of death and from an unknown environment can cause haemodynamic instabilities such as increased blood pressure (BP), PR, RR and deterioration of GCS scores [2]. Researches indicated that 13.9% ICU mortality rate was due to physiological parameters alteration [1].

The ICU environment is a multiple experience for each patient, because anxiety due to the nature of the around and their medical or surgical condition. Patients in ICU and patients undergone heart surgery, such patients are anxious [3,4]. Over 70% of ICU patients experience anxiety. In studies of patient experiences in ICU, difficulty sleeping, pain and anxiety were most problems [5]. Anxiety in these situations causes agitation, affecting nervous system, catecholamine release, cause dysrhythmias, increased basal metabolic rate, changes in vital signs, myocardial ischemia, detrimental at a psychological level, heart failure, delirium, delay in recovery of injuries and infections, decreases physical well-being and sleep and lead to a prolonged hospitalization of the patient in critical care and finally may leads to death [4,6-8].

Today, alternative and complementary therapies such as reflexology, relaxation, herbal medicine, hypnosis, music therapy, guided imagery, therapeutic touch, and therapeutic massage have been used to decrease the mentioned side effects [2]. Massage therapy is one of the most common complementary treatment methods [9,10]. Previous research reported the effects of massage on reduced anxiety and pain of patients with cardiovascular surgeries, stroke, constipation and hand pain [4, 11]. Providing health care with high quality for the patients in ICU and care planning by nurses or physicians in these patients is necessary. Therefore, the purpose of

this study was to evaluate the effect of massage therapy by patient's relative on physiological outcome (vital signs, GCS and ABG) of ICU patients.

MATERIALS AND METHODS

This is an experimental study that was performed at the trauma ICU of the Imam Khomeini Hospital in Ilam University of Medical Sciences (western Iran), during the January to October 2014. The study design was approved by the Institutional Committee of Ethics Practice of our institution, and informed consent was obtained from all samples. The sample size was calculated using a pilot study with 15 patients and 15 patients' relative or family members and the following formula:

$$n = (Z_1 - \alpha/2 + Z_1 - \beta)(\delta_1^2 + \delta_2^2) / (X_1 - X_2)^2 = 54$$

$$Z_1 - \alpha/2 = 1.96, Z_1 - \beta = 0.84, \delta_1 = 5, \delta_2 = 6, X_1 - X_2 = 3$$

In a randomized, double-blind trial 54 patients and 54 family members were placed in the experimental group and equal numbers were selected for the control group. Patients were randomly selected by convenience sampling from the record list of the ward at our institution. The inclusion criteria included; length of stay more than 7 days of hospitalization, GCS of 7-12, haemodynamic stability, without mental disorder, without infectious disease or hepatitis, known skin problem, intracranial pressure less than 20 mmHg, and no limitation or contraindication for changes of body position or body massage. The exclusion criteria were the loss of consciousness, having recently cardiac arrest. After training of family members they were allowed to massage the patient. In the intervention group, massage therapy was done by one of the patient's family during a 45 minute session. The control group received the routine care of the unit and no intervention was provided for the control group.

The method of massage was whole body massage. Deltoid muscles, arms, back, shoulder, thighs, palms and fingers, front and posterior parts of the legs, forearms, belly and chest, front and back of feet, auxiliaries and neck muscles of the patients were massaged.

The vital signs (BP, RR, PR and Temperature), GCS score and ABG were measured similarly in intervention and control groups. The data collection tool consisted of two parts. The first part included demographic data (age, sex, marital status, occupation, patient's education and medical diagnosis). The second part included a checklist to record the patient's vital signs (DBP, SBP, T, PR and RR), GCS score and ABG. All data were recorded in both groups before the intervention, 1 hour and 3 hours after the intervention by a nurse.

STATISTICAL ANALYSIS

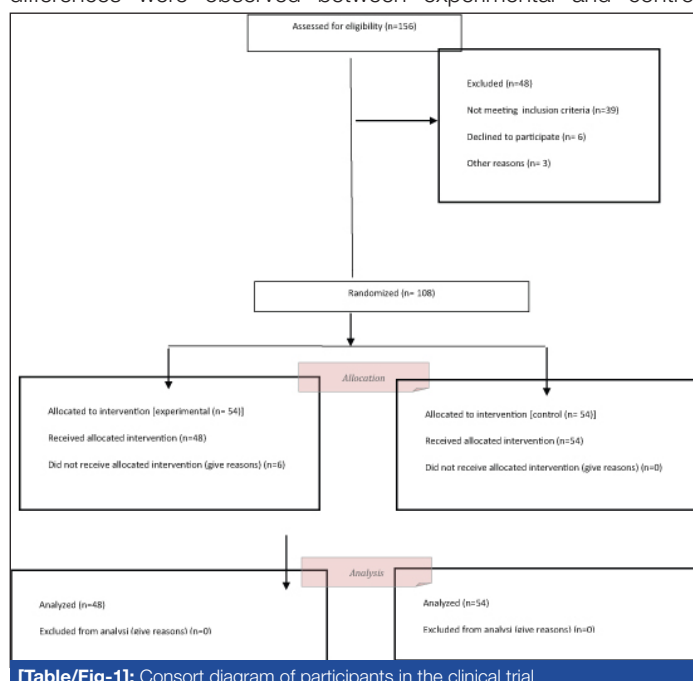
All statistical analyses were done using SPSS, version 16. Categorical data were expressed as percentages. Values are presented as the mean \pm SD. Using the Kolmogorov – Smirnov test, the data distribution was normal and used the parametric method. One-way ANOVA, the independent t-test and paired t-test were used to compare parametric scores. A value of $p < 0.05$ was considered significant.

RESULTS

Six subjects from experimental group were excluded due to exclusion criteria [Table/Fig-1]. None of the control group was excluded. No significant differences were observed between experimental and control groups in demographic variables ($p > 0.05$) [Table/Fig-2].

The parameters of study before intervention was matched in both groups ($p > 0.05$) [Table/Fig-3-5]. The significant differences were observed between experimental and control groups in SBP 1 hour and 3 hours after intervention ($p < 0.001$), DBP, RR and PR 1 hour after intervention ($p < 0.001$) [Table/Fig-3] and GCS 1 hour and 3 hours after intervention ($p < 0.05$) [Table/Fig-5]. Of ABG parameters, significant differences were observed between experimental and control groups in O_2 saturation ($p < 0.001$), PH ($p < 0.001$) and pO_2 ($p < 0.05$) [Table/Fig-4].

According to results significant differences were not observed between experimental and control groups in DBP, RR and PR in 3 hours after intervention ($p > 0.05$) [Table/Fig-3,5]. No significant differences between experimental and control groups in temperature ($p > 0.05$) [Table/Fig-3]. Of ABG parameters, significant differences were observed between experimental and control



[Table/Fig-1]: Consort diagram of participants in the clinical trial

Parameter	Experimental (n=48)	Control (n=54)	p-value
Age (mean \pm sd)	35.2 \pm 11.5	34.9 \pm 10.8	$p > 0.05$
Sex, male [n(%)]	36 (75%)	39(72%)	$p > 0.05$
Married [n(%)]	31(64%)	33(61%)	$p > 0.05$
Employment [n(%)]	26(54%)	28(51%)	$p > 0.05$
Medical diagnosis (Multiple Trauma)	41(85%)	48(88%)	$p > 0.05$
Education	45(93.7%)	52(96.2%)	$p > 0.05$

[Table/Fig-2]: Demographic characteristics of the patients

groups in O_2 saturation ($p < 0.001$), PH ($p < 0.001$) and pO_2 ($p < 0.05$). No significant differences between experimental and control groups in pCO_2 and HCO_3 ($p > 0.05$) [Table/Fig-4].

DISCUSSION

The ICU is a critical ward of hospital and patients experience high anxiety from this environment. Factors such as pain, long term disability, fear of death are the reasons of anxiety in hospitalized patients [4]. Previous study showed that patient anxiety in ICU result in agitation, increased blood pressure, heart rate, respiration rate, the patient's verbalization, and restlessness [5,12]. Our result showed that whole body massage therapy reduces SBP in 1 hour and 3 hours after intervention, DBP, RR and PR in 1 hour after intervention, and increases the level of consciousness that is consistent with previous studies [1,2,13-17].

In discussing the effect of massage on the vital signs Conflicting results exist. Hajhosseini et al., found that massage can positively affect on vital signs of patients admitted in ICU [15]. Combron et al., showed that massage therapy can decrease systolic blood pressure and increase diastolic blood pressure [14]. Wang et al., conclude that foot and hand massage can decrease the pain and reduce the heart rates and respiration, however not significantly affect on blood pressure [18]. As a result of the Holland and Pokorny showed that massage can significantly reduce the heart rates, respiration rates as well as the systolic and diastolic blood pressures [19]. However, some study reported that massage has no effect on physiological parameters such as blood pressure, pulse rate and respiration [4]. Conflicting results of previous studies with the present study may be due to the type and duration of the massage.

Mechanism of parasympathetic activation following whole body massage reduce physiological responses [2]. The mechanical effects of massage is to improve circulation, increase blood flow to a given area, remove waste products from the body, improve joint mobility, relieve pain and reduce muscle tension. It has psychological benefits such as release of energy and fatigue reduction, relaxation and it improves sense of well-being and endorphins may be secreted. Cortisol and epinephrine are decreased. Consequently vessels get dilated, the blood flow increases within the superficial vessels of body and blood pressure reduces [1,13,20]. The massage increases the pressure in tissues. Then, the gradient of pressure between the tissues and vessels will increase, and it facilitates the movement of liquids between tissues and vessels and vice versa. Such movement adjusts physiological criteria such as blood pressure. On the other hand, massage may distract the patient and consequently reduce his anxiety that can finally decrease blood pressure and pulse rate [4].

The strength of our study was the measurement of the ABG, which was not done in previous studies. We found that significantly, O_2 saturation, PH and pO_2 after massage therapy in experimental group increased. No significant differences between experimental and control groups in pCO_2 and HCO_3 . Kaur et al., found that foot massage and reflexology significant improvement oxygen saturation level that is consistent with present study [1].

Recently the use of family members of patients as partners in nursing care and family-centered care recommended [2]. Involvement of

Outcome	group	Before intervention		1 hour after intervention		3 hours after intervention	
		Mean±sd	p- value	Mean±sd	p-value	Mean±sd	p-value
SBP	Experimental	127.56±11.85	0.6*	117.61±7.60	<0.001**	115.05±7.70	<0.001**
	Control	126.44±11.43		126.17±9.90		125.75± 8.30	
DBP	Experimental	75.31± 3.86	0.5*	73.31± 8.25	<0.001 **	74.78± 7.40	0.2*
	Control	75.67± 4.51		75. 43± 9.56		75.67± 7.32	
RR	Experimental	17.12±3.74	0.5*	15.85±3.45	<0.001**	17.04± 4.50	0.3*
	Control	17.94± 3.72		17.11± 2.56		17.68± 2.80	
PR	Experimental	77.62± 9.34	0.3*	71.70± 7.54	<0.001**	76.21±6.37	0.4*
	Control	78.21± 8.16		78. 38±6.87		77.97± 7.52	
Temperature	Experimental	37.89± 0.91	0.8*	37.19± 0.31	0.5*	36.93± 0.28	0.6*
	Control	37.13±0.78		36.93±0.38		37.13±0.38	

[Table/Fig-3]: Outcome parameter of vital signs before and after of intervention
 *** p< 0.05, **p< 0.001, * p>0.05

Outcome	group	Before intervention		1 hour after intervention	
		Mean±sd	p-value	Mean±sd	p-value
O ₂ saturation	Experimental	95.80± 4.50	0.9*	98.47±1.63	<0.001**
	Control	95.38±3.90		94.54±4.06	
PH	Experimental	7.42±0.02	0.9*	7.45±0.02	<0.001**
	Control	7.41±0.03		7.42±0.02	
PCO ₂	Experimental	39.04±6.71	0.7*	36.66±5.71	0.09*
	Control	38.64±6.91		38.12±6.96	
PO ₂	Experimental	135.86±71.29	0.9*	164.01±55.18	0.01***
	Control	134.52±67.43		135.50±71.95	
HCO ₃	Experimental	25.89±3.69	0.9*	25.87±2.67	0.9*
	Control	25.81± 3.78		25.81±3.8	

[Table/Fig-4]: Outcome parameter of ABG before and after of intervention
 *** p< 0.05, **p< 0.001, * p>0.05

Outcome	group	Before intervention		1 hour after intervention		3 hours after intervention	
		Median	p- value	Median	p-value	Median	p-value
GCS	Experimental	10	0.23*	11	0.01***	12	0.01***
	Control	10		10		10	

[Table/Fig-5]: GCS score before and after of intervention
 *** p< 0.05, **p< 0.001, * p>0.05

family members as one of the most important clinical considerations for all hospitalized patients in the ICU, are excellent factor. In the present study due to critical condition of ICU the massage therapy was carried out in one session which was the limitation of this study.

CONCLUSION

To conclude, complementary approaches, such as massage therapy significantly decrease SBP, DBP, RR, PR and increases the level of consciousness can be used in intensive care units to reduce patients' physical and psychological problems. Therefore, the use of massage therapy is recommended to clinical practice as a routine method. The further research is needed for the effect of massage therapy on factor of ABG.

ACKNOWLEDGMENT

This study was supported by the Ilam University of Medical Sciences. We thank Ilam University of Medical Sciences, participants, coordinators, and data reviewers who assisted in this study.

REFERENCES

- [1] Kaur J, Kaur S, Bhardwaj N. Effect of 'foot massage and reflexology' on physiological parameters of critically ill patients. *Nursing and Midwifery Research Journal*. 2012;8(3):223-33.
- [2] Vahedian-Azimi A, Ebadi A, Asghari Jafarabadi M, 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(3):19-25.
- [3] Rymaszewska J, Kiejna A, Hadry T. Depression and anxiety in coronary artery bypass grafting patients. *European Psychiatry*. 2003;18(4):155-60.
- [4] Adib-Hajbaghery M, Abasi A, Rajabi-Beheshtabad R. Whole body massage for reducing anxiety and stabilizing vital signs of patients in cardiac care unit. *MJIR* 2014;28(47):1-9.
- [5] Frazier SK, Moser DK, Riegel B. Critical care nurses' assessment of anxiety: Reliance on physiological and behavioral parameters. *Am J Crit Care*. 2002;11:57-64.
- [6] Chen W, Liu G, Yeh S, Chiang M, Fu M, Hsieh Y. Effect of back massage intervention on anxiety, comfort, and physiologic responses in patients with congestive heart failure. *J Alterna Complement Med*. 2013;19:464-70.
- [7] Abu Ruz ME, Lennie TA, Moser DK. Effects of β-blockers and anxiety on complication rates after acute myocardial infarction. *Am J Crit Care*. 2011;20:67-73.
- [8] Hayes JA, Cox C. Immediate effects of a five-minute foot massage on patients in critical care. *Complement Therapies Nurs Midwifery*. 2000;6(1):9-13.
- [9] Smith CA, Collins CT, Cyna AM, Crowther CA. Complementary and alternative therapies for pain management in labour. *Cochourane Database Syst Rev*. 2006(4):CD003521.
- [10] Sherman KJ, Cherkin DC, Kahn J, Erro J, Hourbek A, Deyo RA, et al. A survey of training and practice patterns of massage therapists in two US states. *BMC Complement Altern Med*. 2005;5:13.
- [11] Denise Oliveira D, Hachul H, Tufik S, Bittencourt L. Effect of massage in postmenopausal women with insomnia – A pilot study. *Clinics*. 2011;66(2):343-46.
- [12] Moeini M, Sadat Kahangi L, Valiani M, Heshmat R. The effect of reflexotherapy on patients' vital signs before coronary artery bypass graft surgery. *IJNMR*. 2011;16(1):8-12.
- [13] Hajbaghery MA, Abasi A, Beheshtabad RR, Fini A. The Effects of Massage Therapy by the Patient's Relative on Vital Signs of Males Admitted in Critical Care Unit. *Nursing and Midwifery Study*. 2012;1(1):16-21.
- [14] Cambron JA, Dexheimer J, Coe P. Changes in blood pressure after various forms of therapeutic massage: a preliminary study. *J Altern Complement Med*. 2006;12(1):65-70.

- [15] Hajhosseini F, Avazeh A, Elahi N, Shariati A, Sour H. The effect of massage on comatos patients' vital signs, hospitalized in intensive care units. *Arak Uni Med Sci J*. 2006;9(3):26-35.
- [16] Meftahi N, Bervis S, Taghizadeh S, Ghafarinejad F. The Effect of Lying in Prone Position on Blood Pressure and Heart Rate with and without Massage. *JRSR*. 2014;1(2):40-43.
- [17] Won JS, Jeong IS, Kim KS. Effect of foot reflexology on vital signs, General Fatigue and wound in cancer patient receiving chaemotherapy. *J Korean Acad Nurse*. 2002;(1):16-26.
- [18] Wang HL, Keck JF. Foot and hand massage as an intervention for postoperative pain. *Pain Manag Nurs*. 2004;5(2):59-65.
- [19] Holland B, Pokorny ME. Slow stroke back massage: its effect on patients in a rehabilitation setting. *Rehabil Nurs*. 2001;26(5):182-86.
- [20] Hasankhani H, Ghaderi F, Lakdzaji S, Nahamin M. The effect of the Slow-Stroke back massage on fatigue of dialyzed patients. *International Research Journal of Applied and Basic Sciences*. 2013;4(10):3004-08.

PARTICULARS OF CONTRIBUTORS:

1. Neurosurgeon, Department of Neurosurgery, Medicine Faculty, Ilam University of Medical Science, Ilam, IR-Iran.
2. MSc of Midwifery, Department of Midwifery, Nursing & Midwifery Faculty, Ilam University of Medical Science, Ilam, IR-Iran.
3. MSc in Nursing, Department of Nursing, Nursing & Midwifery Faculty, Ilam University of Medical Science, Ilam, IR-Iran.
4. Anaesthesiologist, Medicine Faculty, Ilam University of Medical Science, Ilam, IR-Iran.
5. MSc in Nursing, Department of Nursing, Nursing & Midwifery Faculty, Ilam University of Medical Science, Ilam, IR-Iran.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Ali Khani,
Nursing & Midwifery Faculty, Department of Nursing, Ilam University of Medical Science, Ilam, IR-Iran.
E-mail : nimakhani@gmail.com

Date of Submission: **Dec 29, 2014**

Date of Peer Review: **Apr 07, 2015**

Date of Acceptance: **Apr 15, 2015**

Date of Publishing: **Jun 01, 2015**

FINANCIAL OR OTHER COMPETING INTERESTS: None.